TEXAS A&M UNIVERSITY

IFRB 2021

Interdisciplinary Faculty of Reproductive Biology

Confronting and solving challenges to reproduction and health by conducting basic, clinical and translational research, and shaping science and health policy

2021, ISSUE 1

POINTS OF INTEREST:

- The IFRB was organized in 1992 and is one of the largest Reproductive Biology Programs in the US
- Membership includes 39 faculty from 9 departments, 4 colleges and 2 system components
- IFRB sponsored activities: 25th Annual R.O. Berry Lecture, 26 year old IFRB Repro Forum Seminar Series, 25th Texas Forum on Reproductive Sciences, Annual IFRB Retreat

INSIDE THIS ISSUE:

New IFRB Faculty Spotlight

***Dr. Becky Poole** is an Assistant Professor within the Department of Animal Science at Texas A&M University. Dr. Poole is from eastern North Carolina and received a B.S. in Animal Science from NC State University in 2014. She moved to Blacksburg, Virginia and received her M.S. in Animal and Poultry Sciences from Virginia Tech in 2016 under the mentorship of Dr. Shelly Rhoads. Dr. Poole returned to NC State and received her Ph.D. in Animal Science in 2019 under the mentorship of Dr. Dan Poole (no relation). During her time at NC State, she received accolades for both her research and teaching efforts. In 2018, she was instructor of record for the Reproductive Physiology laboratory course and received the departmental Graduate Student Award in Teaching. In 2019, she received the departmental Graduate Student Award in Research and the College of Agriculture and Life Sciences Kenneth R. Keller Award for excellence in doctoral dissertation research. From 2019 to the summer of 2021, she was a Postdoctoral Research Associate in Dr. Ky Pohler's laboratory. During this time, she was awarded a USDA-AFRI Postdoctoral Fellowship focusing on the relationship between hormonal and immunological changes and the microbiome of the reproductive tract in beef cattle. She also received the American Society of Animal Science (ASAS) Southern Section – Emerging Young Scholar Award in 2020.

In September 2021, Dr. Poole transitioned to her current role as an Assistant Professor in the Department of Animal Science. Research in her lab seeks to better understand biological mechanisms that are associated with reduced fertility in domestic livestock species (e.g., beef and dairy cattle, pigs, and sheep), specifically pertaining to how factors such as metabolic disorders, immune function and/or environmental factors contribute to reproductive failure. The long-term goal of this research is to optimize fertility in livestock species to thus improve the sustainability and profitability of the animal production industry. Currently, her most recent research has focused on: 1) the relationship between uterine bacterial communities and cytokine concentrations prior to insemination, and 2) the influence of reproductive hormones (progesterone [P4] and estradiol [E2]) on uterine bacterial communities.

The immunological environment of the reproductive tract is most often associated with postpartum uterine disease in dairy cattle; however, the immune system also plays a critical role in healthy cattle for normal reproductive functions such as the development and maintenance of pregnancy. Cytokines serve as the communicators of the immune system and aid to regulate the local immune environment by the secretion of pro- and anti-inflammatory cytokines. In healthy cattle, the uterus will experience a steady decrease in pro-inflammatory cytokines, such as interleukin (IL)-1b and IL-6, and an increase in anti-inflammatory cytokines, such as IL-10 and transforming growth factor beta (TGF-β), during the postpartum period leading up the insemination. In some of Dr. Poole's postdoctoral work, she wanted to investigate the relationship between pro- and anti-inflammatory cytokines and bacterial communities within the uterus of postpartum beef cattle and determine the potential effects of the local immune environment on fertility. She demonstrated that concentrations of the anti-inflammatory cytokine, TGF-β, was elevated both 21 and 2 days prior to artificial insemination (AI) in cattle that were able to establish a pregnancy (Pregnant) versus those that were unable to establish a pregnancy (***Open; Figure 1A, see page 2***). Moreover, the bacterial genus, Ureaplasma spp., was positively correlated with uterine TGF-β concentrations 2 days prior to AI in Pregnant cows. Previous studies have shown that an abundance of Ureaplasma spp. in the uterus prior to AI is associated with establishment of pregnancy in both beef and dairy cattle. Additionally, concentrations of the pro-inflammatory cytokine, IL-6, was reduced in resulting

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TEXAS A&M UNIVERSITY

IFRB New Faculty Spotlight (cont'd from page 1)

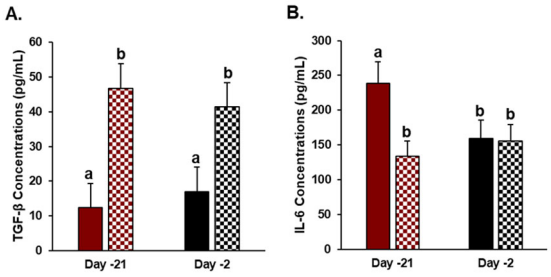

Figure 1. (A) Concentrations of uterine TGF-β on 21 and 2 days prior to AI in resulting pregnant (checkered bars) and open cows (solid bars). (B) Concentrations of uterine IL-6 on 21 and 2 days prior to AI in resulting pregnant and open cows (Figures adapted from Poole et al., Front. Anim. Sci. 2021; 2:704714).

pregnant cows 21 days prior to AI when compared to resulting open cows (***Figure 1B***). Ultimately, results from this study suggest that an anti-inflammatory uterine environment appears to be correlated with the presence of bacterial species that are associated with successful establishment of pregnancy in cattle. Future studies in Dr. Poole's lab will continue to investigate the relationship between uterine bacterial communities and a wider range of cytokines utilizing a multiplex cytokine array in postpartum beef cattle.

In 2020, Dr. Poole received a USDA-AFRI Postdoctoral Fellowship and conducted research investigating the influence of endogenous P4 and E2 concentrations on uterine bacterial communities in beef heifers. The relation between circulating concentrations of P4 and E2 prior to insemination play a key role in optimizing fertility in cattle. Specifically, reduced fertility has been associated with low P4 concentrations (1 to 3 ng/mL) and the persistence of a large follicle prior to insemination. Previous data from the Pohler lab identified that uterine bacterial communities undergo rapid changes throughout an estrous synchronization protocol, suggesting that hormonal concentrations (P4 and E2) may influence bacterial abundances over time. Therefore, Dr. Poole conducted a study in which beef heifers were synchronized (estrus: day 0) and classified into four groups based on the presence of a corpus luteum (CL) and P4 concentrations on day -2 and the presence of an ovulatory follicle and E2 concentrations on day 0: 1) High P4-High E2, 2) High P4-Low E2, 3) Low P4-High E2, and 4) Low P4-Low E2. When observing bacterial relative abundance by phylum in High P4-Low E2 heifers, the relative abundance of Actinobacteria significantly decreased from day -2 to day 0 and Tenericutes increased from day -2 to day 0 (***Figure 2***).

There were no significant shifts by phylum for the other treatment groups. Additionally, High P4-Low E2 heifers displayed a decrease in relative abundance of bacteria within the genus Corynebacterium (within phylum Actinobacteria). However, Low P4-High E2 heifers had no differences in the relative abundance of Corynebacterium from day -2 to 0 but was significantly greater on day 0 compared to other treatment groups (***Figure 3***). Previous studies have indicated that an abundance of Corynebacterium in the uterus prior to AI has been previously associated with negative effects on fertility in beef cattle. Overall, these results indicate that differing concentrations of P4 and E2 appear to alter uterine bacterial communities, and this could ultimately impact fertility outcomes in beef cattle. Dr. Poole's lab will continue to explore various endocrine factors that are associated with shifts in uterine bacterial communities in cattle and how this could influence fertility outcomes.

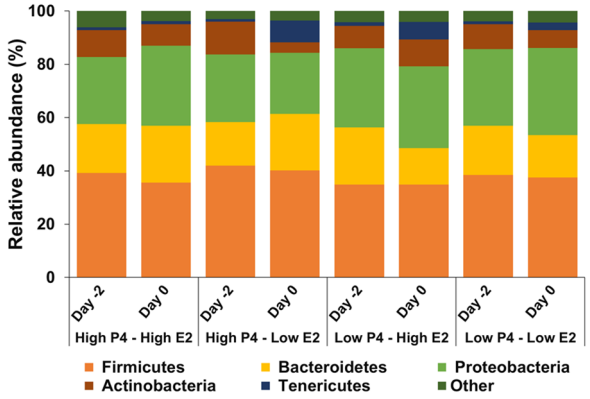

Figure 2. Impact of endogenous progesterone (P4) and estradiol (E2) concentrations on uterine phylum relative abundance.

To date, Dr. Poole has published 17 peer-reviewed manuscripts in journals including Journal of Animal Science, Theriogenology, and Animal Reproduction Science, 27 scientific abstracts, and 4 conference proceedings as a first author or co-author. Dr. Poole is excited for the opportunity to conduct research at Texas A&M University and looks forward to collaborating with numerous IFRB members. ***

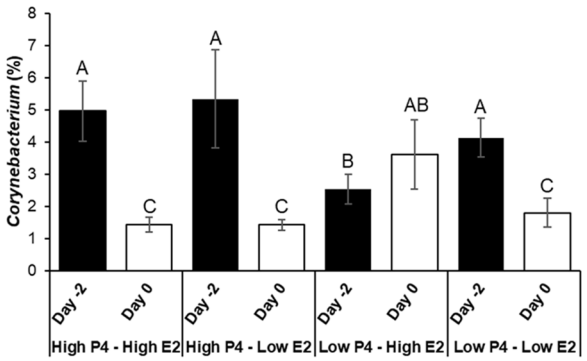

Figure 2. Impact of endogenous progesterone (P4) and estradiol (E2) concentrations on the relative abundance of the bacterial genus Corynebacterium.

SAVE THE DATE

27th Annual Texas Forum for Reproductive Sciences

April 7-8, 2022

Location: MD Anderson Onstead Auditorium, Houston Texas

Plenary Speakers: Swathi Arur, Ph.D., Department of Genetics, University of Texas MD Anderson Cancer Center

Stephanie Pangas, Ph.D., Department of Pathology, Baylor College of Medicine

Marie-Claude Hoffman, Ph.D., Program Chair

Chandra Yalampalli, Ph.D., Meeting Organizer

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IFRB Faculty Spotlight: Dr. Qinglei Li

***Dr. Qinglei Li is an Associate Professor in the Department of Veterinary Integrative Biosciences (VIBS). He is the Chair of the Interdisciplinary Faculty of Reproductive Biology and has served as the chair of the seminar committee of IFRB in the past**. Dr. Li received his Bachelor degree in Medicine at Bin Zhou Medical College and completed his Masters and Ph.D. training in Harbin Medical University, China. Before joining the faculty of Texas A&M University in 2011, Dr. Li worked as a postdoctoral associate at Michigan State University and Baylor College of Medicine. He has actively served the scientific community of the reproductive biology. He is currently an associate editor for Molecular Human Reproduction and a reviewing editor for Biology of Reproduction.

Dr. Li's long-term research goal is to identify the cellular and molecular basis of reproductive diseases, thereby contributing to a framework for the development of novel diagnostic and treatment strategies to improve the reproductive potential. His research focuses on understanding the mechanism underlying uterine development and the pathogenesis of gynecologic cancers. His laboratory has created novel mouse models that harbor genetic modifications of critical transforming growth factor β (TGFβ) signaling components using conditional loss-of-function and gain-of-function approaches. These models yield novel insights into the fundamental roles of TGFβ signaling in reproductive function & dysfunction.

Normal myometrial differentiation is critical for uterine function. Developmental defects in the myometrium are associated with reproductive disorders, such as implantation failure, preterm labor, and uterine rupture, some of which are severe causes of neonatal mortality and morbidity. Dr. Li's lab has focused on key components of TGFβ signaling pathway-the TGFβ type 1 and type 2 receptors (TGFBR1/TGFBR2) that are required for canonical TGFβ signaling. Dr. Li's work has shown that TGFβ signaling is indispensable for female fertility and myometrial integrity. His lab has further revealed that myometrial defects in TGFBR1 mice do not directly arise from the intrinsic deficiency in uterine smooth muscle cell differentiation, but are linked to impaired deposition of key extracellular matrix components and abnormal uterine cell migration during a critical time window of postnatal uterine development. Besides the myometrial defects, loss of TGFBR1 also causes altered epithelial cell proliferation, which culminates in endometrial hyperplasia, a premalignant lesion of endometrial carcinoma. Recent work from Dr. Li's group has revealed the functional equivalence between TGFBR1 and TGFBR2 in the female reproductive tract, lending support to an essential requirement for the two receptors in maintaining its developmental integrity.

To complement findings from the loss of function mouse model, Dr. Li's lab went on to develop a gain-of-function model to conditionally overactivated TGFBR1. It was found that constitutive activation of TGFBR1 in the mouse uterus leads to enlarged myometrial component, with impaired uterine gland formation in the endometrial stroma. Because normal endometrial differentiation is critical for uterine decidualization, Dr. Li's group has examined the decidual response of these mice and found that decidualization is compromised in mice harboring constitutively active TGFBR1 in the uterus. The findings suggest that the changes of the expression of genes encoding matrix proteins, integrins and smooth-muscle filament proteins upon TGFBR1 overactivation alter the matrix properties, creating a roadblock for uterine gland branching/formation.

