

# IFRB 2020

## 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
- For the first time in 26 years, three IFRB sponsored activities, the Annual R.O. Berry Lecture, the Annual Texas Forum on Reproductive Sciences, and Annual IFRB Retreat were cancelled due to restrictions caused by the COVID-19 pandemic.

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2020, ISSUE 1

# New IFRB Faculty Spotlights



**Three New Faculty Members Join the Interdisciplinary Faculty of Reproductive Biology in 2020:** **Dr. Reinaldo Cooke**, Associate Professor, Department of Animal Science; **Dr. George A. Perry**, Department of Animal Science and Texas A&M AgriLife Research and Extension Center in Overton, and **Dr. Heewon Seo**, Assistant Research Professor, Department of Veterinary Integrative Biosciences.

**\*Dr. Reinaldo Fernandes Cooke** is an Associate Professor – Beef Cattle Production in the Department of Animal Science at Texas A&M University. Dr. Cooke was born and grew up in Brazil, where he received a B.Sc. (2003) in Animal Sciences from Sao Paulo State University. Dr. Cooke moved to Florida in the summer of 2004, where he received a M.Sc. (2006) and Ph.D. (2008) in Animal Sciences from the University of Florida. Prior to his current appointment, Dr. Cooke served as Associate and Assistant Professor - Beef Cattle Specialist at Oregon State University. Dr. Cooke leads the Texas A&M – Area of Excellence in Cattle Adapted to Tropical and Sub-tropical Environments, the Texas A&M 44 Farms - International Beef Cattle Academy, and serves the American Society of Animal Sciences (ASAS) in many different roles, including as Section Editor for the Journal of Animal Science (since 2014). Dr. Cooke received the ASAS Western Section - Young Scientist Award in 2016, ASAS Western Section - Extension Award in 2017, ASAS Early Career Achievement Award in 2018, and the ASAS Animal Management Award in 2020.



During his career, Dr. Cooke developed an active research program focused on developing and disseminating management systems to enhance production efficiency in cow-calf operations. These systems not only represent 86% of beef operations and comprise 84% of the beef cattle population in the US, but also regulate domestic and international beef supply by determining the number of cattle available for growth/slaughter. Dr. Cooke's research efforts are directed toward three main areas: 1) management to enhance health and

productivity in beef cattle; 2) nutritional interventions during pregnancy and early life to enhance beef cattle productivity; and 3) management to enhance reproduction in beef cowherds. Within this latter area, Dr. Cooke has focused on how temperament and supplementing essential fatty acids impact reproductive efficiency of beef females. Collaboration with international institutions is a fundamental component of Dr. Cooke's program, generating research-based information relevant to US and international cow-calf industries.

Temperament is defined as the fear-related behavioral responses of cattle when exposed to human handling. As cattle temperament becomes more excitable, their reaction to human contact or other handling procedures becomes more aggressive and/or fearful. Beef producers consider temperament to be an important trait when selecting cattle, particularly due to its heritability, relevance to personnel security and animal welfare. Numerous research studies from Dr. Cooke have also demonstrated that cattle temperament directly impacts production and health responses, including reproductive performance of beef females. More specifically, cows classified with excitable temperament have reduced pregnancy rate, calving rate,

weaning rate, and kg of calf weaned/cow exposed to breeding compared to cows with adequate temperament (**Table 1, page 2**). These outcomes were noted across breed types (*Bos taurus* and *B. indicus*-influenced females), reproductive management [artificial insemination (AI), natural breeding, and both], and environment (tropical, sub-tropical, and temperate climates). Circulating cortisol concentrations were greater in cows with excitable temperament (**Table 1**), which indicates that their decreased pregnancy rates could be attributed to neuroendocrine stress responses stimulated by handling for estrus synchronization and AI. Nonetheless, the same decrease in reproductive performance was observed in excitable cows assigned to natural breeding only, with no human interaction or handling to stimulate neuroendocrine stress responses during the breeding season.

(continued on page 2)



## New IFRB Faculty: Dr. Cooke (cont'd from page 1)

**Table 1.** Productive responses of beef cows according to temperament at the beginning of the breeding season (EXC = excitable, ADQ = adequate). Adapted from Cooke et al. (2012; doi:10.2527/jas.2011-4768) and Cooke et al. (2017; doi:10.2527/jas.2016.1098).

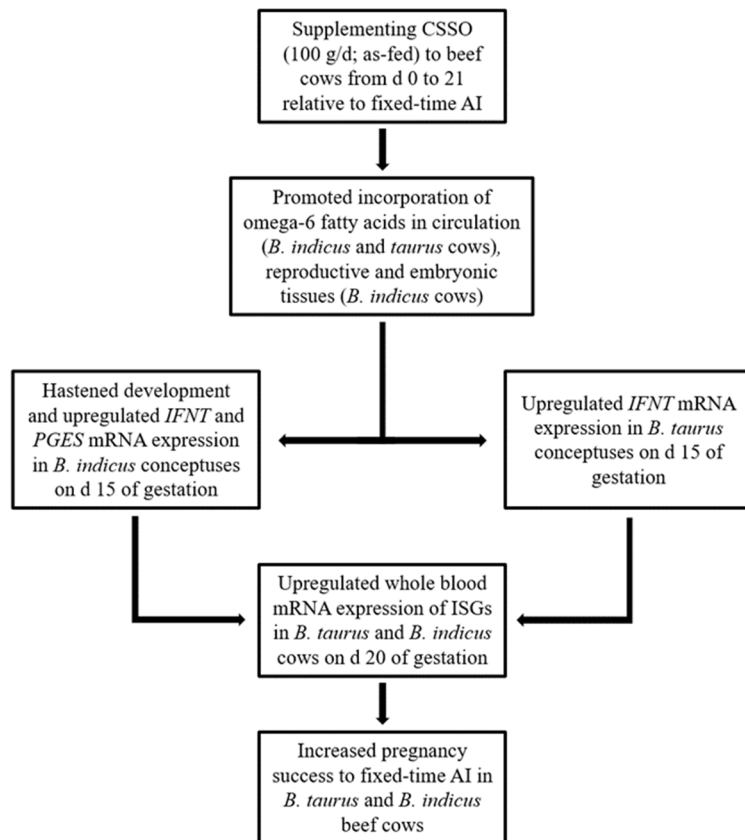
Item	Angus-influenced cows			Nelore cows		
	ADQ	EXC	P =	ADQ	EXC	P =
Reproductive results	n = 324	n = 109	-	n = 726	n = 227	-
Pregnancy rates to AI	N/A	N/A	-	47.2	41.0	0.10
Final pregnancy rates, %	94.6	88.7	0.03	79.0	75.3	0.23
Pregnancy loss, %	2.8	3.8	0.63	6.4	11.4	0.04
Calving rate, %	91.8	85.0	0.04	74.9	66.9	0.02
Weaning results						
Calf weaning weight, kg	248	247	0.71	210	204	0.04
Calf weaning age, days	201	203	0.45	212	209	0.05
Weaning rate, %	89.9	83.9	0.09	69.4	63.9	0.09
Kg of calf weaned/cow	223	207	0.08	146	130	0.04

Additional mechanisms associating temperament and reproduction in beef females, including post-conception effects and potential genetic and innate deficiencies within the reproductive system of excitable cows, are under investigation by Dr. Cooke's research program.

Dr. Cooke's research group has also investigated the impacts of supplementing Ca salts of soybean oil (CSSO), a source of omega-6 fatty acids (FA), on reproductive performance of beef cows. Initial studies were conducted with Nelore (*B. indicus*) cows grazing tropical pastures,

**Table 2.** Reproductive responses of beef cows supplemented or not with CSSO after AI. Adapted from Cooke (2018; doi:10.1093/jas/sky414).