TGFβ signaling is involved not only in uterine physiology, but also in endometrial pathology. Although a role of TGFβ signaling in endometrial cancer has long been proposed, yet the exact function of TGFβ signaling in endometrial carcinogenesis remains unknown. To answer this question, Dr. Li's group has conditionally ablated TGFBR1 in PTEN-inactivated uterine epithelial cells using progesterone receptor Cre recombinase, thereby creating a mouse model with simultaneous loss of TGFBR1 and PTEN in the uterus (termed $Pten^{d/d}$; $Tgfbr1^{d/d}$). These efforts have unveiled a tumor suppressive function of TGFBR1-mediated signaling in the uterus. More importantly, these studies unmask a role of TGFβ signaling in controlling the production of pro-inflammatory chemokines including CXCL5 and CCL2 and tumor metastasis (Fig. 1).

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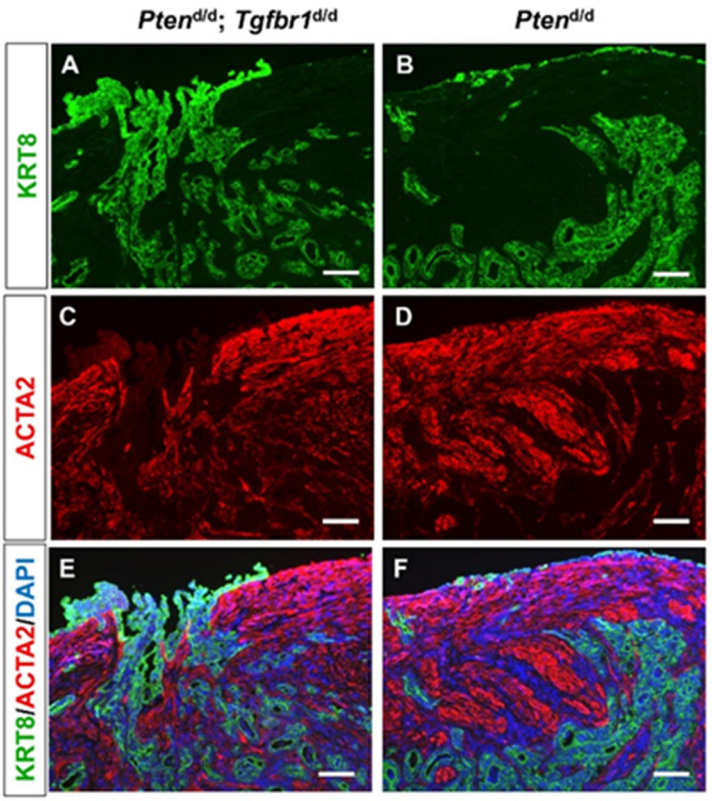


Figure 1. Loss of TGFBR1 promotes myometrial invasion. (A-F) Double immunofluorescence of KRT8 and ACTA2 using uteri of $Pten^{d/d}$; $Tgfbr1^{d/d}$ and $Pten^{d/d}$ mice. Severe myometrial invasion/disruption was found in a 7-week-old $Pten^{d/d}$; $Tgfbr1^{d/d}$ mouse compared with a 9-week-old $Pten^{d/d}$ mouse. Note the endometrial cancer cells invaded through the myometrial wall in $Pten^{d/d}$; $Tgfbr1^{d/d}$ mice. DAPI was used to counterstain nuclei.

Faculty Spotlight, Dr. Qinglei Li cont'd from page 3)

As Pten$^{d/d}$; Tgfbr1$^{d/d}$ mice develop pulmonary metastasis, they may serve as a better model for human endometrial cancer which frequently shows distant organ metastasis. This mouse model may be valuable for preclinical testing of new drugs that target the metastasis in endometrial cancer, the most common gynecologic cancer.

Another area of interest is to understand the etiology of ovarian granulosa cell tumors (GCTs). Ovarian GCTs are the major type of sex cord-stromal tumors that consist of adult and juvenile subtypes. While the 5-year survival rate in stage I patients is relatively high, poor prognosis is associated with advanced-stage tumors. The poorly defined etiopathology of ovarian GCTs represents a significant knowledge gap, preventing the development of an effective therapeutic strategy to combat these tumors. Dr. Li's group has shown that overactivation of TGFBR1 in the mouse ovary provokes the development GCTs that phenocopy the histological, hormonal, and molecular characteristics of human GCTs (Figure 2).

GCTs can also occur in the testes of men with a very low incidence. Recent work in Dr. Li's lab has revealed the formation of testicular GCTs upon sustained activation of TGFBR1. The findings indicate that TGFβ signaling activation is a potent driver of GCTs, irrespective of the sex origin. In the future, these preclinical mouse models will be harnessed to uncover new opportunities for the treatment of GCTs. Because TGFβ signaling regulates cancer development in multiple systems, findings from these studies may help discover a common route for tumorigenesis.

A new research area in Dr. Li's lab is to investigate how TGFβ signaling interacts with epigenetic mechanisms to orchestrate uterine development and function. While the Waddington epigenetic landscape portrays the cell fate determination during development, key developmental events governed by epigenetic modifications in the uterus remain poorly understood. Endeavors in this field are expected to inform new strategies to treat female infertility and pregnancy loss. ***

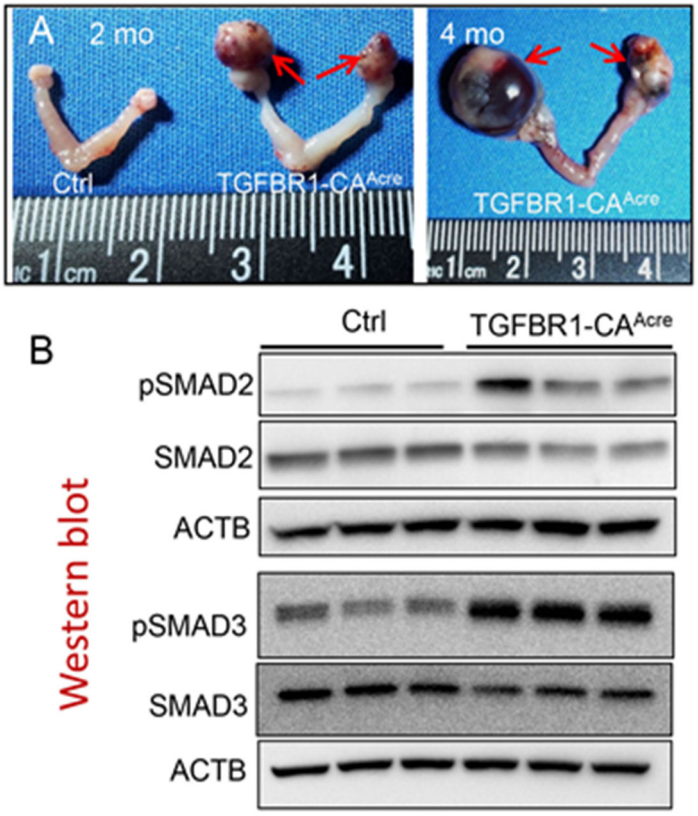


Figure 2. Constitutively active TGFBR1 in the mouse ovary promotes ovarian tumor development. (A) Macroscopic images of ovarian tumors in TGFBR1-CA mice at 2 (n = 16) and 4 (n = 7) months of age. Arrows indicate ovarian tumors. (B) Enhanced SMAD2/3 signaling in GCT tissues. n = 3. ACTB was included as an internal control. Each lane in panel (B) represents an independent sample. Adapted from Gao et al., 2016.

Four IFRB Faculty Receive American Society of Animal Science Awards

***Dr. G. Cliff Lamb,** Professor and Head of the Department of Animal Science was the recipient of a 2021 American Society of Animal Science National Award as an ASAS Fellow: Research Category. His primary research efforts have focused on applied reproductive physiology in cattle emphasizing synchronization of estrus in replacement heifers and postpartum cows.

***Dr. Reinaldo F. Cooke,** Associate Professor in the Department of Animal Science was the 2021 recipient of the Animal Growth and Development National Award recognized by the American Society of Animal Science and sponsored by DSM Nutritional Products for his internationally recognized academic program with a specific emphasis on growing Bos taurus and B. indicus cattle and accomplishments leading to the discovery, dissemination, and application of knowledge in cattle growth/development in the US and the world.

***Dr. Ky G. Pohler**, Assistant Professor in Department of Animal Science was the 2021 recipient of the Early Career Achievement National Award from the American Society of Animal Science and sponsored by the ASAS Foundation. Dr. Pohler's research focuses on physiological and molecular mechanisms that control reproductive efficiency in cattle.

***Dr. Dr. Rodolfo Cardoso**. Associate Professor in the Department Animal Science was the 2021 recipient of the Outstanding Young Animal Scientist - Research from the American Society of Animal Science - Southern Section. He is nationally and internationally recognized for his research in reproductive neuroendocrinology.

IFRB Seminar Series, 2021

The IFRB Seminar Series, Reproductive Biology Forum, has been held during the Fall and Spring Semesters since 1990. The IFRB Seminar Series is coordinated by **Dr. Sakhila Banu**.

January 22, **Avery Kramer and Bryan McLendon**, Ph.D. Candidates, Department of Veterinary Integrative Biosciences, Texas A&M University."

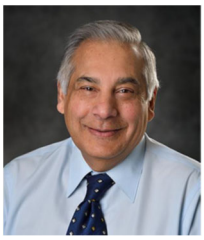
Porcine conceptuses utilize glucose and fructose to support development during the peri-implantation period of pigs" & "Pig conceptuses secrete IFN gamma to recruit T cells which enhance glycolytic metabolism within the hypoxic peri-implantation uterus."

January 29, **Melissa Pepling**, Ph.D., Professor, Department of Biology, Syracuse University, "Signaling Pathways Important for Formation of the Ovarian Reserve."

February 5, **Joan Jorgensen**, D.V.M., Ph.D., Associate Professor, School of Veterinary Medicine, "Vignettes on ovary & testis development: When the fetal problem becomes an adult problem".

February 12, **Megan G. Davey,** Sc.D., Group Leader Functional Genetics and Development, The Roslin Institute and R (D)SVS, College of Medicine and Veterinary Medicine, University of Edinburgh, UK, "Birds have dinosaur feet - Why counting toes matters."

February 26, **Joanne S. Richards,** Ph.D., Professor, Molecular and Cellular Biology Dan L Duncan Comprehensive Cancer Center, Baylor College of Medicine, "Androgens, AR and Theca Cell Function and Dysfunction: Is there a link to PCOS?"



March 5, **Asgi Fazleabas**, Ph.D., Department of Obstetrics, Gynecology & Reproductive Biology, Director, Center for Women's Health, Michigan State University, "NOTCH as a mediator of Endometriotic Lesion Development."

March 12, **Ulrike Luderer,** M.D., Ph.D., M.P.H., Director, Environmental Health Sciences Graduate Program, School of Medicine, University of California, Irvine. "Developmental origins of disease: Reproductive disorders caused by prenatal exposure to benzo[a]pyrene"

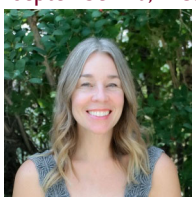
March 26, **Claire Stenhouse**, Ph.D., Postdoctoral Research Associate, Department of Animal Science Texas A&M University, "Mineral transport and metabolism at the ovine maternal-conceptus interface: New insights from bone."

April 9, **Heewon Seo,** Ph.D., Assistant Research Professor, Department of Veterinary Integrative Biosciences, Texas A&M University. "New insights into the histologic and metabolic basis for early placental development in pigs, sheep, cattle, and baboons."

April 23, **Soumen Paul**, Ph.D., Professor and Graduate Program Director, Department of Pathology & Laboratory Medicine, University of Kansas School of Medicine. "Molecular control of trophoblast progenitors and human placentation."

April 30, **Zelieann Craig,** Ph.D., Associate Professor, BIO5 Institute, School of Animal & Comparative Biomedical Sciences, University of Arizona. "Modeling human relevant phthalate exposures in mice."

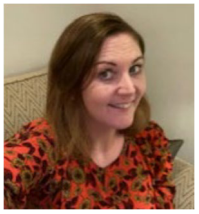
September 3, **Francesca E. Duncan**, Ph.D., Co-Director, Center for Reproductive Science, Assistant Professor, Department of Obstetrics and Gynecology, Feinberg School of Medicine, Northwestern University. "An old matrix: The multi -faceted role of hyaluronan in ovarian aging."



September 10, **Heather Burkin**, Ph.D., Assistant Professor, Department of Pharmacology, School of Medicine, University of Nevada, "Pathways to preterm birth: Regulation of uterine activation and contraction."

September 17, **Veena Taneja**, Ph.D., Associate Professor, Department of Immunology, Mayo Clinic, Rochester, Minnesota, "Pathways to preterm birth: Regulation of uterine activation and contraction."

September 24, **Joe (Huanyu) Qiao**, Ph.D., Assistant Professor, Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois at Urbana-Champaign. "One ring to rule them all: RNF212 is a bad memory for oocytes."



October 1, **Niamh Forde,** Ph.D., Associate Professor in Molecular Reproductive Biology, Faculty of Medicine and Health Sciences, University of Leeds, UK. "Understanding endometrial function for fertility, food, and health."

October 8, **S. Ramasmy,** M.D., CEO Heal Your Heart (Vaso-Meditech EECP centers), Chennai, Tamil Nadu, India. "Enhanced external counter pulsation (EECP): From concept to application."

October 15, 26th **IFRB Retreat and 14th Dr. Raymond O. Berry Memorial Lecture**. (see page 11)

(Seminar series, continued on page 6)

Texas Forum for Reproductive Sciences

***The 26th Annual Texas Forum for Reproductive Sciences regional reproductive biology meeting was hosted by Baylor College of Medicine, Texas A&M University, and The University of Texas at San Antonio on April 17-18, 2021.**

TFRS was established in 1995 to encourage the exchange of scientific knowledge and collaborations among scientists in Texas in the area of female reproduction. Several years later, this cooperative group expanded to include male reproduction and began an all-inclusive Forum for Reproductive Sciences.

This year meeting organizers were **Drs. Brian Hermann, Annie Newell-Fugate, and Stephanie Pangas** from UT San Antonio, Texas A&M and Baylor College of Medicine, respectively. Platform presentations on the first day of the meeting included:

Julie Hakim, MD, Department of Obstetrics and Gynecology, Baylor College of Medicine, "Vaginal healing research: from bench to bedside and beyond."

Payal Shah, Department of Veterinary Physiology and Pharmacology, College of Veterinary Medicine and Biomedical Sciences, Texas A&M University. "Dietary coconut oil mitigates hyperandrogenemia in obese female pigs due to suppression of androgen steroidogenesis in the adrenal cortex and theca externa."

Deepak Kumar, PhD, Department of Obstetrics and Gynecology, Washington University School of Medicine. "SARS CoV2 nonstructural proteins reprogram placental autophagy and also impair lipid metabolism."

Luwam Ghidei, MD, Department of Obstetrics and Gynecology, Baylor College of Medicine. "Cycle characteristics and treatment outcomes among BRCA mutation carriers undergoing in-vitro fertilization."

Kyunghee Hong, PhD, Departments of Biochemistry and Obstetrics & Gynecology, University of Texas Southwestern Medical Center. "Placental NRF2 May Serve a Key Role in Maternal-Fetal Tolerance during Pregnancy."

Deirdre Scully, PhD, Department of Molecular Physiology and Biophysics, Baylor College of Medicine. "Novel concepts of oocyte dynamics during oviductal transport."

Nan Ni, Department of Veterinary Integrative Biosciences, Texas A&M University. "Functional similarity between TGF-beta type 2 and type 1 receptors in the female reproductive tract."

Claire Stenhouse, PhD, Departments of Animal Science, Veterinary Integrative Biosciences, and Veterinary Physiology and Pharmacology, Texas A&M University. "Exogenous progesterone in early pregnancy has programming effects on phosphate, calcium, and Vitamin D signaling in the ovine endometrium and placenta in late pregnancy."

Drs. Chandra Yallampalli and Marie-Claude Hofmann for their continued efforts as the chairs of the TFRS Steering Committee. We also thank the members of the TFRS Steering Committee for their time and effort in ensuring the continued success of the TFRS and in coordinating this year's meeting. These members include Drs. Austin Cooney (DMS), Brian Hermann (UTSA), Greg Johnson (TAMU), Qinglei Li (TAMU), Mala Mahendroo (UTSW), John McCarrey (UTSA), Annie Newell-Fugate (TAMU), Gary Newton (PVAMU), Stephanie Pangas (BCM), Joanne Richards (BCM), and Ignatia Van den Veyver (BCM).

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Save The Date
27th Annual Texas Forum for Reproductive Sciences
April 7-8, 2022
Location: MD Anderson Onstead Auditorium, Houston Texas

Plenary Speakers:
Swathi Arur, Ph.D., Department of Genetics, University of Texas MD Anderson Cancer Center
Stephanie Pangas, Ph.D., Department of Pathology, Baylor College of Medicine
Marie-Claude Hoffman, Ph.D., Program Chair
Chandra Yalampalli, Ph.D., Meeting Organizer

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IFRB Seminar Series, 2021, continued from page 5

October 22, **Rodney Geisert,** Ph.D. Professor, Division of Animal Science, University of Missouri, Animal Sciences Research Center. "CRISPR/Cas9 gene editing provides a method to understand the role of pig conceptus factors involved with establishment and maintenance of pregnancy.

"November 12, **Gavin Wright**, Ph.D., Professor, Department of Biology, University of York , UK. "Discovering extracellular receptor-ligand interactions that are essential for cellular recognition processes: methods and mammalian fertilization"

November 19, **Mala Mahendroo**, Ph.D., Professor of Obstetrics & Gynecology and member of the Cecil H. and Ida Green Center for Reproductive Biology Sciences, UT Southwestern Medical Center. " Protection and preparation: molecular multitasking to achieve cervical remodeling in pregnancy."

November 26, **Chendil Damodaran**, Ph.D., Professor and Interim Associate Dean of Research and Innovation, Rangel College of Pharmacy, Texas A&M University, "Targeting AR and AR-variant(s) in castration resistant prostate cancer"

IFRB Postdoctoral Trainee Spotlight

***Dr. Liga Wuri** joined **Dr. Sakhila K. Banu's** laboratory in April 2019 as a Postdoctoral Research Associate and is currently working on an NIH-funded project, "Mechanism of prenatal chromium-VI exposure and germ cell apoptosis in the ovary." Her main focus is on analysis of the impacts of prenatal exposure to hexavalent Cr (Cr(VI)) on oocyte and embryo development.

Dr. Wuri was born and raised on a farm in the northeast region of Inner Mongolia of China. She earned B.S and M.S degrees in Animal Sciences from Inner Mongolia Agricultural University where she worked with Dr. Narenhua where she used bovine oocytes to study the localization of the membrane protein, CD9, on both fresh and vitrified oocytes during her master's program with Narenhua. She then moved to the U.S. where she began her Ph.D. program at the University of Missouri, working with Dr. Yuksel Agca, Associate Professor in the Department of Veterinary Pathobiology. Her research examined various hormonal regimens on superovulation as well as the impact of different cryopreservation and euthanasia protocols on the quality of the mouse oocytes. This involved development of protocols for the analysis and visualization of oocyte subcellular proteins by fluorescence probes and immunofluorescence staining. A major interest has been to image dynamic changes in cytoskeletal proteins of oocytes during development. Findings from this work were published in *Molecular Reproduction and Development* and *Reproduction, Fertility and Development* in 2019 and 2020. During her Ph.D. program, she also collaborated with Dr. Tumen Wuliji at Lincoln University of Missouri on an organic lamb breeding project.

Dr. Wuri then moved to Texas A&M to begin her first postdoctoral training program with Dr. Banu where she has been working on the intergenerational inheritance of infertility in female rats due to Cr(VI), exposure via the oocytes. Interestingly, when 21-day-old female rats received environmentally relevant doses of Cr (VI) in drinking water for a week, it diminished metaphase II oocytes quality and cytoskeletal machinery (***Figure 1***). Cr(VI) also caused misalignment of microtubules, DNA double-strand breaks, and disrupted F-actin distribution which subsequently degraded oocyte quality as shown in (***Figure 2)*** compared to the control. Her ongoing work investigates the molecular pathways regulating the development of the oocytes and embryos exposed to chromium prenatally.

Dr. Wuri has participated at national and international conferences as well as local meetings. She presented her work entitled "In vitro fertilization in rats: A potential tool to study female reproductive toxicology" at the International Ecotoxicology Conference, Madurai Kamaraj University, India, in September, 2021. She presented a poster entitled "Chromium (VI) exposure deteriorates metaphase II oocyte quality and disrupts cytoskeletal machinery in superovulated rats" at both IFRB and the Texas A&M Center for Environmental Health Research (TiCER) annual conferences in 2021. This work is currently in revision for the journal *Toxicology Reports.*

As summarized in the ***Schematic (below)***, work from our laboratory shows evidence for Cr(VI) in causing infertility by compromising oocyte quality, decreasing mitochondrial function, aberrantly increasing actin accumulation, delaying polar body extrusion, and altering cortical granule distribution. Therefore, from a clinical perspective, studies suggest measuring the Cr burden in the urine from women with sub-fertility or follicular fluid in IVF women might be a helpful approach to predict poor quality oocytes, at least in Cr-exposed patients. Based on our findings and evidence from the literature, clinical practice in reproductive medicine may benefit from monitoring endocrine disruptor levels in Infertile or IVF women as a prognostic marker for infertility. This work was supported grants from NIEHS (R01-ES025234 to S.K.B), and in part, by the TiCER P30-ES029067.

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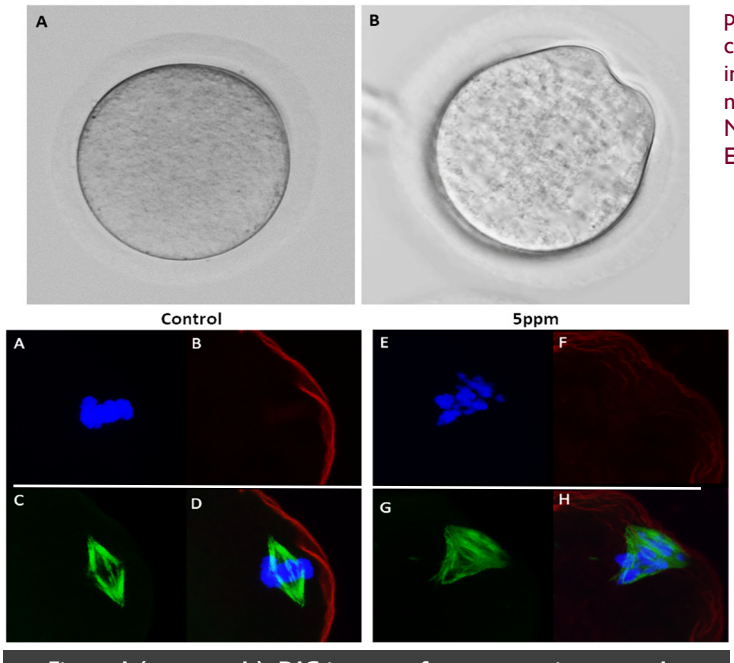
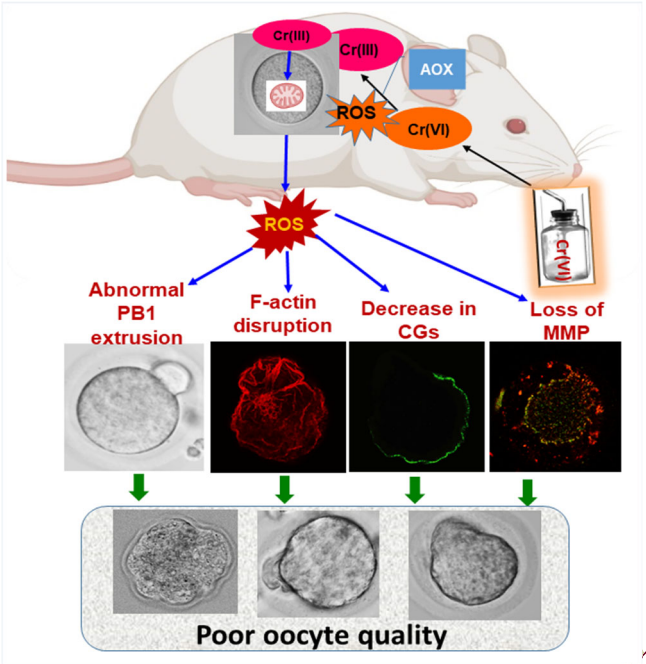


Figure 1 (top panels). DIC images of representative control oocyte (healthy/good quality) and a 5-parts per million (ppm) -Cr(VI) exposed oocyte with dysmorphic phenotype.
Figure 2 (lower panels). Fluorescence images of control and 5 ppm Cr(VI)-exposed oocytes showing labeled DNA (A&E), F-actin (B&F), microtubules (C&G) and merged images (D&H).



TEXAS A&M UNIVERSITY

IFRB Trainee News

Frontiers in Reproduction Course: Molecular and Cellular Concepts and Applications

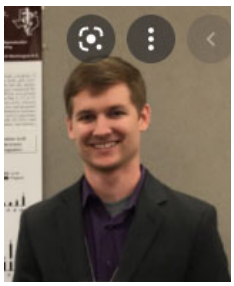
http://www.mbl.edu/fir/
Course Date: April 30-June 12, 2022

Submission Deadline: January 17, 2022

Course Director: Rafael Fissore, University of Massachusetts, Amherst

RECENT GRADUATES

***Avery Kramer** completed her Biomedical Sciences Ph.D. degree in the laboratory of **Dr. Greg Johnson** and will graduate in December 2021. The title of her dissertation is "Glucose and Fructose Metabolism and Transport during Pig Pregnancy." She is joining the laboratories of Drs. Thomas Janssen and Teresa Powell at the University of Colorado Anschutz Medical Campus, Aurora, Colorado.



***Bryan McLendon** also completed the Biomedical Sciences Ph.D. degree in the labs of **Drs. Greg Johnson** (Chair) and **Fuller Bazer** (Co-chair) and will graduate in December 2021. The title of his dissertation is "Paracrine Effects of IFNG on the Porcine Uterine Endometrium." After graduation, Bryan will join Colossal Laboratories & Biosciences, a new biotechnology company working on saving endangered species and restoring extinct species including the wooly mammoth.