Item	Angus-influenced cows			Nelore cows		
	CSSO	CON	P =	CSSO	CON	P =
Pregnancy rates to AI, %	60.2	51.7	0.01	49.0	38.1	<0.01
Conceptus length (day 15), cm	11.3	11.4	0.97	2.58	1.15	0.04
Conceptus, mRNA expression (day 15)						
<i>Interferon-tau</i>	21.3	12.1	0.05	21.0	5.1	0.03
<i>Prostaglandin E synthase</i>	2.22	2.50	0.69	7.89	2.99	0.02
Blood cells, mRNA expression (day 20)						
<i>Interferon-stimulated gene 15</i>	43.1	29.8	0.04	33.8	23.7	<0.01
<i>Mxrovirus resistance 2</i>	20.2	20.1	0.98	47.1	27.6	<0.01
<i>20,50-oligoadenylate synthetase</i>	26.8	18.3	0.03	48.1	35.2	0.02



associated with increased mRNA expression of interferon-tau in day 15 conceptuses and mRNA expression of interferon-stimulated genes by day 20 of gestation (Table 2). Collectively, post-AI CSSO supplementation favored incorporation of omega-6 FA into maternal and embryonic tissues, which enhanced interferon-tau synthesis by the conceptus and increases pregnancy rates to fixed-time AI in *B. indicus* and *B. taurus* beef cows (Figure 1). Currently, Dr. Cooke is working with industry to develop a self-fed molasses-based tub with CSSO inclusion to facilitate the use of this technology by commercial cow-calf operations throughout the breeding season.

Dr. Cooke's research program also investigates others aspects of reproduction in *B. taurus* and *B. indicus*-influenced females, including nutritional modulation of puberty and pregnancy success, impacts of management stress on heifer reproductive development, and how the rumen microbiome contributes to uterine and vaginal microbiomes. For more information about Dr. Cooke's research and academic efforts, feel free to contact him (reinaldocooke@tamu.edu) or stop by his office at 230D Kleberg Center. \*\*\*

**Figure 1 (left).** Summary diagram of the impacts of supplementing CSSO to beef cows after AI. (IFNT = interferon-tau; PGES = prostaglandin E synthase; ISGs = interferon-stimulated genes). Adapted from Cooke (2018; doi:10.1093/jas/sky414).



## IFRB New Faculty Spotlight: Dr. Heewon Seo

**\*Dr. Heewon Seo** is an Assistant Research Professor within the Department of Veterinary Integrative Biosciences (VIBS) and a new faculty member of the Interdisciplinary Faculty of Reproductive Biology (IFRB). He received a B.S. in Biotechnology from Yonsei University and completed a M.S. and a Ph.D. under the direction of former IFRB trainee, Dr. Hakhyun Ka, who is a professor in the Department of Biological Science and Technology, Yonsei University, Wonju, Republic of Korea. He completed postdoctoral work with Dr. Greg Johnson.

The long-term goal of Dr. Seo's research is to understand the cellular and molecular interactions between the conceptus and uterus during the processes of implantation and early placental development. He is utilizing four large animal species, pigs, sheep, cows and baboons, to pursue comparative studies across species that have different types of implantation (invasive, non-invasive) and placentation (epitheliochorial, synepitheliochorial, hemochorial) to gain insights into the physiological, endocrine, cellular and molecular events that support successful pregnancy. Particularly, his most recent research has focused on the dynamic temporal and spatial changes in the metabolism of the multiple cell types within the uterus and placenta during implantation and placentation across these four species.

Dr. Seo is investigating role of glutaminolysis as a TCA cycle anaplerotic pathway in proliferation and elongation of the conceptus trophoblast (Tr) during the peri-implantation period of pigs. Glutaminolysis is the process by which cells convert glutamine into glutamate and then  $\alpha$ -ketoglutarate ( $\alpha$ KG) that is a TCA cycle intermediate. Glutamine, one of major components of histotroph, increases the proliferation of porcine Tr cells in vitro, and his work has determined that enzymes required for glutaminolysis are expressed by the Tr of pig conceptuses. A hypothesis is that within a hypoxic environment, Tr cells of porcine conceptuses utilize glutamine within the uterine lumen as an alternate carbon source to maintain TCA cycle flux and provide biosynthetic precursors for the synthesis of nucleotides and lipids that is essential to support elongation, migration, and hormone synthesis by porcine conceptuses. The specific objectives of this research are to: 1) determine if glutaminolysis drives TCA cycle anaplerosis through oxidative and reductive pathways to support nucleotide and lipid biosynthesis in pig conceptuses; and 2) determine if inactivation of glutaminolysis and reductive carboxylation affects proliferation and elongation of pig conceptuses during the peri-implantation period. This research has been funded by the United States Department of Agriculture (USDA) at 2020. He is a PI, and Dr. Greg Johnson, Dr. Fuller Bazer and Dr. Guoyao Wu are Co-PIs on this grant.

Dr. Seo recently has expanded his research efforts to the initial immunohistochemical localization of relevant proteins in the uterine and placental tissues of an early pregnant baboon. A baboon is a highly respected animal model for human pregnancy, but little is known about the early post-implantation period of placentation in this species. In humans, effective circulation through the placental villi is only achieved towards the end of the first trimester and thus implantation and early placentation in primates takes place in a hypoxic, nutrient restricted environment. Therefore, they hypothesize that metabolic adaptation to a hypoxic uterine environment is conserved across species, and the



metabolic pathways activated in baboons under hypoxic condition are similar to what they have observed in pigs. Indeed, results of his work show that enzymes required for one-carbon metabolism and the polyol pathway/fructolysis, as well as transporters for glucose/fructose, are expressed by the cytotrophoblast and syncytiotrophoblast of placental villi and/or invading extravillous trophoblasts in the trophoblastic shell in baboons (immunofluorescence detection of solute carrier 2A1 (SLC2A1), a glucose transporter, in the trophoblast cells of an implantation site of a baboon is shown in **Figure 1** (see page 8). This research is relevant to a NIH grant submission entitled "metabolic adaptation of conceptuses to a hypoxic intrauterine environment" with Dr. Fuller Bazer and Dr. Greg Johnson as the PIs and Dr. Azgi Fazleabas and Dr. Seo as the Co-Investigators.

Another interest of Dr. Seo is the basic mechanisms that underlie early placental development in livestock species. More specifically, he is interested in the mechanism by which synepitheliochorial placentation in the placentomal regions and epitheliochorial placentation in the inter-placentomal regions develop within the placenta of sheep and cattle. For over 20 years the scientific consensus has been that, during trophoblast syncytialization in sheep and cattle, binucleate trophoblast giant cells (TGCs) differentiate from the mononuclear trophoblast cells (MTCs) through mitotic polyploidy, and individual TGCs fuse with individual uterine luminal epithelial (LE) cells to form trinucleate cells. TGCs are thought to continue to develop and migrate to the LE layer and fuse with these growing trophoblast-LE syncytial cells to eventually form extensive syncytial plaques. However, results of his work indicate that uterine LE cells are not incorporated into syncytial plaques, but are engulfed and eliminated by TGCs, that early placentation in sheep is more similar to early placentation in humans than is currently understood in that both develop mononucleated cytotrophoblast and multinucleated syncytiotrophoblast layers of entirely placental origin. Results of the follow-up studies show that OPN and integrins are expressed by migrating cells in the placentomal region to form synepitheliochorial placenta and in the inter-placentomal region to form epitheliochorial placenta in sheep.

Almost nothing is known about the process of early trophoblast syncytialization in cattle. Scientists have been limited to information obtained from sheep, however it is known that the degree of syncytial formation within the mid-pregnancy placentomes of cattle is less extensive than what is observed for sheep. The scientific consensus is that syncytialization in cattle is limited to the formation of trinucleate trophoblast-maternal hybrid cells that form throughout gestation, are transient, and eventually become absorbed by the trophoblast layer. However, Dr. Seo and Dr. Greg Johnson have preliminary results, in collaboration with Dr. Ky Pohler in the Department of Animal Science here at Texas A&M University, showing that early syncytialization in the bovine placenta is not limited to the formation of trinucleate cells but that extensive syncytial plaques develop to line the entire uterine-placental interface, which is similar to sheep placentation (shown in **Figure 2** (see page 8). Their new observations in sheep and cattle suggest that the current dogma for placental syncytialization in ruminants should be revised. They hypothesize that trophoblast fusion,

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**\*Dr. George Perry** is an Associate Professor at the Texas A&M AgriLife Research & Extension Center in Overton. Dr. Perry grew up on a cow-calf operation outside of Giddings, TX. He received his B.S. degree in Animal Science from Texas A&M. He then received his M.S. from the University of Missouri under the mentorship of Dr. Michael F. Smith. His Ph.D. was conducted between the University of Missouri and the Fort Keogh USDA-ARS research facility in Miles City, MT under the mentorship of Dr. Michael F. Smith and Dr. Thomas Geary (USDA). Before returning to Texas A&M in 2020 he spent 17 years as a faculty member in the Department of Animal Sciences at South Dakota State University. Dr. Perry is honored and excited by the opportunity to return to Texas A&M and looks forward to collaborations with IFRB members.

Dr. Perry's research program has focused on understanding mechanisms to improve reproductive efficiency of beef cattle. One of his focus areas is the role of preovulatory estradiol in improving reproductive success. Even though gonadotropin-releasing hormone can induce ovulation of follicles that contain oocytes capable of being fertilized, research from Dr. Perry's lab has demonstrated a 27% improvement in reproductive success among cows that exhibit estrus prior to fixed-time AI compared to



those that do not. The mechanisms that may lead to this increase in reproductive success are likely regulated through the increase in estradiol that occurs at the onset of estrus. This increase in estradiol has been associated with improved sperm transport to the site of fertilization (**Figure 1**).

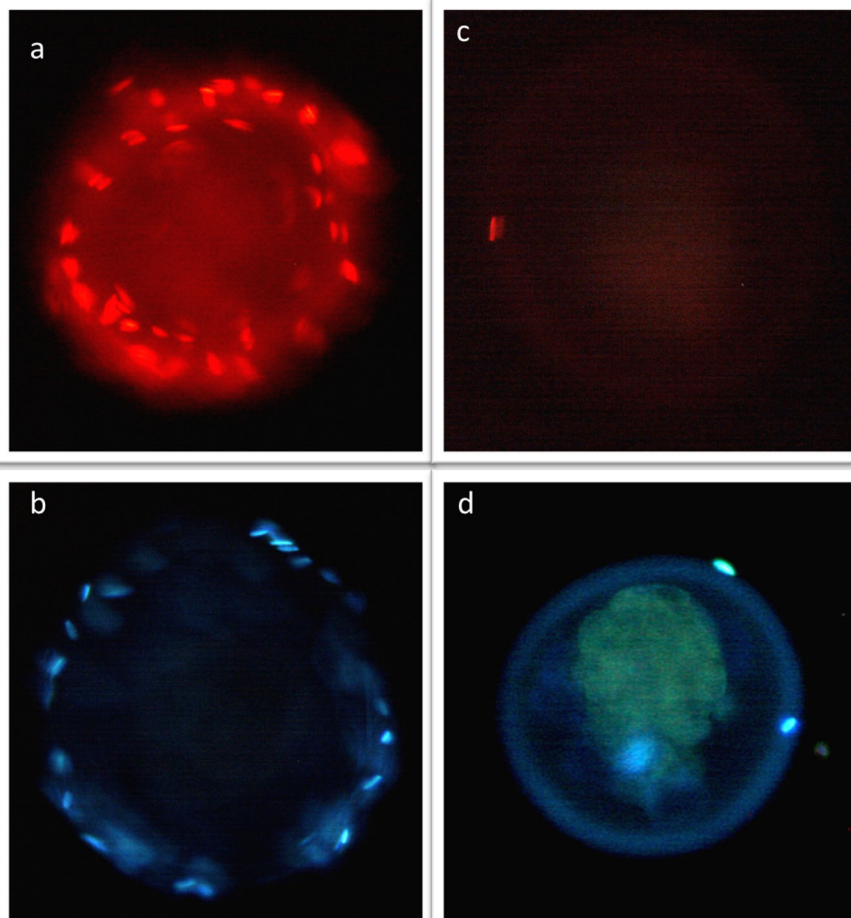
This increased sperm transport is likely mediated through changes in the uterine environment as his lab has reported that uterine pH decreases at the onset of estrus and this change is regulated by changes in sodium/hydrogen transporters. In addition, animals with a rise in estradiol prior to fixed-time AI have increased embryo survival to day 30 after insemination or embryo transfer.

Dr. Perry's lab has also investigated the role of vaccinations prior to the start of the breeding season on reproductive success of beef herds. Recent work has demonstrated that when a modified live vaccine is administered within 30 days prior to insemination the subsequent conception rates are decreased compared cows vaccinated with a killed vaccine at the same time point (**Table 1**, see page 14).

Recent work has indicated that this impact on pregnancy success is likely mediated through luteal function, as even among well vaccinated animals (received a yearly vaccination) abnormal estrus cycles can occur following vaccination with a modified live vaccine.

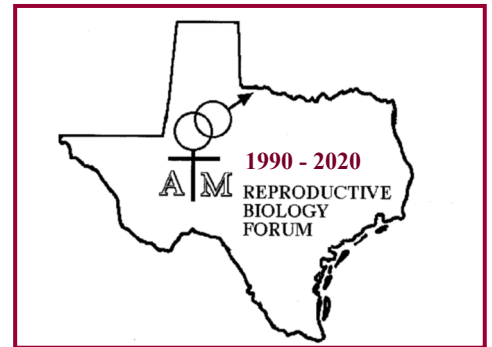
More recently, Dr. Perry's lab has been investigating factors that impact bull fertility and sperm transport and survival. It is well known that there are differences among bulls in fertility. The difficulty, however, is determining what causes these differences. Field fertility data can be impacted by sperm transport, fertilization success, and early embryo survival. Thus, how sperm interacts with the environment is critical to how long the deposited sperm have to fertilize the oocyte. When used in fixed-time artificial insemination programs the sperm are asked to survive for an extended period of time, thus determining regulation of this lifespan can have tremendous impact on the improvement of bull fertility. In addition to the genetic material that sperm brings to the oocyte at fertilization, the sperm also brings micro RNAs. These microRNAs can interact in the developing embryo to influence it during early development.

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**Figure 1.** The number of accessory sperm bound in the zona pellucida from cows that exhibited estrus prior to fixed time AI (a and b) compared to cows that did not exhibit estrus prior to fixed-time AI (c and d).

# IFRB Seminar Series, 2020



The IFRB Seminar Series, Reproductive Biology Forum, has been held weekly during the Fall and Spring Semesters since 1990 (30 years!). The IFRB Seminar Series is coordinated by **Dr. Sakhila Banu**.

January 24, **Dr. Bill Foxworth**, Research Scientist, International Goat Research Center, Cooperative Agricultural Research Center, Prairie View A&M University,

"Incompetent Caprine Corpora Lutea: Abnormal Luteal Regression During Metestrus."

January 31, **Dr. Katrin Hinrichs**, Professor and Patsy Link Chair in Mare Reproductive Studies, Department of Veterinary Physiology and Pharmacology, Texas A&M University, "Calcium-Ionophore Induced Calcium Influx in Stallion Sperm."

January 31, **Luisa Ramírez-Agámez, DVM** Graduate Theriogenology Student Department of Large Animal Clinical Sciences & Department of Veterinary and Pharmacology, Texas A&M University, "Is the Acrosome Reaction in Stallion Sperm Affected by Energy Source in Culture Media?"