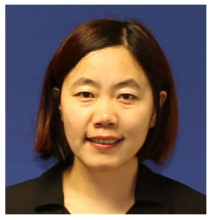
***Yudishtar Bedi** completed his Biomedical Sciences Ph.D. degree in the laboratory of **Dr. Michael Golding** where his research focused on paternal epigenetic mechanisms of inheritance, including the role of sperm histones and noncoding RNAs in transmitting fetal alcohol spectrum disorders (FASDs) phenotypes to the offspring. The title of his dissertation is, Paternal Preconceptional Alcohol Exposure Alters the Sperm Epigenetic Landscape and Adversely Affects Offspring Development." Yudi is now a postdoctoral researcher in the Bhutani laboratory at Stanford University in California.

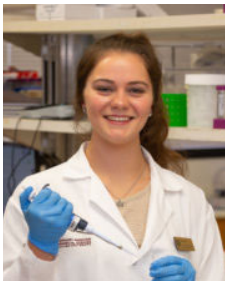
AWARDS AND HONORS

***Nirvay Sah,** a Ph.D. candidate in the laboratory of **Dr. Fuller Bazer**, received the GK Graduate Scholar Award from the Golden Key International Honor Society and the 2021 Animal Science Graduate Student Association Involvement Award. He received the Second Place Award for Best Poster Presentation at the Texas Forum for Reproductive Sciences annual meeting held in June, 2021. He received two travel awards from the Department of Animal Science and a Research and Presentation award from the Office and Graduate and Professional Studies at TAMU to attend the 54th SSR annual meeting in Saint Louis, MO. During the annual SSR meeting, he was also the recipient of USDA-NIFA-AFRI merit award for his research titled "Ovine utero-placental tissues metabolize creatine during pregnancy to support conceptus development."

***Jacob Cabler**, undergraduate engineering research assistant and Toxicology graduate student co-author **Pierre Ferrer** in **Dr. Tracy Clement's** laboratory received a top poster presentation award at the Texas A&M Center for Environmental Health Research P30 Center Research Symposium in December at the Stella Hotel in December. The title of their poster was "Development of a Testis Tissue Chip to Model the Seminiferous Epithelium In-Vitro, and incorporation of High Impact Undergraduate Research Experience for Proof of Practice." Jacob will begin his training in the EnMed program collaboration between TAMU Engineering and Houston Methodist Hospital in September 2022 that trains students jointly in medicine and engineering.

***Dr. Liga Wuri**, Postdoctoral Research Associate in **Dr. Sakhila Banu's** lab presented her work entitled, "In vitro fertilization in rats: A potential tool to study female reproductive toxicology" at the International Ecotoxicology Conference, Madurai Kamaraj University, India, Sept.2021.





***Alexis Roach**, graduate student in **Dr. Michael Golding's** laboratory received a 3rd place award in the competition for the 2021 Data Sciences International Physiological-Omics Trainee Research Excellence Award – Experimental Biology .

***Nicole Mehta** , postdoctoral trainee in Dr. Golding's laboratory received First Prize: Poster Competition, Medical Research Colloquium, Texas A&M College of Medicine, February 10th, 2021.

NEW TRAINEES

***Dr. Sudipta Dutta** joined **Dr. Joe Arosh's** laboratory in 2020. She received her B.S and M.S degrees in microbiology and biotechnology from Calcutta University, Kolkata, India. She completed her Ph.D. from Dr. Melissa Pepling's laboratory at Syracuse University, New York, studying the role of hormones in perinatal folliculogenesis.

{continued on page 15}

A Snapshot of IFRB Research, 2021

The IFRB is recognized as one of the most productive interdisciplinary research and education programs in reproductive biology in the U.S. The following "snapshot" of publications illustrates the multiple investigator research activities of the IFRB, involving extensive participation of trainees during 2021:

Afedi PA, Larimore EL, Cushman RA, Raynie D, Perry GA. iTRAQ-based proteomic analysis of bovine pre-ovulatory plasma and follicular fluid. Domest Anim Endocrinol. 2021 Jul;76:106606.

Afedi PA, Larimore EL, Cushman RA, Raynie D, Perry GA. iTRAQ-Based proteomic dataset for bovine pre-ovulatory plasma and follicular fluid containing high andlow Estradiol. Data Brief. 2021 Mar 26;36:106998.

Arosh JA, Lee J, Banu SK. Effects of dual inhibition of AKT and ERK1/2 pathways on endometrial pro-inflammatory, hormonal, and epigenetic microenvironment in endometriosis. Mol Cell Endocrinol. 2022 Jan 1;539:111446

Bake S, Pinson Mr, Pandey S, Chambers P, Mota R, Fairchild AE, M

iranda RC, Sohrabji F. Prenatal alcohol-induced sex differences in immune, metabolic and neurobehavioral outcomes in adult rats. Brain Behav Immun. 2021 Nov;98:86-100.

Baranwal G, Pilla R, Goodlett BL, Coleman AK, Arenaz CM, Jayaraman A, Rutkowski JM, Alaniz RC, Mitchell BM. Common metabolites in two different hypertensive mouse models: a serum and urine metabolome study biomolecules. 2021 Sep 21;11(9):1387

Baron JA, Nichols HB, Anderson C, Safe S. Cigarette Smoking and Estrogen- Related Cancer. Cancer Epidemiol Biomarkers Prev. 2021 Aug;30(8):1462-1471.

Baron JA, Nichols HB, Safe S. Cigarette Smoking and Estrogen-Related Cancer- Reply. Cancer Epidemiol Biomarkers Prev. 2021 Oct;30 (10):1978.

Bazer FW, Seo H, Johnson GA, Wu G. One-Carbon Metabolism and Development of the Conceptus During Pregnancy: Lessons from Studies with Sheep and Pigs. Adv Exp Med Biol. 2021;1285:1-15.

Bazer, FW, H. Seo, G.A. Johnson, and G. Wu. 2021. One-carbon metabolism and development of the conceptus during pregnancy: Lessons from studies with sheep and pigs. Adv. Exp. Med. Biol. 1285:1-15.

Behlen JC, Lau CH, Li Y, Dhagat P, Stanley JA, Rodrigues Hoffman A, Golding MC, Zhang R, Johnson NM. Gestational Exposure to Ultrafine Particles Reveals Sex- and Dose-Specific Changes in Offspring Birth Outcomes, Placental Morphology, and Gene Networks. Toxicol Sci. 2021 Oct 5: kfab118.

Boltze J, Aronowski JA, Badaut J, Buckwalter MS, Caleo M, Chopp M, Dave KR, Didwischus N, Dijkhuizen RM, Doeppner TR, Dreier JP, Fouad K, Gelderblom M, Gertz K, Golubczyk D, Gregson BA, Hamel E, Hanley DF, Härtig W, Hummel FC, Ikhsan M, Janowski M, Jolkkonen J, Karuppagounder SS, Keep RF, Koerte IK, Kokaia Z, Li P, Liu F, Lizasoain I, Ludewig P, Metz GAS, Montagne A, Obenaus A, Palumbo A, Pearl M, Perez-Pinzon M, Planas AM, Plesnila N, Raval AP, Rueger MA, Sansing LH, Sohrabji F, Stagg CJ, Stetler RA, Stowe AM, Sun D, Taguchi A, Tanter M, Vay SU, Vemuganti R, Vivien D, Walczak P, Wang J, Xiong Y, Zille M. New Mechanistic Insights, Novel Treatment Paradigms, and Clinical Progress in Cerebrovascular Diseases. Front Aging Neurosci. 2021 Jan 28;13:623751.

Born HA, Martinez LA, Levine AT, Harris SE, Mehra S, Lee WL, Dindot SV, Nash KR, Silverman JL, Segal DJ, Weeber EJ, Anderson AE. Early Developmental EEG and Seizure Phenotypes in a Full Gene Deletion of Ubiquitin Protein Ligase E3A Rat Model of Angelman Syndrome. eNeuro. 2021 Mar4;8 (2):ENEURO.0345-20.2020.

Bradbery AN, Coverdale JA, Hartz CJ, Millican AA, Goehring MS, Files KK, Picking E, Hammer CJ, Dunlap KA, Cardoso RC, Wickersham TA, Leatherwood JL, Satterfield MC. Effect of maternal overnutrition on predisposition to insulin resistance in the foal: Maternal parameters and foal pancreas histoarchitecture. Anim Reprod Sci. 2021 Apr; 227: 106720.

Bradbery AN, Coverdale JA, Hammer CJ, Dunlap KA, Leatherwood JL, Satterfield MC. Effect of maternal overnutrition on predisposition to insulin resistance in the foal: Foal skeletal muscle development and insulin signaling. Domest Anim Endocrinol.2021 Oct; 77:106648.

Bradbery AN, Coverdale JA, Hartz CJ, Millican AA, Goehring MS, Fikes KK, Picking E, Hammer CJ, Dunlap KA, Cardoso RC, Wickersham TA, Leatherwood JL, Satterfield MC. Effect of maternal overnutrition on predisposition to insulin resistance in the foal: Maternal parameters and foal pancreas histoarchitecture. Anim Reprod Sci. 2021 Apr; 227: 106720.

Brandão AP, Cooke RF. Effects of Temperament on the Reproduction of Beef Cattle. Animals (Basel). 2021 Nov 21;11(11):3325.

Branyan TE, Selvamani A, Park MJ, Korula KE, Kosel KF, Srinivasan R, Sohrabji F. Functional Assessment of Stroke-Induced Regulation of miR-20a-3p and Its Role as a Neuroprotectant. Transl Stroke Res. 2021 Sep 27.

Broder ED, Elias DO, Rodríguez RL, Rosenthal GG, Seymoure BM, Tinghitella RM. Evolutionary novelty in communication between the sexes. Biol Lett. 2021 Feb;17(2):20200733.

Bugno-Poniewierska M, Raudsepp T. Horse Clinical Cytogenetics: Recurrent Themes and Novel Findings. Animals (Basel). 2021 Mar 16;11(3):831.

Cappellozza BI, Cooke RF, Harvey KM. Omega-6 Fatty Acids: A Sustainable Alternative to Improve Beef Production Efficiency. Animals (Basel). 2021 Jun 12;11(6):1764.

Cappellozza BI, Bohnert DW, Reis MM, Swanson KC, Falck SJ, Cooke RF. Influence of amount and frequency of protein supplementation to steers consuming low-quality, cool-season forage: intake, nutrient digestibility, and ruminal fermentation. J Anim Sci. 2021 Jun 1;99(6):skab112

Cappellozza BI, Bohnert DW, Reis MM, Van Emon ML, Schauer CS, Falck SJ, Cooke RF. Influence of amount and frequency of protein supplementation to ruminants consuming low-quality cool-season forages: efficiency of nitrogen utilization in lambs and performance of gestating beef cows. J Anim Sci. 2021 Jun 1;99(6):skab122

Cardoso D, Cardoso RC, de Paula Nogueira G. Functions of the GABAergic system on serum LH concentrations in prepubertal Nellore heifers. Anim Reprod Sci. 2021 Jun;229:106764.

Castaneda C, Juras R, Kjöllerström J, Hernandez Aviles C, Teague SR, Love CC, Cothran EG, Varner DD, Raudsepp T. Thoroughbred stallion fertility is significantly associated with FKBP6 genotype but not with inbreeding or the contribution of a leading sire. Anim Genet. 2021 Dec;52(6):813-823.

Cerri RLA, Burnett TA, Madueira AML, Silper BF, Denis-Robichaud J, LeBlanc S, Cooke RF, Vasconcelos JLM. Symposium review: Linking activity-sensor data and physiology to improve dairy cow fertility. J Dairy Sci. 2021 Jan;104(1):1220-1231.

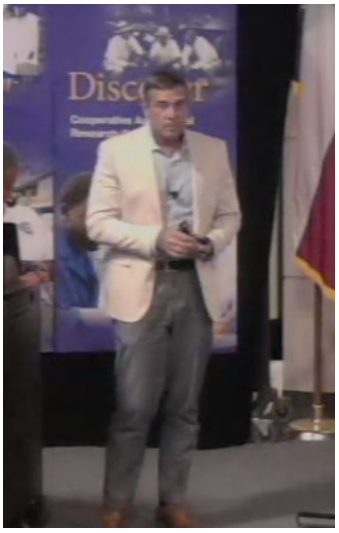
Chang RC, Thomas KN, Mehta NA, Veazey KJ, Parnell SE, Golding MC. Programmed suppression of oxidative phosphorylation and mitochondrial function by gestational alcohol exposure correlate with widespread increases in H3K9me2 that do not suppress transcription. Epigenetics Chromatin. 2021 Jun 15;14(1):27

Chapkin RS, Davidson LA, Park H, Jin UH, Fan YY, Cheng Y, Hensel ME, Landrock KK, Allred C, Menon R, Klemashevich C, Jayaraman A, Safe S. Role of the Aryl Hydrocarbon Receptor (AhR) in Mediating the Effects of Coffee in the Colon. Mol Nutr Food Res. 2021 Oct;65 (20): e2100539.