February 14, **Dr. David Threadgill**,

University Distinguished Professor, Tom and Jean McMullin Chair of Genetics, Professor of Molecular and Cellular Medicine, "Epidermal Growth Factor Receptor Has a Context Dependent Role in Placental Development."

February 28, **Dr. James Cai**, Associate Professor, Veterinary Integrative Biosciences, Texas A&M, "Functional Implications of Single-Cell Expression Variability and Gene Expression Programs in Regulatory Networks as Revealed by Machine Learning."

August 28, **Robert Rose DVM, MS,**

**DACLAM**, Executive Director, Comparative Medicine Program, Texas A&M University, "Experiences with Reproductive and Teratology Studies in Pre-clinical Toxicology."



September 4, **Ken J. Gillenwater**, Assistant Director, Animal Welfare Office, Division of Research, Texas A&M University, "Introduction to Animal Research and the IACUC."

September 11, **Dr. Aileen F. Keating, Ph.D.**

Associate Professor, Department of Animal Science, Director, Interdepartmental Toxicology Graduate Program, Iowa State University, "Unscrambling effects of ototoxicant exposure."



September 18, **Ben Mörpurg, Ph.D.**, Executive Director and **Andrei E. Golovko, Ph.D., M.B.A.**, Production Manager, Texas A&M Institute of Genomic Medicine,

"Gene Editing and Other Transgenic Services at TIGM."

September 25, **Amanda H. Mahnke, Ph.D.**,

Associate Research Scientist, Department of Neuroscience and Experimental Therapeutics, Texas A&M University, "Circulating miRNAs as Biomarkers of Prenatal Drug Exposure and Developmental Outcomes."

October 2, **Elizabeth A. Wellberg, Ph.D.**,

Assistant Professor, Department of Pathology, Stephenson Cancer Center, University of Oklahoma Health Sciences Center, Stephenson Cancer Center, "Exploring the Metabolic Effects of Breast Cancer Endocrine Therapy."

October 9, **Russell V. Anthony, Ph.D.**, Hill Professor of Biotechnology, Dept. Biomedical Sciences, Animal Reproduction and Biotechnology Laboratory, Colorado State University, "An Old Cowboy with New Tales about an Old Hormone."

October 16, **George Perry, Ph.D.**, Beef Cattle Reproductive Physiology, Texas A&M AgriLife Research and Extension Center, "Role of Estradiol in Early Embryo Survival."

October 23, **Katherine L. Cook, Ph.D.**, Assistant Professor, Department of Surgery, Wake Forest School of Medicine, "Influences of Diet and Endocrine-Targeting Therapy on Breast Microbiome Plasticity."



October 30, **Shawn L. Chavez, Ph.D.**, Associate Professor, Oregon National Primate Research Center, Departments of Obstetrics & Gynecology and Molecular & Medical Genetics, Oregon Health & Science University, "Cross-Species Comparison of Aneuploidy Dynamics in Mammalian Preimplantation Embryos."

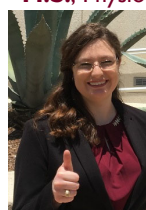
November 6, **Yoel Sadovsky, MD.**, Executive Director, Elsie Hilliard Hillman Chair of Women's Health Research, Distinguished Professor of OB-GYN, Microbiology and Molecular Genetics, University of Pittsburgh, "Placental Small Extracellular Vesicles in Maternal-Fetal Communication and Pregnancy Health."

November 13, **Jodi Anne Flaws, Ph.D.**,

Professor, Comparative Biosciences, Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois-Urbana/Champaign, "The Effects of a Phthalate Mixture on Female Reproduction."

November 20, **Katherine M. Halloran,**

**M.S.**, and **Robyn Moses, M.S.**, Physiology of Reproduction Doctoral Students, Bazer Laboratory, Department of Animal Science, Texas A&M University. "Hormonal Regulation of Agmatine and Polyamines at the Ovine Conceptus-Maternal Interface" and "Metabolism of Glucose and Fructose by the Ovine Conceptus During the Peri-Implantation Period of Pregnancy."



## IFRB Trainee News

### RECENT GRADUATES

\***Colleen Lambo, D.V. M.**, completed her Ph.D. degree in the laboratory of **Dr. Shannon Washburn** and graduated in December 2020. The title of her dissertation was "Novel Investigations to Classify Fetal Growth Restriction in Ovine Models of Reproductive Health."



\***Nicola Oosthuizen**, working in the laboratory of **Dr. Cliff Lamb**,



completed her Physiology of Reproduction Ph.D. degree and earned a Certificate in Statistics in May 2020. The title of her dissertation was "Characteristics of Estrus and Manipulation of the Estrous Cycle to Impact Fertility of Beef Females." She will be moving to South Dakota to work for ABS Global as their Reproductive Specialist and as a Team Leader starting February 2021.

\***Sydney Reese** working with **Dr. Ky Pohler** completed her Physiology of Reproduction Ph.D. degree. The title of her dissertation was "Alterations In Endocrine Profiles Contributing to Late Embryonic Mortality in Cattle." She is moving to a job in industry.

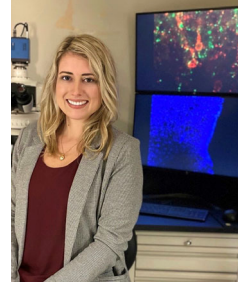


\***Lohana Fernandez Montero** completed her Physiology of Reproduction M.S. degree with **Dr. Ky Pohler**. The title of her thesis was "Bovine pregnancy associated glycoproteins in beef cattle: effects of embryo size and various methods of handling of plasma and serum samples." She has taken a position in industry.

\***Nick Holloway** working with **Dr. Duncan MacKenzie** defended his thesis titled "Localization of the Sodium Iodide Symporter (NIS) in Zebrafish" in March and received his M.S. in Biology in May 2020. He then moved to the Department of Nutritional Science and Toxicology at the University of California at Berkeley, where he is pursuing a PhD in Endocrinology, studying regulation of adipose tissue function in the lab of Dr. Hei Sook Sul. Nick's M.S. research has been published: N. Holloway, B. Riley, and D. S. MacKenzie (2021) Expression of the sodium iodide symporter (NIS) in reproductive and neural tissues of teleost fish. *Gen Comp. Endocrinol* 300: 113632.



\***Sarah West** earned a M.S. degree in Physiology of Reproduction under the mentorship of **Drs. Rodolfo Cardoso and Gary Williams**. Her thesis research focused on the effects of perinatal nutrition on the neuropeptide Y system in the bovine female. Sarah will continue in the lab of Dr. Rodolfo Cardoso to pursue a PhD in Physiology of Reproduction investigating the KNDy neuron biology in *Bos taurus* and *Bos indicus* heifers.



\***Tatiane Maia** earned a M.S. degree in Physiology of Reproduction under the mentorship of **Drs. Gary Williams and Rodolfo Cardoso**. Her thesis focused on the effects of perinatal nutrition on puberty and reproductive phenotype in *Bos indicus*-influenced heifers. Tatiane will be joining the laboratory of Dr. Peter Hansen at the University of Florida in 2021.

\***Robyn Moses** earned a M.S. degree in Physiology of Reproduction under the mentorship of **Dr. Fuller W. Bazer**. Her thesis was titled "Utilization of glucose and fructose by the ovine conceptus during the peri-implantation period of pregnancy." She will continue to work in Dr. Bazer's lab to pursue a PhD in Physiology of Reproduction and will continue further investigations of work investigating sheep conceptus metabolism of glucose and fructose.



### NEW TRAINEES & STAFF

**Dr. Renata Landers** is a new Postdoctoral Research Associate in the lab of **Dr. Rodolfo Cardoso**. Renata earned her M.S. and Ph.D. degrees from Sao Paulo State University (Jaboticabal, Brazil). Renata currently leads a NIH-funded project investigating the multigenerational effects of prenatal exposure to androgen excess using the female sheep as the animal model. Her project aims to generate fundamental knowledge that can have clinical implications to women with PCOS and other hyperandrogenic conditions.



\***Jessica Sustaita** is a new PhD student in Physiology of Reproduction in the Department of Animal Science. She joined the lab of **Dr. Rodolfo Cardoso** in August 2020. She obtained her B.S. in Animal Science at Texas A&M University in 2017. Jessica's re  
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Frontiers in  
Reproduction  
Course:  
Molecular and  
Cellular Concepts and Applications

<http://www.mbl.edu/fir/>

The FIR Course  
will not be held  
in 2021



# A Snapshot of IFRB Research, 2020

**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 research productivity illustrates the multiple investigator research activities of the IFRB, involving extensive participation of trainees during 2020:**

Achorn AM, Rosenthal GG. It's Not about Him: Mismeasuring 'Good Genes' in Sexual Selection. *Trends Ecol Evol.* 2020 Mar;35(3):206-219.

Agostini LP, Dettogni RS, Dos Reis RS, Stur E, Dos Santos EVW, Venter DP, Garcia FM, Cardoso RC, Graceli JB, Louro ID. Effects of glyphosate exposure on human health: Insights from epidemiological and in vitro studies. *Sci Total Environ.* 2020 Feb 25;705:135808.

Angeli B, Cappelozza B, Moraes Vasconcelos JL, Cooke RF. Administering an Appeasing Substance to Gir × Holstein Female Dairy Calves on Pre-Weaning Performance and Disease Incidence. *Animals (Basel).* 2020 Oct 24;10(11):1961.

Bae H, Yang C, Lee JY, Park S, Bazer FW, Song G, Lim W. Melatonin improves uterine-conceptus interaction via regulation of SIRT1 during early pregnancy. *J Pineal Res.* 2020 Sep;69(2):e12670.

Baker, E.C., K. Z. Cilkiz, P.K. Riggs, B.P. Littlejohn, C.R. Long, T.H. Welsh, Jr., R.D. Randel, and D.G. Riley. 2020. Effect of prenatal transportation stress on DNA methylation in Brahman heifers. *Livestock Science Volume 240:* doi.org/10.1016/j.livsci.2020.104116

Balasubramanian D, Baranwal G, Clark MC, Goodlett BL, Mitchell BM, Rutkowski JM. Kidney-specific lymphangiogenesis increases sodium excretion and lowers blood pressure in mice. *J Hypertens.* 2020 May;38(5):874-885.

Balasubramanian D, Gelston CAL, Lopez AH, Iskander G, Tate W, Holderness H, Rutkowski JM, Mitchell BM. Augmenting Renal Lymphatic Density Prevents Angiotensin II-Induced Hypertension in Male and Female Mice. *Am J Hypertens.* 2020 Jan 1;33(1):61-69.

Bazer FW, Seo H, Wu G, Johnson GA. Interferon tau: Influences on growth and development of the conceptus. *Theriogenology.* 2020 Jul 1;150:75-83.

Berg EL, Pride MC, Petkova SP, Lee RD, Copping NA, Shen Y, Adhikari A, Fenton TA, Pedersen LR, Noakes LS, Nieman BJ, Lerch JP, Harris S, Born HA, Peters MM, Deng P, Cameron DL, Fink KD, Beitnere U, O'Geen H, Anderson AE, Dindot SV, Nash KR, Weeber EJ, Wöhr M, Ellegood J, Segal DJ, Silverman JL. Translational outcomes in a full gene deletion of ubiquitin protein ligase E3A rat model of Angelman syndrome. *Transl Psychiatry.* 2020 Jan 27;10(1):39.

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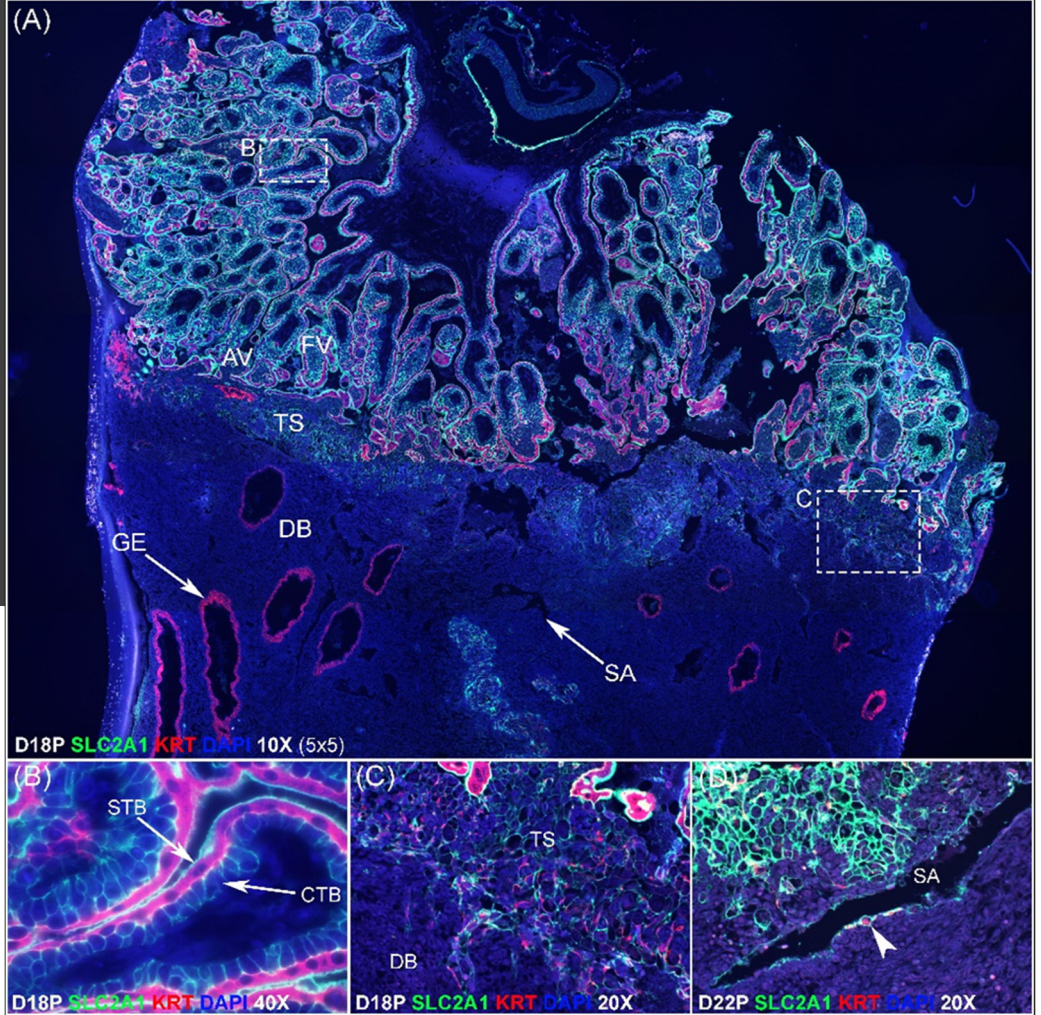
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# New Faculty Spotlight, Dr. Seo (cont'd from page 3)

Figure 1 (right) Immunofluorescence staining for SLC2A1 and cytokeratin (KRT) in baboon placental tissues during early placentation. SLC2A1 protein (green color) was detected in the cytotrophoblast (CTB) and the syncytiotrophoblast (STB) with strong intensity in the STB of placental villi. SLC2A1 protein was also detected in the invading extravillous trophoblasts in the trophoblastic shell (TS) and in the spiral arteries (SA) replacing endothelial cells (see an arrow head) on Day 22 of pregnancy. AV, anchoring villi; FV, floating villi; DB, decidual basalis; GE, glandular epithelium.