(continued on p. 11)

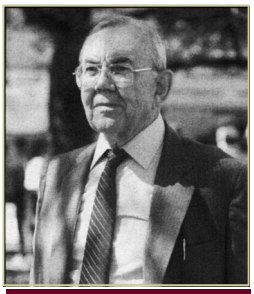
26th Annual Dr. Raymond O. Berry Memorial Lecture

The Twenty-Sixth Annual Dr. Raymond O. Berry Memorial Lecture, sponsored and organized by the Interdisciplinary Faculty of Reproductive Biology, was held at Prairie View A&M University, on October 15, 2021. This event was not held in 2020 due to COVID-19 restrictions on meetings. Gregory A. Johnson, PhD, Professor and Chancellor's Enhancing Development and Generating Excellence in Scholarship (EDGES) Fellow, Department of Veterinary Integrative Biosciences, College of Veterinary Medicine and Biomedical Sciences, and Adjunct Professor, Department of Animal Science, Texas A&M University was selected by IRFB faculty to give the presentation. entitled "*Using Livestock to Understand the Immunology of Pregnancy.*"



Professor Johnson is a native of Wyoming who received his M.S. and Ph.D. degrees in Microbiology and Reproductive Biology, respectively, from the University of Wyoming and postdoctoral training at Texas A&M University. He was recruited to the University of Idaho in 2000 as Assistant Professor of Animal and Veterinary Science and served there through 2002. He was then recruited back to Texas A&M University in 2002 as Assistant Professor, Department of Veterinary Integrative Biosciences, and he was promoted to rank of Professor in 2014. In addition to being invited to present the 26th Annual Dr. Raymond O. Berry Memorial Lecture in Reproductive Immunology in 2021, Dr. Johnson has received numerous other honors and recognitions. They include: 1) EDGES fellow in 2020; 2) invited 2019 D.H. Barron Lecture sponsored by the D.H Barron Reproductive and Perinatal Biology Research Program, University of Florida; 3) excellence in reviewing for the journal Placenta (2016); 4) School of Veterinary Medicine Honors Convocation Faculty Award for Research: Outstanding Mentor for Graduate Students and/or Postdoctoral Research Associates in both 2014 and 2016; 5) Texas A&M Association of Former Students Award for College-Level Distinguished Achievement for Teaching in 2013 and University Level Award For Research in 2020; 6) Gamma Sigma Delta Award of Merit for Teaching (2012); 7) Vice Chancellor's Award in Excellence for Diversity for the Bridges to the Doctorate in Reproductive Biology Leadership Team (2011); and 8) Vice Chancellor's Award in Excellence for Team Research in Uterine Biology and Pregnancy (2005). Dr. Johnson is Associate Editor for the journal Reproduction (2018-present) and member of the editorial boards of the journals Placenta (2017-present) and Domestic Animal Endocrinology (2014-present). He has also served on the editorial boards of Reproduction (2013-2018) and Biology of Reproduction, 2004-2012).

Dr. Johnson is a member of the Society for the Study of Reproduction, The Endocrine Society, and the International Federation of Placenta Associations. He served as an elected member of the Board of Directors for the Society for the Study of Reproduction. He has been: an organizer and member of the Executive Committee of the Texas Forum on Reproductive Sciences; a past Chair of the Interdisciplinary Faculty of Reproductive Biology at Texas A&M University; Co-Organizer, of the Annual Dr. Raymond O. Berry Memorial Lecture and Annual Interdisciplinary Faculty of Reproductive Biology (IFRB) Retreat; Ad Hoc reviewer for National Science Foundation CAREER Proposals; and Ad Hoc grant reviewer for the National Science Centre of Poland.



"Dr. Berry's pioneering studies contributed basic knowledge about maternal immune recognition of the fetal - placental unit."

-Fuller W. Bazer

Dr. Johnson is known for excellence in teaching at the undergraduate and graduate levels. He has served as chair or co-chair of graduate supervisory committees for 41 graduate students and a member of committees for 93 graduate students. He has mentored to one international undergraduate student and 54 undergraduate students, as well as five postdoctoral fellows who are enjoying excellent careers. Funding for Dr. Johnson's research and graduate education from competitive grants from the U.S.D.A.'s Animal and Food Research Institute and the National Institutes of Health. The quality of his discovery research is evident in 51 invited presentations at national and international scientific meetings, 176 papers published in refereed scientific journals, 13 book chapters, 26 illustrative drawings for scientific papers, and 170 abstracts of papers presented at scientific meetings.

For his outstanding contributions, Texas A&M University recognizes the work of Dr. Johnson through the Raymond O. Berry Memorial Lecture which was established in 1994 by **Dr. Fuller W. Bazer**. This Lecture Series ensures that his contributions will continue to inspire students and faculty whose application of biotechnology to the field of reproductive biology contributes to animal agriculture and impacts the biomedical community. Dr. Berry's pioneering studies of genetic factors affecting reproduction contributed basic knowledge about maternal immune recognition of the fetal-placental unit. These principles are now fundamental to the discipline of reproductive immunology.

Below: Meeting organizers and presenters (left to right), From Texas A&M, *Drs. Qinglei Li, Bob Burghardt, Greg Johnson, Fuller Bazer, members of Dr. Berry's family, Mrs. Dorothy McLemore, Dr. Berry's daughter and Alecia Smith granddaughter, and from Prairie View A&M, Dr. Bill Foxworth). For 24 years, Dr. Duane Kraemer, who worked with Dr. Berry, has previously led off the Lecture by providing an entertaining presentation that included memories of Dr. Berry. Dr. Kraemer was unable to attend this year, and Dr. Bill Foxworth, a former trainee of Dr. Kraemer, presented comments on some of Dr. Berry's contributions.*

Reproduction Research Snapshot, cont'd from page 7 PNAS

Che, D.S., P.S. Nyingwa, K.M. Ralinala, G.M.T. Maswanganye, and G. Wu. 2021. Amino acids in the nutrition, metabolism, and health of domestic cats. Adv. Exp. Med. Biol. 1285:217-231.

Chen PR, Lucas CG, Cecil RF, Pfeiffer CA, Fudge MA, Samuel MS, Zigo M, Seo H, Spate LD, Whitworth KM, Sutovsky P, Johnson GA, Wells KD, Geisert RD, Prather RS. Disrupting porcine glutaminase does not block preimplantation development and elongation nor decrease mTORC1 activation in conceptuses. Biol Reprod. 2021 Nov 15;105(5):1104-1113

Chen, J.Q., Y.C. Yang, C. Yang, ZL. Dai, I.H. Kim,?G. Wu, and Z.L. Wu. 2021. Dietary supplementation with glycine enhances intestinal mucosal integrity and ameliorates inflammation in C57BL/6J mice with high-fat diet-induced obesity. J Nutr. 151:1769-1778.

Chidambara Murthy KN, Jayaprakasha GK, Safe S, Patil BS. Citrus limonoids induce apoptosis and inhibit the proliferation of pancreatic cancer cells. Food Funct. 2021 Feb 15;12(3):1111-1120.

Chung DD, Pinson MR, Bhenderu LS, Lai MS, Patel RA, Miranda RC. Toxic and Teratogenic Effects of Prenatal Alcohol Exposure on Fetal Development, Adolescence, and Adulthood. Int J Mol Sci. 2021 Aug 16;22(16):8785.

Ciernia LA, Perry GA, Smith MF, Rich JJ, Northrop EJ, Perkins SD, Green JA, Zezeski AL, Geary TW. Effect of estradiol preceding and progesterone subsequent to ovulation on proportion of postpartum beef cows pregnant. Anim Reprod Sci. 2021 Apr;227:106723.

Cilkiz KZ, Baker EC, Riggs PK, Littlejohn BP, Long CR, Welsh TH, Randel RD, Riley DG. Genome-wide DNA methylation alteration in prenatally stressed Brahman heifer calves with the advancement of age. Epigenetics. 2021 May;16(5):519-536

Pinson MR, Holloway KN, Douglas JC, Kane CJM, Miranda RC, Drew P. Divergent and overlapping hippocampal and cerebellar transcriptome responses following developmental ethanol exposure during the secondary neurogenic period. Clin Exp Res. 2021 Jul;45(7):1408-1423.

Colombo EA, Cooke RF, Brandão AP, Wiegand JB, Schubach KM, Sowers CA, Duff GC, Block E, Gouvêa VN. Performance, health, and physiological responses of newly received feedlot cattle supplemented with pre- and probiotic ingredients. Animal. 2021 May;15(5):100214

Cooke RF, Lamb GC, Vasconcelos JLM, Pohler KG. Effects of body condition score at initiation of the breeding season on reproductive performance and overall productivity of Bos taurus and B. indicus beef cows. Anim Reprod Sci. 2021 Sep;232:106820.

Dias HP, Poole RK, Albuquerque JP, Dos Santos PH, Castilho ACS, Pohler KG, Vasconcelos JLM. Progesterone dose during synchronization treatment alters luteinizing hormone receptor and steroidogenic enzyme mRNA abundances in granulosa cells of Nellore heifers. Anim Reprod Sci. 2021 Feb;225:106681

Dillon, E.L. and G. Wu. 2021. Cortisol enhances ctrulline synthesis from proline in enterocytes of suckling piglets. Amino Acids.

Diniz JHW, Peres RFG, Teixeira ACB, Riveros JAN, Noronha IM, Martins CFG, Oliveira CS, Pohler KG, Pugliesi G, Oliveira LZ. Administration of PGF2? at the moment of timed-AI using sex-sorted or conventional semen in suckled Nelore cows with different intensity of estrus behavior. Theriogenology. 2021 Oct 15;174:169-175

Dolan CP, Imholt F, Yang TJ, Bokhari R, Gregory J, Yan M, Qureshi O, Zimmel K, Sherman K, Falck A, Yu L, Leininger E, Brunauer R, Suva LJ, Gaddy D, Dawson LA, Muneoka K. Mouse Digit Tip Regeneration is Mechanical Load-dependent. J Bone Miner Res. 2021 Nov 16

Donnelly CG, Bellone RR, Hales EN, Nguyen A, Katzman SA, Dujovne GA, Knickelbein KE, Avila F, Kalbfleisch TS, Giulotto E, Kingsley NB, Tanaka J, Esdaile E, Peng S, Dahlgren A, Fuller A, Mienaltowski MJ, Raudsepp T, Affolter VK, Petersen JL, Finno CJ. Generation of a Biobank From Two Adult Thoroughbred Stallions for the Functional Annotation of Animal Genomes Initiative. Front Genet. 2021 Mar 8;12:650305.

Earnhardt AL, Neuendorff DA, Long CR, Welsh TH Jr, Randel RD. Evaluation of the effects of sire and dam calving group on age at first calving in Brahman heifers. Theriogenology. 2021 Jun;167:32-36

Eixoto PM, Hubner AM, Junior WMC, Cunha LL, Garrett EF, Pohler KG, Dias NW, Mercadante VRG, Canisso IF, Lima FS. Characterization of pregnancy-associated glycoproteins and progesterone as a predictor of twins and conceptus loss in high-risk-pregnancy Holstein cows. J Dairy Sci. 2021 Apr;104(4):5034-5046.

El-Hakim Y, Mani KK, Eldouh A, Pandey S, Grimaldo MT, Dabney A, Pilla R, Sohrabji F. Sex differences in stroke outcome correspond to rapid and severe changes in gut permeability in adult Sprague-Dawley rats. Biol Sex Differ. 2021 Jan 15;12(1):14.

Elmetwally MA, Li X, Johnson GA, Burghardt RC, Herring CM, Kramer AC, Meininger CJ, Bazer FW, Wu G. Dietary supplementation with L-arginine between days 14 and 25 of gestation enhances NO and polyamine syntheses and the expression of angiogenic proteins in porcine placentae. Amino Acids. 2021 Nov 6. doi: 10.1007/s00726-021-03097-2. Epub ahead of print.

Elmetwally, M.A., X.L. Li, G.A. Johnson, R.C. Burghardt, C.M. Herring, A.C. Kramer, C.J. Meininger, F.W. Bazer, and G. Wu. 2021. Dietary supplementation with L-arginine between Days 14 and 25 of gestation enhances NO and polyamine syntheses and expression of angiogenic proteins in porcine placentae. Amino Acids.

Elswood J, Pearson SJ, Payne HR, Barhoumi R, Rijnkels M, W Porter W. Autophagy regulates functional differentiation of mammary epithelial cells. Autophagy. 2021 Feb;17(2):420-438.

Ferrer P, Clement TM. A FAKtual Retelling of Blood-Testis Barrier and Cytoskeletal Regulation. Endocrinology. 2021 Sep 1;162 (9):bqab086.

Fikes KK, Coverdale JA, Leatherwood JL, Campbell JM, Welsh TH Jr, Hartz CJ, Goehring M, Millican AA, Bradbery AN, Wickersham TA. Effect of bioactive proteins on gait kinematics and systemic inflammatory markers in mature horses. Transl Anim Sci. 2021 Feb 8;5(1): txab017.