D18P SLC2A1 KRT DAPI 10X (5x5)

D18P SLC2A1 KRT DAPI 40X

D18P SLC2A1 KRT DAPI 20X

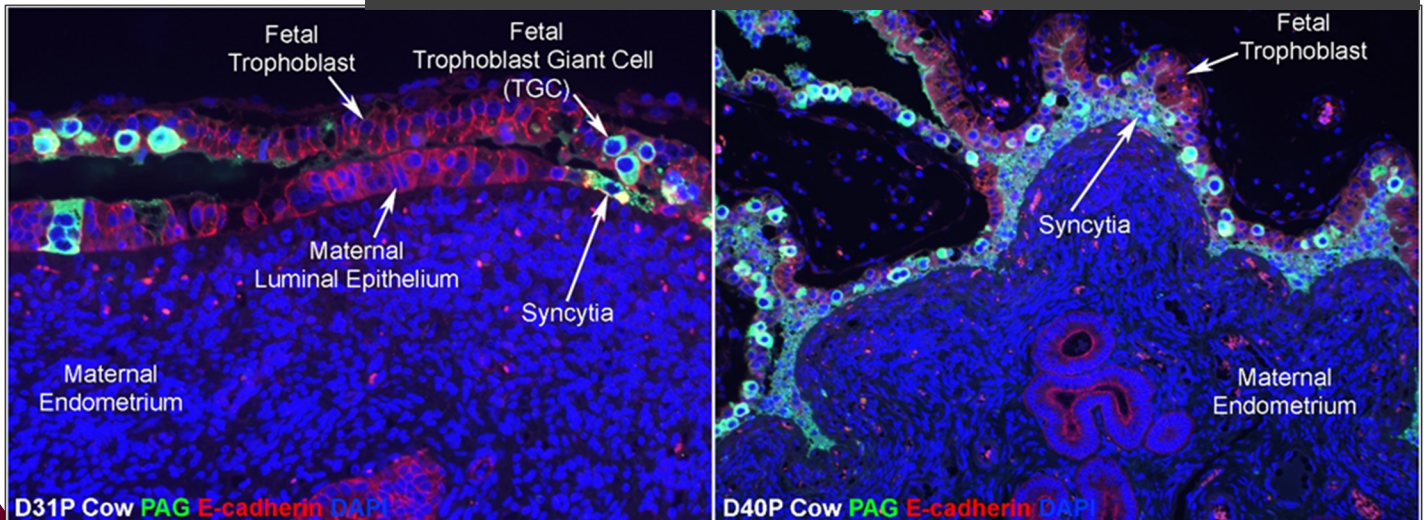
D22P SLC2A1 KRT DAPI 20X

trophoblast migration, and elimination of uterine LE cells by trophoblasts in sheep is also true for cattle.

Dr. Seo has published, as a first author and co-author, 47 peer-reviewed manuscripts in journals including *Endocrinology*, *Biology of Reproduction*, *Reproduction and Placenta*. He works very closely with a collegial group of respected scientists here at Texas A&M University who focus on pregnancy in livestock species, including Drs. Greg Johnson and Robert Burghardt within the CVMB, and Drs. Fuller Bazer and Guoyao Wu within the College of Agriculture & Life Sciences. He is looking forward to interacting and working with others in IFRB.

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Figure 2 (below) Double immunofluorescence staining for pregnancy associated glycoprotein (PAG; stains TGCs; green) and E-cadherin (stains mononuclear Tr and LE; red) at implantation sites in the cow. E-cadherin-stained uterine LE cells are replaced with PAG-stained syncytia in the uterine LE layer. The blue nuclei are stained with DAPI for histological reference. D, Day; P, pregnancy.



D31P Cow PAG E-cadherin DAPI

D40P Cow PAG E-cadherin DAPI



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search project focuses on elucidating the epigenetic mechanisms underlying neuroendocrine perturbations in female sheep prenatally exposed to androgen excess.

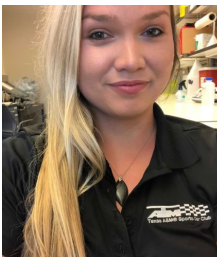
\***Kaitlin Epperson** is working towards a Ph.D. with **Dr. George Perry** studying the relationship between reproductive physiology and vaccination in beef cattle. Prior to joining Dr. Perry at A&M, she completed her M.S. with him in December of 2019 at South Dakota State University. During that time her thesis work was focused on the influences of estrus resynchronization, Bovine Viral Diarrhea Virus, and peri-AI nutrition on reproductive success.



\***Lacey Quail** is a Ph.D. student with **Dr. George Perry**. Lacey is originally from South Dakota where she completed her B.S. in Animal Science. Lacey received her M.S. in Physiology of Reproduction from TAMU in August 2018 while working with Drs. Ron Randel and Tom Welsh. Her thesis was titled Relationships between Antral Follicle Numbers and Postpartum Interval in Brahman Females. Before returning to TAMU in 2020 to continue with her Ph.D., Lacey

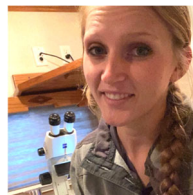
worked as the Sheep Teaching & Research Center manager for Michigan State University. Currently her research focuses on the role of proovulatory estradiol in beef cattle.

\***Jaclyn Ketchum** is a Ph.D. student in Physiology of Reproduction working with **Dr. George Perry**. In 2020 she earned her M.S. degree from the University of Missouri under Dr. Mike Smith and her B.S. degree was completed at Kansas State University in 2018. Jaclyn's current research focuses on sperm-borne miRNAs and their role in early embryonic development of bovine.



\***Katherine (Katie) Zimmel**, Research Associate, is the manager of **Dr. Mike Golding's** lab. Originally from Houston, Katie graduated from Baylor University with a Bachelor's degree in Biology. Katie has advanced histology and medical imaging expertise and directs research projects examining embryonic patterning defects induced by either preconception or early life exposures.

\***Alyx Staples** as a M.S. student in the laboratory of **Dr. Ky Pohler**. Alyx is originally from New Providence, Iowa. She completed an undergraduate degree at Iowa State University in Animal Science and will be working on the efficiency of bovine IVF embryos.



\***Rafael Pavia** is a PhD student in **Dr. Ky Pohler's** lab. Rafael is originally from Venezuela where he completed a Veterinary Medicine degree. He has worked in the industry both in Latin American in the United States before returning to graduate school. Rafael will be working on pregnancy associated glycoproteins in cattle.

#### GRAD STUDENT AND POSTDOC GRANTS & AWARDS

\***Dr. Rebecca Poole**, Postdoctoral Research Associate in the laboratory of **Dr. Ky Pohler** received a USDA-AFRI competitive grant for her postdoctoral studies, "Hormonal and Immunological Influences on the Uterine Microbiome in Cattle." 7/15/20 - 7/14/22.

**Dr. Poole** also received the Southern Section ASAS Emerging Scholar Award was the recipient of the 2020 Southern Section of the American Society of Animal Science (ASAS) Emerging Young Scholar Award, presented to her at the annual 2020 Southern Section ASAS Meeting

\***Dr. Nicola Oosthuizen**, in **Dr. Cliff Lamb's** lab, received the First Place Award at the 2020 Texas A&M Postdoctoral Research Symposium held in September.

\***Sarah West** working in the lab of **Dr. Rodolfo Cardoso** received a 2020 USDA-NIFA-AFRI Merit Award at the 2020 Society for the Study of Reproduction (SSR) Annual Meeting where she presented her research "Effects of Prenatal and Postnatal Nutrition on Neuropeptide Y Neuronal Projections to Kisspeptin Neurons in the Arcuate Nucleus of Beef Heifers."

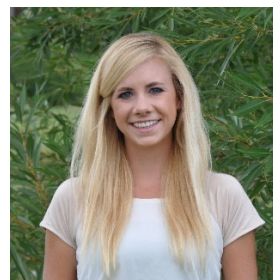


\***Dr. Claire Stenhouse**, postdoctoral fellow in the laboratory of **Dr. Fuller Bazer** was the recipient of an SSR Trainee Travel Award for the 2020 Society for the Study of Reproduction (SSR) Annual Meeting where she presented her work "Phosphate Regulation Pathways are Present in the Ovine Conceptus, Endometrium and Placenta."

\***Viviana Garza** in **Drs. Gary Williams'** (chair) and **Rodolfo Cardoso's** (co-chair) group was awarded a Pathways to the Doctorate Fellowship from the Office of Graduate and Professional Studies, TAMU.



\***Avery Kraemer** working in the lab of **Dr. Greg Johnson** received 2020 USDA-NIFA-AFRI Merit Award at the 2020 Society for the Study of Reproduction (SSR) Annual Meeting where she presented her research "Porcine Conceptuses Utilize the Polyol Pathway and Fructose-Driven Glycolysis (Fructolysis) to Support Development during the Peri-Implantation Period of Pregnancy. Avery's recent first authored manuscript published this year in *Endocrinology* was selected for a Commentary in *Endocrinology*. Kramer AC, Steinhauser CB, Gao H, Seo H, McLendon BA, Burghardt RC, Wu G, Bazer FW and Johnson GA. Steroids Regulate Expression of SLC2A1 and SLC2A3 to Deliver Glucose into Trophectoderm for Metabolism via glycolysis. *Endocrinology*, 2020; 161:1-19. **Commentary:** Mathew DJ. Glucose and Fructose transport across the epitheliochorial placenta: SLC2A and the uterine-placental interface in pigs. *Endocrinology*, 2020; 161:1-2.



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## IFRB Graduate Student Spotlights

**\*Katherine Halloran** is a Ph.D. candidate in the Department of Animal Science mentored by **Dr. Fuller W. Bazer**. She received her BS from California Polytechnic State University San Luis Obispo, where she participated in undergraduate volunteer research related to cryopreservation of dairy cow embryos generated by IVF. Katherine joined Dr. Bazer's laboratory in 2016 as a MSc Student, where her research focused on the effects of exogenously administered progesterone on fetal and placental development in sheep. Her work showed that progesterone administered during the pre-implantation period in sheep (and before conceptus signaling of interferon tau, the maternal recognition of pregnancy signal in ruminants) affects the composition of amino acids in placental fluids, as well as the expression of nutrient transporters in the endometrium and placenta. In her PhD studies, Katherine has explored the relationships between interferon tau and progesterone signaling and their influence on synthesis and secretion of agmatine and polyamines, in addition to how hexose sugars contribute to one carbon metabolism. Ultimately, she is interested in understanding how different components of uterine histotroph (namely hexose sugars, amino acids, agmatine, and polyamines) are utilized by the conceptus and endometrium to stimulate pathways such as one-carbon metabolism and the mechanistic target of rapamycin (mTOR). These pathways are instrumental for proliferation and development of the elongating conceptus in sheep, thus have significant relevance for successful outcomes of pregnancy in mammals. Katherine has been a Trainee Member of the Society for the Study of Reproduction (SSR) and has presented her work each summer at the national meetings.

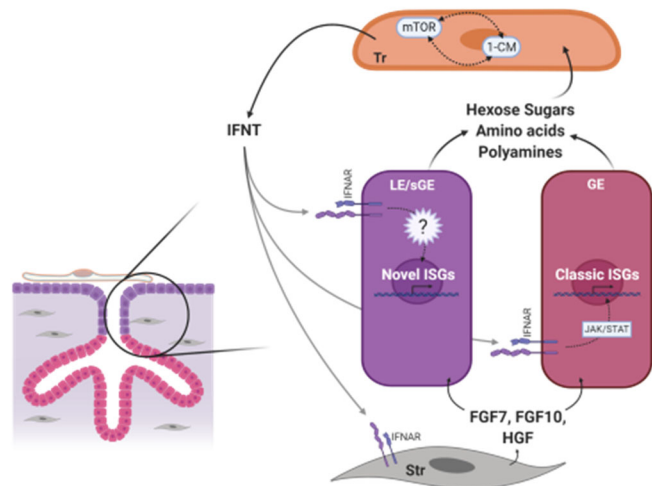


Houston, and the 2018 Mammalian Reproduction Gordon Research conference in Italy. Over the course of her MSc and PhD degrees, Katherine has also worked as a teaching assistant the Department of Animal Science. She has taught laboratory sections for ANSC 221, 333, 414, and 434. Each semester and each new class brings a new set of learning opportunities for Katherine, and she appreciates these opportunities to develop her teaching and mentoring skills. In addition to her research and teaching roles, Katherine has also been actively involved in the Animal Science Graduate Student Association and currently serves on the 2020-2021 Executive Committee as Secretary and Head of the Professional Development Committee. Since 2017, Katherine has served as the IFRB Trainee Representative on the IFRB Executive Committee. With the guidance of her graduate committee consisting of Drs. Fuller Bazer, Guoyao Wu, Gregory Johnson, and Robert Burghardt, Katherine wishes to continue on the pathway of academic research and hopes to become a postdoctoral research associate after graduation.

Outside of the lab, Katherine enjoys outdoor activities such as hiking and horseback riding. Katherine is also an avid reader and occasional crafter in her spare time. \*\*\*

She has delivered oral presentations at the 2018 IFRB Retreat in Navasota, the 2018 Texas Forum for Reproductive Sciences (TFRS) in

Working model of trophoblast (Tr) signaling of interferon tau (IFNT) in uterine luminal (LE), superficial glandular (sGE), and glandular epithelia (GE), in conjunction with stromal cells (Str). LE, sGE, and GE synthesize and/or transport nutrients into the uterine lumen in the form of histotroph. In response, the trophoblast cells of the conceptus activate signaling pathways including mTOR and one-carbon metabolism to support proliferation, migration, and elongation during the peri-implantation period of pregnancy.



## IFRB Graduate Student Spotlights



**\*Gabriela Dalmaso de Melo** is a second year PhD student in the Department of Animal Science mentored by **Dr. Ky Pohler**. Originally from Brazil, Gabriela earned her D.V.M in 2016 from São Paulo State University. In 2017, she joined University of São Paulo as a Master student majoring in Physiology of Reproduction. Her research focused on early pregnancy diagnosis approaches in *Bos indicus* cattle using new technologies such as Doppler ultrasonography, quantification of peripheral interferon-tau stimulated genes and pregnancy associated glycoproteins. Results from her research demonstrated that it is possible to accurately diagnose pregnancy in cattle as early as day 18 to 20 of gestation. These findings have major impact on the beef industry, allowing producers to increase the chances of females to get pregnant during the breeding season, and subsequently increasing

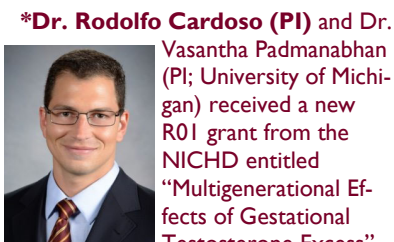


overall production efficiency. With these findings, Gabriela published two peer-reviewed manuscripts and eight scientific abstracts and had the opportunity to present her data in several national and international meetings. Gabriela received a study abroad grant from Sao Paulo Research Foundation which allowed her to perform part of her research at Dr Pohler's lab at Texas A&M University. After defending her masters, Gabriela was awarded with the Cattle Adapted to Tropical and Subtropical Environments Assistantship to pursue a PhD under Dr. Pohler mentorship. Currently, Gabriela works on characterizing and understanding the events that lead to late embryonic mortality in cattle. Reproductive failure is one of the greatest causes of economic loss in cattle, and embryonic mortality is a primary

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## IRFB Faculty Activities, Awards, etc.

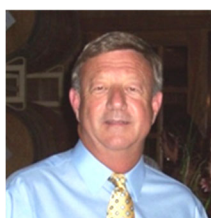
### NEW GRANTS:



**\*Dr. Rodolfo Cardoso (PI)** and Dr. Vasantha Padmanabhan (PI; University of Michigan) received a new R01 grant from the NICHD entitled "Multigenerational Effects of Gestational Testosterone Excess".