Fontes PLP, Oosthuizen N, Ciriaco FM, Sanford CD, Canal LB, Cooke RF, Pohler KG, Henry DD, Mercadante VRG, Ealy AD, Johnson SE, DiLorenzo N, Lamb GC. Effects of nutrient restriction on the metabolic profile of Bos indicus-influenced and B. taurus suckled beef cows. Animal. 2021 Mar;15(3):100166

Fontes PLP, Oosthuizen N, Ciriaco FM, Sanford CD, Canal LB, Cooke RF, Pohler KG, Henry DD, Mercadante VRG, Ealy AD, Johnson SE, DiLorenzo N, Lamb GC. Effects of nutrient restriction on the metabolic profile of Bos indicus-influenced and B. taurus suckled beef cows. Animal. 2021 Mar;15(3):100166

Frank JW, Steinhauser CB, Wang X, Burghardt RC, Bazer FW, Johnson GA. Loss of ITGB3 in ovine conceptuses decreases conceptus expression of NOS3 and SPP1: implications for the developing placental vasculature. Biol Reprod. 2021 Mar 11;104(3):657-668.

Furukawa K, He W, Bailey CA, Bazer FW, Toyomizu M, Wu G. Polyamine synthesis from arginine and proline in tissues of developing chickens. Amino Acids. 2021 Nov;53(11):1739-1748

Gilbreath KR, Bazer FW, Satterfield MC, Wu G. Amino Acid Nutrition and Reproductive Performance in Ruminants. Adv Exp Med Biol. 2021;1285:43-61.

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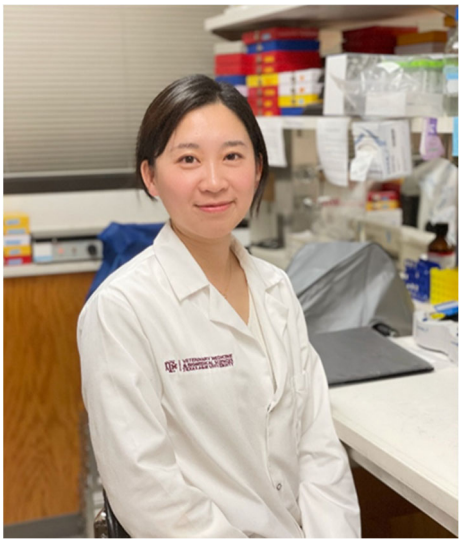
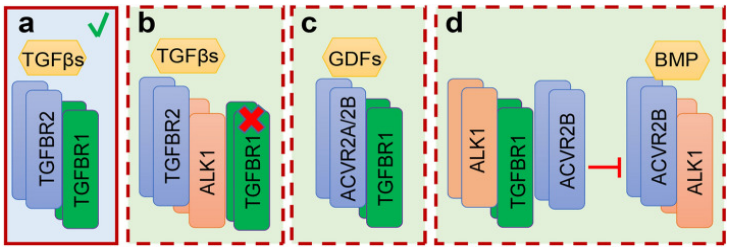
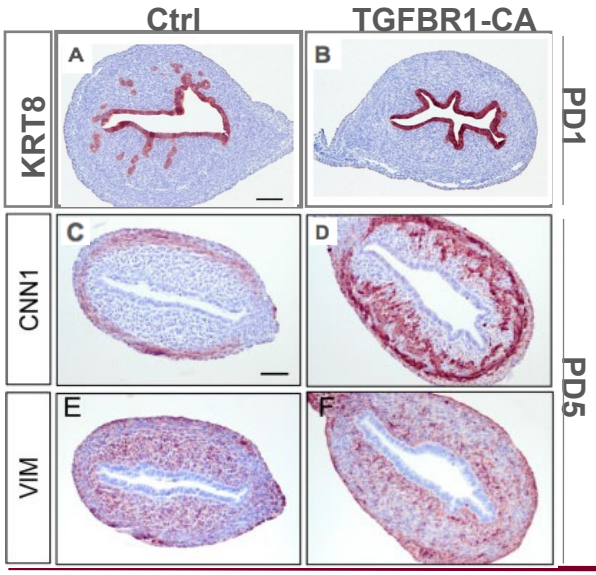
IFRB Graduate Student Spotlight



***Nan Ni** is a Ph.D. candidate in the Department of Veterinary Medicine & Biomedical Sciences mentored by Dr. Qinglei Li. She received her bachelor's degree from Jilin University, P.R. China. She participated in research related to connexins and tumor drug-resistance as undergraduate student. Nan joined Dr. Qinglei Li's lab in 2016, her research focuses on the role of TGF-β signaling in uterine functions. In her PhD studies, Nan explored the roles of TGF-beta type 1 (TGFBR1) and type 2 (TGFBR2) receptors in the female reproductive tract. TGFβ signaling plays critical roles in reproductive development and function. TGFβ ligands signal through TGFBR2/TGFBR1 complex. As TGFBR2 and TGFBR1 form a signaling complex upon ligand stimulation, they are expected to be equally important for propagating TGFβ signaling that elicits cellular responses. However, several genetic studies challenge this concept and indicate that disruption of TGFBR2 or TGFBR1 may lead to contrasting phenotypic outcomes. Nan's results reveal the functional similarity between TGF-beta type 1 and type 2 receptors in maintaining the structural integrity of the female reproductive tract. Conditional deletion of Tgfbr2 led to a similar phenotype to that of Tgfbr1 deletion in the female reproductive tract. Furthermore, genetic removal of Tgfbr1 in the Tgfbr2-deleted uterus had minimal impact on the phenotype of Tgfbr2 conditional knockout mice. In summary, her results prove the functional requirement of these receptors in the female reproductive tract. In addition to functional similarity between TGFBR1 and TGFBR2, she is also interested in the effects of dysregulated TGF-β signaling on uterus development and functions. Her studies show that sustained activation of TGF-β signaling in the mouse uterus results in glandular defects, which is proved to be associated with altered differentiation of endometrial stromal cells and formation of stromal compartment.

Nan has been a Trainee Member of the Society for the Study of Reproduction (SSR). She has presented her research work at the 2017 and 2018 Society for the Study of Reproduction annual meetings. Nan delivered oral presentation at the 2021 Virtual Annual Texas Forum for Reproductive Sciences (TFRS) meeting and Fall 2021 Uterine Workshop meeting. She received 2018 CVM Trainee Grant and 2017, 2018 GSA travel awards. In addition to her research, Nan has been actively participated in academic activities. She works as trainee volunteer at the 2018 Society for the Study of Reproduction annual meeting and moderator at the 2018 and 2019 Annual Texas Forum for Reproductive Sciences meetings. Outside of laboratory life, Nan enjoys outdoor activities and reading in her spare time. ***





Top left panel: (a–d) Potential modes of actions of TGFBR2 and TGFBR1 in different experimental systems. TGFBR2 is well known to complex with TGFBR1 to transduce signals by TGFβs (a). However, TGFBR2 may interact with other type 1 receptors in the absence of TGFBR1 to mediate TGFβ signaling that is detrimental to the homeostasis of aortic wall (b). On the other hand, TGFBR1 may bind to receptors besides TGFBR2 to mediate GDF signaling during craniofacial development (c). Moreover, TGFBR1 can interact with ALK1 and ACVR2B to suppress the formation of ACVR2B/ALK1 complex, thereby inhibiting BMP signaling (d). Our studies using conditional deletion of Tgfbr2, Tgfbr1, and Tgfbr1/2 suggest the functional similarity between TGFBR2 and TGFBR1 in maintaining the developmental integrity of the female reproductive tract (a).

Lower left panes: (A-F) Constitutive activation of TGFBR1 in mouse uterus causes adenogenic defects and alteration of early uterine development. (A-B) Immunohistochemical staining of KRT8 was performed using uterine samples from control and TGFBR1-CA mice. Scale bar is representatively shown in (A) and equals 100μm. (C-F) Immunohistochemical analysis of CNN1 and VIM in the uteri of control and TGFBR1-CA mice at PD5. Scale bar is representatively shown in (C) and equals 50 μm (C-F).

Two IFRB Trainees Receive American Society of Animal Science National Awards

***Dr. Kelsey M. Harvey (Schubach)** who completed her PhD program in December 2020 with **Dr. Reinaldo Cooke** and started as an Assistant Professor at Mississippi State University in January 2021was the recipient of the Agri-King Outstanding Animal Science Graduate Student Award from the American Society of Animal Science.

***Alice P. Brando** is a doctoral Student in the laboratory of **Dr. Reinaldo Cooke** who is investigating the use of ω-6 fatty acids supplements to improve physiological and productive responses in beef cattle. She received the 2021Wetteman Graduate Scholar in Physiology Award from the American Society of Animal Science.

Science Signaling

Research Snapshot, cont'd from page 13

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(continued on page 17)

IFRB Trainee News, cont'd from page 8

IFRB Graduate Student Spotlight

*Robyn Moses is a PhD student in the Physiology of Reproduction section in Department of Animal Science, mentored by Dr. Fuller Bazer. She received her BS in Biology in 2018 from Texas A&M University. In 2017, she joined Dr. Bazer's laboratory as an undergraduate researcher as part of the Collaborative Learning Initiatives in Maternal, Perinatal, and Infant Health Research (CIMPIR) Tier One Program, where she worked with Emily Hoskins and Kitty Halloran on their work investigating the effects of exogenous progesterone administration on nutrient transport during early and late pregnancy, respectively. Robyn continued in Dr. Bazer's laboratory as a MS Student in 2018, mentored by Drs. Fuller Bazer, Gregory Johnson, and Guoyao Wu, where she investigated the metabolic contributions of glucose and fructose by the ovine conceptus during the peri-implantation period of pregnancy. Her work demonstrated that the ovine conceptus can metabolize fructose by the pentose phosphate pathway and Krebs cycle. Additionally, she found that fructose can be used by the ovine conceptus for the production of pyruvate and lactate and as a precursor for carbohydrate moieties for protein glycosylation, as one would see in the hexosamine biosynthesis pathway. Currently she is pursuing her PhD under the guidance of Drs. Fuller Bazer, Gregory Johnson, Guoyao Wu, and Shannon Washburn. Her current research expands upon the hypothesis that metabolism of fructose may help the ovine conceptus adapt to the hypoxic environment of the uterus during the peri-implantation period of pregnancy. She is currently focusing on how fructose is metabolized in hypoxic conditions by the conceptus, as well as characterizing the expression enzymes and transporters required for fructose and lactate metabolism by the ovine conceptus (Figure 1).

Robyn has presented her work at the annual Society for the Study of Reproduction meeting, Texas Forum for Reproductive Sciences, and IFRB seminar series and retreat meetings. She is also the Secretary and Professional Development Chair of the Animal Science Graduate Student Association and has served as a graduate teaching assistant, both virtual and in person, for ANSC 333 and 111. Teaching upper- and lower-classmen in and out of the pandemic provided experiences that helped shape her mentoring skills. After completion of her program, Robyn would like to pursue a postdoctoral research position in reproductive medicine and eventually return to academic research. When not in the lab, Robyn enjoys being outdoors, reading, music, and needlepoint embroidery.

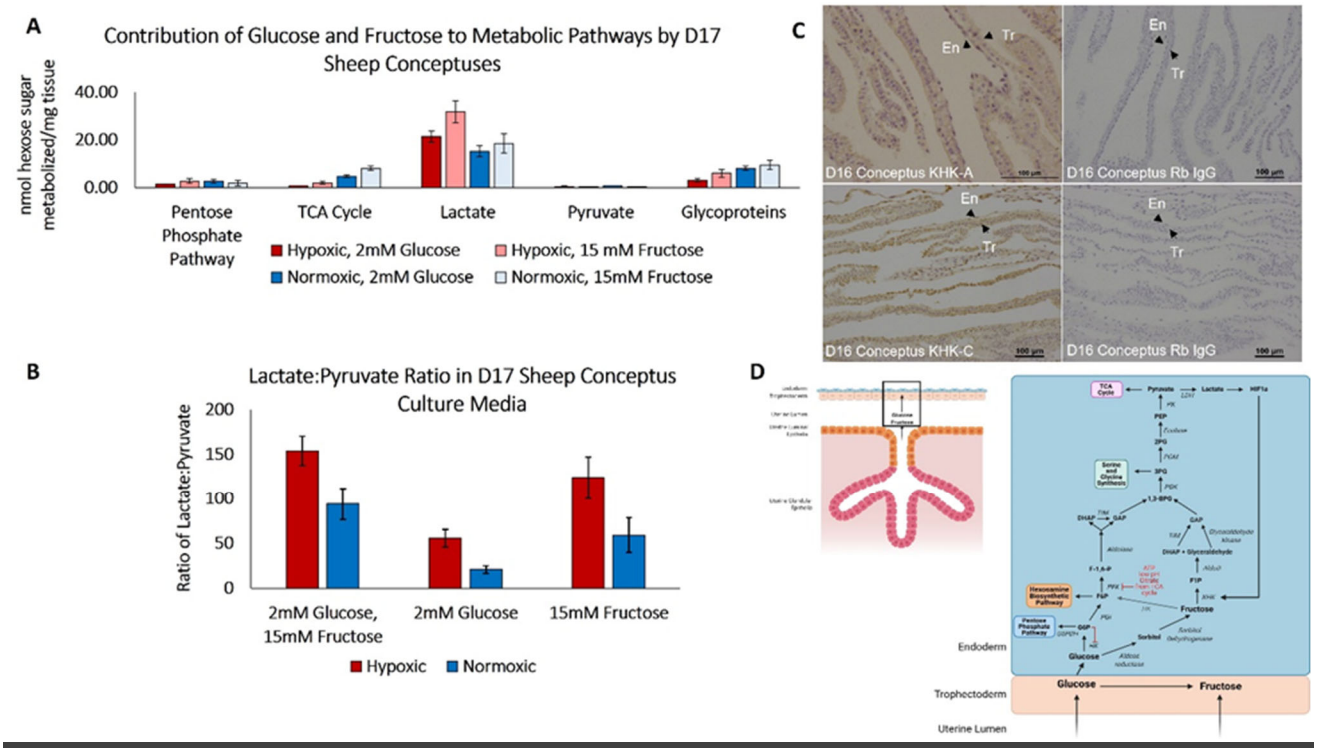


Figure 1. A) Individual contributions of glucose (2mM) and fructose (15mM) and hypoxic and normoxic air conditions by Day (D) 17 ovine conceptuses. B) Ratio of lactate to pyruvate in culture media after D17 ovine conceptuses were cultured in glucose and fructose in hypoxic and normoxic conditions. C) Ketohexokinase isoforms localized in D16 ovine conceptuses. KHK-A was localized to the trophectoderm, while KHK-C was localized to both endoderm and trophectoderm. D) Proposed model of hypoxic induction of KHK in the conceptus and subsequent metabolism of glucose and fructose.

IRFB Faculty Activities, Awards, etc.

NEW GRANTS:

***Drs. Michael C. Satterfield (PI) and Kayla Bayless, Fuller Bazer Guoyao Wu (Co-PIs),** received a USDA/AFRI award, "Nutraceutical Modulation of Placental Growth and Function," 09/01/2021-8/30/2024, $650,000.

***Drs. Fuller Bazer (PI) and Greg Johnson and Guoyao Wu (Co-PIs),** received notification of a USDA/AFRI award, "Arginine and Creatine Kinase: Key Roles in Conceptus Development." 01/01/2022-12/31/2026. $650,000.

***Drs. Greg Johnson (PI) and Fuller W. Bazer (Co-PI),** received notification of a USDA/AFRI award, "Metabolic adaptation of conceptuses to a hypoxic environment," 01/01/2022-12/31/2026. $650,000.

***Dr. George Perry (PI) and collaborators, Drs. Jason Banta and Thomas Hairgrove** received notification of a USDA/AFRI award, "Impact of timing of vaccination on reproductive success in beef cattle." 03/01/2022 – 02/28/2025 $299,941.

***Dr Guoyao Wu (PI)** received notification of a USDA/AFRI award, "Impact of dietary glutamate on the development of gut mucosal immunity in hybrid striped bass." 650,000.

***Dr Guoyao Wu (PI)** also received notification of a USDA/AFRI award, Biosynthesis and nutritional roles of glycine in hybrid striped bass." $650,000.

***Drs. Guoyao Wu (PI) and Greg Johnson (Collaborator)** received notification of a USDA/AFRI award, "Dietary requirements of hybrid striped bass for biosynthesizable amino acids,"

***Drs. Rodolfo Cardoso** and **Gary Williams** received a new grant from USDA-AFRI-NIFA entitled "Genotypic Differentiation of Bovine KNDy Neuron Function". 5/1/2021 – 4/30/2025, $500,000.

AWARDS & HONORS:

***Dr. Fuller Bazer** was elected Fellow of the Society for the Study of Reproduction, 2021. The SSR Distinguished Fellowship recognizes active SSR members for their outstanding contributions to the field of reproductive biology and to the Society, illustrated by sustained high impact research, leadership, service and mentorship.

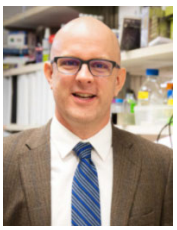
***Dr. Greg Johnson** was an invited speaker at the Colorado State University Animal Reproduction & Biotechnology Laboratory (ARBL) seminar series on October 18, 2021. His talk was entitled "Understanding the physiology of pregnancy by focusing on the uterine-placental interface of ruminants and pigs."

***Dr. Johnson** was also an invited speaker at the São Paulo Research Foundation, FAPESP - Sponsored webinar, "Emerging Topics in Reproduction" May 14, 2021. His talk was entitled "Comparative placentation analysis in domestic species."

***Dr. Rodolfo Cardoso** was an invited lecturer at the Interdisciplinary Reproduction and Health Group at the University of Missouri. "Developmental Programming of the Neuroendocrine System in Ruminants", November, 2021.

***Dr. Guoyao Wu** was in invited speaker at the ASAS Symposium on Rethinking/ Reexamining Grand Challenges, "Beef as a functional food for improving human nutrition and health", American Society of Animal Science Conference, July 16, 2021.

***Dr. Sakhila Banu** was an invited lecturer at the University of California, Irvine Center for Occupational and Environmental Health. "Exposure to hexavalent chromium and female reproductive dysfunction", November 5, 2021.



***Dr. Michael Golding** was invited to give a number of invited talks during the past year including:

"Epigenetic Toxicity: Preconception paternal alcohol exposure and the programming of offspring birth defects. Texas A&M Interdisciplinary Faculty of Genetics – Research Seminar Series, Texas A&M University , April 12, 2021.

Dr. Golding was Theme Discussant: "Preconception Exposures: Role of Fathers" National Institute of Health (NIH) Strategic Workshop: Environmental influences on Child Health outcomes (ECHO) - Preconceptional Origins of Child Health Outcomes Workshop, Duke University, Raleigh North Carolina, USA. June 17, 2021.

"Paternal Alcohol Use Contributes to Fetal Alcohol Spectrum Disorder Growth & Metabolic Defects." Symposia Speaker: Preconception Alcohol Effects on Offspring Health, 2021 Annual Meeting for the Research Society on Alcoholism, Virtual Meeting , June 21, 2021.

(continued on page 16)

"Germline Epigenetic Programming and Paternal Contributions to Fetal Alcohol Spectrum Disorders (FASDs): Questioning the Prevailing Paradigm. Invited speaker, University of Michigan NIEHS P30 Center: Lifestage Environmental Exposures and Disease (M-LEEaD) seminar series, Ann Arbor, Michigan, USA. , September 28, 2021.

"Paternal Exposures, Epigenetic Memories, and Compromised Placentation: Understanding the Impact of Male Drinking on Offspring Growth." Keynote Speaker: Texas A&M Center for Environmental Health Research (TiCER) Research Symposium, Bryan, Texas, December 8, 2021.

INTERNATIONAL ACTIVITIES & LECTURES

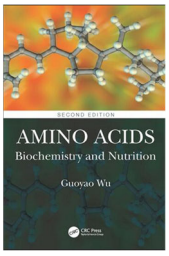
***Dr. Sakhila Banu** presented an international lecture, "Heavy Metal Toxicity: Ecological and Global Public Health Concern" at the International Conference on Ecotoxicology – Impacts, Assessment and Mitigation, Madurai Kamaraj University, Tamil Nadu, India. September 16-17, 2021.

IRFB Faculty Activities, Awards, etc. continued from page 15

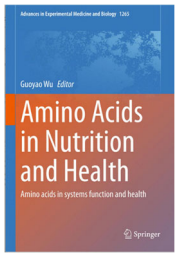
***Dr. Heewon Seo** gave an invited presentation (virtually) entitled "Comparative Analyses of Placentation in Domestic Species" at the International Symposium on Developmental Biotechnology, South Korea, October 15th, 2021.

BOOKS

Dr. Guoyao Wu** published two new books since the last IFRB Newsletter. ***Amino Acids: Biochemistry and Nutrition (Second Edition) presents exhaustive coverage of amino acids in the nutrition and health of humans and other animals. Revised, expanded and updated to reflect scientific advances, this book introduces the basic principles of amino acid biochemistry and nutrition, while highlighting the current knowledge of the field and its future possibilities.



The second book this year is **Amino Acids in Nutrition and Health: Amino acids in systems function and health, comprehensively covers the metabolism of amino acids in all systems and sense organs of humans and animal models.** It addresses the crucial roles of amino acids in improving the systematic health and well-being of humans and animal models. It also provides practical solutions through amino acid nutrition to prevent and treat chronic and infectious diseases in humans an animal models.



BOOK CHAPTERS

***Johnson GA, Bazer FW and Seo H**. 2021. The early stages of implantation and placentation in the pig. In: Placentation in Mammals: Tribute to E.C. Amoroso's lifetime contributions to viviparity. Advances in Anatomy, Embryology and Cell Biology. Ed's R.D. Geisert and T.E. Spencer. Academic Press: Springer Nature, Switzerland, pp 61-89.

***Green JA, Geisert RC, Johnson GA and Spencer TE.** Implantation and placentation in ruminants. Tribute to E.C. Amoroso's lifetime contributions to vivparity. Advances in Anatomy, Embryology and Cell Biology. Ed's R.D. Geisert and T.E. Spencer. Academic Press: Springer Nature, Switzerland, pp 129-154**.** ***

IRFB Trainee News continued from page 8

***Alison Basel** is a new Ph.D. student in **Dr. Michael Golding's** laboratory. Alison is from Johannesburg, South Africa, and received a B.S. in Genetics from Iowa State University. She is focused on understanding the link between parental alcohol consumption, altered epigenetic programming, and predisposition of offspring to enhanced tissue fibrosis and cancer.

***Sanat Bhadsavle,** MVSc is a new Ph.D. student in **Dr. Golding's** lab. He received his BVSc degree from the Bombay Veterinary College and a M.S. in Animal Biotechnology from the National Dairy Research Institute, India. Sanat's research focuses on defining the role of sperm histones in transmitting an epigenetic memory of paternal alcohol exposure to the offspring and the impacts on the early-stage fetus and placenta.

***Jessica Sustaita** is a PhD student under the mentorship of **Dr. Rodolfo Cardoso**. Jessica will investigate effects of prenatal androgens on the development of the sexually dimorphic nucleus in the preoptic area of the brain in male lambs.

***Amy L. Phillips** is a new Ph.D. student in the laboratory of **Dr. Sakhila Banu**. She earned a B.S. in Natural Science from Oklahoma Baptist University. In 2017, she joined the College of Veterinary Medicine and has worked a diagnostic technician at TVMDL before joining the lab.

***Brette Poliakiwski** is a first-year Ph.D. student with **Drs. Ky Pohler** and **Cliff Lamb** (co-advisor). She grew up in Alberta, Canada on a beef/dairy family operation and recently graduated with an Animal Science degree from the University of Saskatchewan. She is currently studying the contribution that prostaglandins have on late embryonic mortality in bovine.

***Joe Cain** is a new M.S. student under the mentorship of **Dr. Greg Johnson**. Joe is originally from San Diego, California and earned his B.S. in Biological Sciences from University of California, Santa Barbara. His research will include the examination of Class I MHC expression in late ovine pregnancy and early bovine pregnancy.

***Sara Gurule** is a M.S. student under direction of **Dr. Rodolfo Cardoso**. Sara received her B.S. degree in Animal Science from New Mexico State University in 2021. Sara's research investigates the multigenerational effects of prenatal exposure to androgen excess in sheep , who recapitulate reproductive and metabolic alterations similar to those seen in women with PCOS.

***Damon Smith** is a new M.S. student in the lab of **Dr. Ky Pohler**. Damon is from Manhattan, Kansas where he received his B.S. degree at Kansas State University in Animal Science. His research focuses on better understanding the differences in pregnancy loss between Bos indicus and Bos taurus cattle while also exploring the differing contributions to pregnancy loss from the embryo and uterus.

***Learsi De Hoyos** is a senior Biomedical Sciences major, currently working on her B.S. degree. During the summer, 2021, Learsi has been working with **Dr. Sakhila Banu** focusing on changes in cytoskeletal machinery of the oocytes imposed by Cr(VI) exposure.

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Research Snapshot, cont'd from page 15

Li, T.T., S.M. Huang, L. Lei, S.Y. Tao, Y. Xiong, G. Wu, J. Hu, X.K. Yuan, S.J. Zhao, B. Zuo, H.J. Yang, Y.P. Xiao, G. Lin, and J.J. Wang. 2021. Intrauterine growth restriction alters nutrient metabolism in the intestine of porcine offspring. J. Anim. Sci. Biotechnol. 12:15, pp. 1-12.

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IFRB Faculty Transitions

*__Dr. Gary R. Newton__ completed his career as Research Scientist Leader and Director of the International Goat Research Center on March 31, 2021. He began his academic appointment at Prairie View A&M University in June 1989 after completing postdoctoral training at the University of Florida. He received a B.S. in Biology from the State University of New York at Geneseo. He spent 30 months as a Peace Corps Volunteer in Malaysia before enrolling in graduate school at the University of Kentucky, where he received a Ph.D. in Animal Science. As a new investigator he secured research funding from the USDA and NIH and established a collaborative research program in early pregnancy biology that built university research infrastructure and facilitated experiential learning for graduate and undergraduate students interested in research. He was a Principle Investigator (PI) or Co-PI on grants totaling $3.39 million. He provided significant service as an expert reviewer for NIH and USDA research funding programs including NIGMS-NIH - Minority Biomedical Research Review Sub-Committee, NIH-USDA Special Emphasis Program - Research in Biomedicine and Agriculture Using Agriculturally Important Domestic Species, USDA-ARS National Program 101 Food Animal Production, USDA National Research Initiative Competitive Grants Program – Animal Reproduction Program, and USDA-1890 Capacity Building Grant Program.

Many of his NIH and USDA funded research projects involved collaborations involving faculty with similar interests at Texas A&M University where he held Adjunct appointments in the Department of Animal Science and Veterinary Integrative Biosciences. Research collaborators at Texas A&M University included Drs. David Adelson, Marcel Amstalden, Fuller Bazer, Robert Burghardt, Nancy Ing, David Forrest, Greg Johnson, Thomas Spencer, Thomas Welsh, Jr., and Mark Westhusin.

These collaborations helped create a pipeline for student matriculation into graduate and professional degree programs at TAMU and nationwide. The Bridges to the Doctorate in Reproductive Biology Leadership Team efforts were rewarded in 2011 with the Texas A&M AgriLife, Vice Chancellor's Award for Excellence in Diversity. In 2008 he was appointed the Director of the International Goat Research Center (IGRC) and was the primary point of contact for renovations to the IGRC research laboratories and animal care facilities. Renovation of six research barns improved facilities needed for implementation of a comprehensive animal care and use program, including expansion of the Universities capacity to conduct biomedical research. A GrowSafe Feed Intake and Behavior Monitoring System will serve as a tool for genetic selection and herd improvement. His vision was the IGRC becoming a small ruminant CORE research and training center for the TAMUS and beyond. His interests in international agriculture and development enabled PVAMU participation in earlier USAID funded goat projects in Kenya, Ethiopia, Jordon and Haiti. He was a founding member of the Interdisciplinary Faculty for Reproductive Biology and the Texas Forum for Reproductive Sciences and was a dedicated organizer and supporter of the annual meetings.

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* __Dr. Gary L. Williams,__ Professor and research leader in the Animal Reproduction Laboratory the Texas A&M AgirLife Research Station in Beeville, retired after nearly 37 years on May 31, 2021. During that time, served as the research leader/scientist-in-charge at the Beeville Station and as a member of the graduate faculty in the Department of Animal Science, TAMU, College Station. He started his academic career in a teaching/research position at North Dakota State University, Fargo in 1978. In 1984, he joined the Texas Agricultural Experiment Station in Beeville and undertook the design and development of the Animal Reproduction Laboratory where he has remained for the balance of his career. He is an internationally recognized scholar in reproductive physiology, endocrinology, and reproductive management of beef cattle and horses. He is an internationally recognized scholar in reproductive physiology, endocrinology, and reproductive management of beef cattle and horses and an established authority in the field of neuroendocrine signaling pathways controlling the nutritional programming of puberty in beef heifers. It has also contributed to the understanding of seasonal reproduction in mares and identification of methodologies for its control. Some specific areas of his research include:

- Neuroendocrinology of the postpartum period in cattle which has led to has led to an improved understanding of the physiological regulation of postpartum anovulation, maternal behavior, lactation, and the central control of gonadotropin secretion in cattle, results of which have been incorporated into practical protocols for managing bovine postpartum reproduction.
- Dietary fat metabolism and ovarian physiology in cattle: use of oilseeds to enhance postpartum reproductive performance in thin cows leading to expanded use of oilseeds for beef cattle supplementation programs and development of commercial high fat supplements by most major U. S. feed manufacturers.
- Nutritional programming of puberty in the heifer: impact of pre- and postnatal nutrition on adult reproductive phenotype.
- Synchronization of ovulation for fixed-time AI in Bos indicus influenced cattle. Development of the protocol known as Bee Synch II, referred to nationally in the Beef Sire Directories as PG-5-day-Co-Synch + CIDR, is now the only nationally-recommended approach for synchronization of ovulation for fixed-time AI of Bos-indicus-influenced cattle.
- Neuroendocrine control of reproductive seasonality in the mare. This work demonstrated the ability of continuous, subcutaneous infusion of native GnRH treatment to accelerate the timing of pregnancy by up to 2 months within a normal management setting.

Since 1984, he has served as chair or co-chair of 36 M.S./Ph.D. degree programs, and mentored 8 postdoctoral trainees, received $4.6 million in extramural funding and support. He was Associate Editor for the Journal of Animal Science, 2003-2007 and served as Editor-in Chief, Domestic Animal Endocrinology from 2009-2018. His most recent awards were the Senior AgriLife Research Faculty Fellow, Texas A&M AgriLife Research, 2020 and Research Fellow Award, American Society of Animal Science Research, 2017.

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Biology of Reproduction

Research Snapshot, cont'd from page 17

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14th Annual IFRB Retreat, 2021

The 14th Annual IFRB Retreat was held on October 15, 2021 in conjunction with the 26th Annual Dr. Raymond O. Berry Memorial Lecture. Over 60 IRFB faculty and trainees from the Colleges of Veterinary Medicine & Biomedical Sciences and Agriculture and Life Sciences, Science and Medicine, along with Prairie View A&M participated in the Retreat which was held at Prairie View A&M University, Prairie View, TX. **Dr. Bob Burghardt,** presided over the meeting.

Organizers of the retreat were Drs. Gary Newton from Prairie View A&M **Greg Johnson** and **Fuller Bazer** from Texas A&M.

Trainee platform presenters included 8 Ph.D. Candidates and one undergraduate researcher.

Xin Fang, "Activation of TGF-Beta Signaling as an Oncogenic Switch in Sertoli Cells In Vivo."

Gabi Dalmaso, DVM, "Influence of Pregnancy-Associated Glycoproteins on the Reproductive Transcriptome in Bos Indicus Heifers."

Camilo Hernandez Aviles, DVM, Studies in the Acrosomal function of Fertile and Subfertile Stallions.

Luisa Fernanda Ramirez-Agamez, DVM, "A Comparison of Biopsy Procedures for Preimplantation Genetic Diagnosis in Equine Embryos."

Avery Kramer, "Porcine Conceptuses Utilize Glucose for Aerobic Glycolysis and Glutaminolysis."

Jacob Cabler, "Developing Bioengineering Approaches to Model the Seminiferous Epithelium in vitro."

Kaitlin Epperson, "Development and Function of the Bovine Corpus Luteum Mediated by Vaccination at AI."

Nirvay Sah, DVM "The Ovine Utero-Placental Tissues Metabolize Creatine for Feto-Placental Development."

Brianna Myre, "A Novel Approach to a New Question: Evaluating Ecological Breeding Strategies in Sea Turtles."

Viviana Garza, "Impact of Pre-and Postnatal Nutritional Extremes on Tonic Secretion of Gonadotropins and Feedback Responsiveness to Estradiol in Sexually Mature Heifers."

Invited faculty presenters included:

Dr. Fuller Bazer, "The Multiple Roles of Arginine During Pregnancy."

Dr. Qinglei Li, "New Insights into Uterine Epithelial Development."

Retreat participants also attended a trainee poster session that included from TAMU and PVAMU.

Support for the 14th Annual IFRB Retreat and Dr. Raymond O. Berry Memorial Lecture was provided by **Dr. Cliff Lamb,** Department of Animal Science, **Drs. Jane Welsh** and **Larry Suva**, Departments of Veterinary Integrative Biosciences, and Veterinary Physiology & Pharmacology and **Dr. Fuller Bazer**, through his Distinguished Professor account.

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IRFB Undergraduate Research Student Spotlight

***Makenzie Newton** is from New Boston, Texas, and graduated from Texas A&M University with a degree in Animal Science in December, 2021. Following graduation, she will begin graduate school under the supervision of **Dr. Fuller W. Bazer**, pursuing a master's degree in the Physiology of Reproduction. At the beginning of her collegiate career, Makenzie had plans to attend veterinary school to become a rural veterinarian. It was not until she began working in Dr. Bazer's laboratory as an undergraduate researcher in August, 2019 that she decided to change her original plan. In Dr. Bazer laboratory, she has appreciated the importance of high-quality research and has become passionate about conducting research at the intersection of nutrition and reproduction. Since joining the laboratory, she has become familiar with laboratory techniques, terminology, and animal reproductive concepts. A s an undergraduate researcher, she has assisted **Dr. Claire Stenhouse** in a research project pertaining to the roles of calcium, vitamin D, and phosphorus during pregnancy in the sheep. The project has focused on quantifying these molecules in plasma, uterine flushings, placental fluids, endometria, and placentomes across gestation. Experiments have sought to identify regulatory pathways for the transport of calcium, vitamin D, and phosphorus during the peri-implantation period and in late gestation. The data generated from this work has been included in two peer-reviewed publications in *Biology of Reproduction*. While working on this project, she became an Aggie Research Scholar under the mentorship of Dr. Stenhouse. During graduate school, Makenzie plans to conduct a project relating to the dietary supplementation of beef heifers with unprotected citrulline to determine its effects on conceptus (fetus and associated placental membranes) development during the first 60 days of gestation. It has been shown that citrulline is not readily degraded in the bovine rumen. Additionally, citrulline is known to be a precursor for arginine, and arginine has been shown to enhance the early stages of ruminant pregnancies. Therefore, it is expected that increasing citrulline intake will enhance bovine conceptus development. During her 3.5 years at Texas A&M University, Makenzie has not only participated in undergraduate research, but has also been inducted into The Maroon and White Leadership Program, where she served as President during her junior year. In the summer of 2021, Makenzie completed an internship at Cactus Feeders where she gained knowledge about the beef cattle industry. All of Makenzie's experiences have helped her to realize her passion for sustainable agriculture and assisted her in identifying applicable research avenues to ultimately help beef cattle producers make informed and efficient production decisions.

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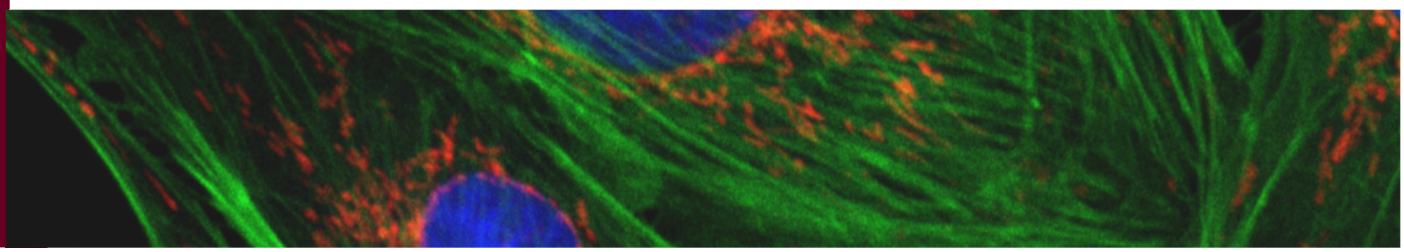

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Research Snapshot, cont'd from page 19

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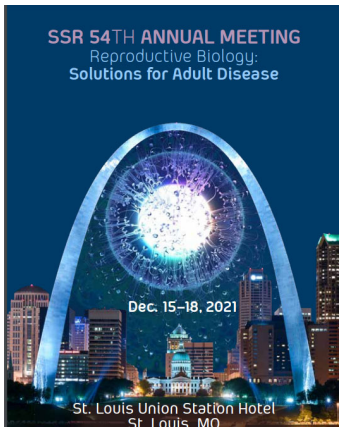
54th SSR Annual Meeting, St. Louis, MO, 2021 American Society for Animal Science, Louisville, Kentucky



The 54th Annual Meeting of the Society for the Study of Reproduction was held at the St. Louis Union Station Hotel St. Louis, MO, Dec. 15-18, 2021. Reproductive Biology: Solutions for Adult Disease." Drs. Tracy Clement and Rodolfo Cardoso served as members of the Program Committee. This year 17 IFRB faculty and 14 trainees contributed to the annual program. This included 8 trainees who submitted first-authored abstracts.

The 55th Society for the Study of Reproduction (SSR) Annual Meeting will be held from Jul 26 - 29, 2022 at Spokane Convention Center, Spokane, Washington.

The 2021 American Society for Animal Science was held in conjunction with CSAS and SSASAS hybrid meeting in Louisville, Kentucky July 14-18, 2021 at the Kentucky International Convention Center (KICC). More than 50 presentations were given by TAMU faculty including 12 IFRB members and 20 trainees.

The 2022 American Society for Animal Science will be held in conjunction with CSAS at the Oklahoma City Convention Center June 26-30, 2022. The deadline for abstracts is March 22, 2022.

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ASAS-CSAS ANNUAL MEETING
OKLAHOMA CITY, OKLAHOMA
JUNE 26-30, 2022

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Comments, Suggestions?

Contact Newsletter Editor
Bob Burghardt

IFRB RESEARCH AND TRAINING MISSION:
Reproductive Biology is at the epicenter of the life sciences. Focal areas of research and graduate/postdoctoral training in the IFRB are interdisciplinary and cover both genders, encompass humans, domestic animals, laboratory animals and wildlife, and include: assisted reproductive techniques, biological clocks, cloning, conservation of endangered species, contraception, developmental biology, diseases of the reproductive tract, endocrinology, fertilization, fetal growth retardation, gametogenesis, gender-biased diseases and health issues, immunology, infertility, lactation, pregnancy and pregnancy-related disorders, premature labor, recovery of function, science and health policy, stem cell biology, systems biology and functional genomics, toxicology, and uterine biology. The outcomes of this research are impacting Texas, our nation and the world.