5/1/2020 – 4/30/2025, \$2,446,810.

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



**\*Drs. Rodolfo Cardoso (PI), Reinaldo Cooke (co-PI), and Kevin Washburn (co-PI)** received a new TAMU T3 grant entitled "Novel Biomarkers to Predict Fertility in Cattle," 3/1/2020 – 2/28/2022, \$32,000.

**\*Drs. Heewon Seo (PI), Greg Johnson (Co-PI), Fuller Bazer (Co-PI) and Guoyao Wu (Co-PI)** received a new grant from USDA-AFRI-NIFA "Glutaminolysis provides TCA cycle intermediates necessary for proliferation in the conceptus trophectoderm of pigs." 6/01/2020 – 5/31/2023, \$500,000.



**\*Dr. Mike Golding** received an NIH NIAA R01 grant entitled, "Heritable, Epigenetic Effects of Paternal Alcohol Use on FASD Phenotypes, 6/15/2020 - 3/31/2025. Co-Investigators are **Drs. Tracy Clement** and **Rajesh Miranda**.

**Dr. Golding** is also Co-Investigator on a Houston Methodist Cancer Center Innovation Award entitled "Exploration of Early-Stage Biomarkers of Urothelial Cell Transformation Induced by Chronic Arsenic Exposure,"

8/01/2020 – 7/31/2022, Co-PIs are Drs. Raj Satkunasivam and Jae Roh.

**\*Dr. Jay Ramadoss (PI)** received a NIH NIAA R01 Grant, "A Novel Mechanistic Framework for FASD Etiology." 4/01/2020 – 3/31/2025, \$1,870,861.



**Dr. Ramadoss** received notice of a new NIH NIAA R01 grant, "Electronic Cigarette Vaping and Vascular Sequelae in the Uterus During Pregnancy", 4/01/2021 to 3/31/2024, \$1,622,622.

**\*Drs. Reinaldo Cooke (PI),**

**Courtney Daigle, Cliff Lamb, Rodolfo Cardoso and Ky G. Pohler (Co-PIs)** received a new grant from USDA-AFRI-NIFA,



"Stocking Density and Management Considerations for Beef Heifers Reared in Drylots." 7/1/2021 - 3/30/2024.

**\*Drs. Reinaldo Cooke (PI), L. O. Tedeschi and Ky G. Pohler (Co-PIs)** received a new grant from USDA NIFA – NNF "Generating expertise to optimize beef production in tropical/subtropical environments." 1/1/2021 – 1/1/2025.

**\*Drs. Ky Pohler (PI), Jon Green and Sofia Ortega (Co-PIs)** received a new grant from USDA-AFRI-NIFA, "Physiological Function of Prostaglandins and Pregnancy Associated Glycoproteins in Late Embryonic Mortality in Cattle." 7/1/2021 - 3/30/2024.

**\*Drs. Tom Hairgrove (PI), David Anderson, James Thompson, Luis Tedeschi, Ron Gill, and Ky G. Pohler (Co-PIs)** received a new grant from USDA-AFRI-NIFA, "Improving the Sustainability of Rural Veterinarians through Mentoring, Targeted Education, Telemedicine, and Monitoring of Disease Syndromes." 9/1/2020 – 8/31/2023.

**\*Drs. Vitor Mercadante; (PI), Alan Ealy, Fernando Biase, Cliff Lamb and Ky G. Pohler (Co-PIs),** Received a new grant from USDA-AFRI-NIFA, "Unraveling the Resilience of *Bos indicus* Cattle to Improve Early Embryonic Survival," 7/1/21 - 6/30/25.

**\*Drs. Ky Pohler (PI), Cliff Lamb and Rodolfo Cardoso (Co-PIs)** received a grant from Sexing Technologies Inc. "Fixed time artificial insemination utilizing sex sorted semen in Brahman or Brahman influenced cattle: Strategies and comparison for increased pregnancy rates."

**\*Dr. Dana Gaddy** received a renewal grant, NIH-T35, Summer Programs for Veterinary Students, 2020 -2025. \$372,550.



**\*Drs. Courtney Daigle, Nancy Ing and Tracy Vemulapalli** received a new TAMU T3 grant entitled "Using Canine Olfaction to Predict Bovine Respiratory Disease and Promote Antimicrobial Stewardship" 3/1/2020 – 2/28/2022, \$32,000.

**\*Drs. S. White (PI), T. Welsh (Co-PI), R. Randel, C. Long, J. Paschal, D. Riley, and P. Riggs, (Co-Is)** received a new grant from USDA-AFRI-NIFA, "Enhancing Sustainability and Profitability of TROPICALLY Adapted Beef Cattle Utilizing a Novel Skeletal Muscle Energetics Approach." 2021 - 2024. \$500,000.

### AWARDS & HONORS:

**\*Dr. Qinglei Li** serves as a chartered member for the NIH CMIR study section and as an ad hoc reviewer for DoD Ovarian Cancer Research Program (OCRCP)."



**Dr. Li** was also appointed Associate Editor for *Molecular Human Reproduction* (MHR). MHR is one of the four official journals of the European Society of Human Reproduction and Embryology (ESHRE). MHR has the most recent impact factor of 3.6 and ranks 6 of 29 in reproductive biology. The journal publishes papers on various topics of reproduction, including physiology, endocrinology, molecular and cell biology, genetics, and epigenetics.

(continued, page 16)

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## New Faculty Spotlight, Dr. Perry (cont'd from page 4)

Table 1. Impact of Vaccine on Pregnancy Success.

Vaccine	AI Conception (%)	Day 56 Pregnancy Success (%)	Breeding Season Pregnancy Success (%)	Early Embryo Loss (%)
Modified Live	40.0 ± 4 <sup>a</sup>	88.9 ± 2 <sup>c</sup>	95.2 ± 2 <sup>c</sup>	2 ± 1
Inactivated	46.5 ± 4 <sup>b</sup>	93.2 ± 2 <sup>d</sup>	98.0 ± 1 <sup>d</sup>	2 ± 1
Saline	43.3 ± 4 <sup>ab</sup>	92.5 ± 2 <sup>d</sup>	96.4 ± 1 <sup>cd</sup>	2 ± 1

Our laboratory

has recently identified 516 microRNAs in sperm with 10 of them being differently expressed between bulls with good and poor field fertility data (**Figure 2**). Dr. Perry's group is currently investigating how these microRNAs may be impacting early embryo development.

Dr. Perry also currently serves as the chair of the Beef Reproductive Taskforce and is an active member in the Society for the Study of Reproduction, American Society of Animal Science, and the American Registry of Professional Animal Scientists. He currently serves on the editorial boards for journals, *Systems Biology in Reproductive Medicine* and *Applied Animal Science*.

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Means within a column having different superscripts are different <sup>ab</sup>P = 0.055, <sup>cd</sup>P ≤ 0.01



Figure 2. Venn diagram of differentially expressed miRNAs among bulls with poor field fertility data compared to bulls with good field fertility data.

## Graduate Student Spotlight, cont'd from page 11

contributor to this loss. Over the last decade, early embryonic mortality has been a focus of intense investigation; however, very little has been learned about late embryonic mortality. Despite the widely accepted magnitude of this problem across the industry, little progress has been made towards understanding the physiological and molecular mechanisms contributing to late embryonic mortality. Until the mechanisms leading to these losses are known, the significant detrimental effects that late embryonic mortality is having on fertility in cattle cannot be ameliorated. As a short-term goal, Gabriela intends to examine the morphological and molecular footprint of successful pregnancies versus cows predicted to experience late embryonic mortality. In collaboration with **Dr. Johnson and Dr. Seo**, Gabriela has developed some preliminary data characterizing the development of bovine conceptus in early to mid-gestation (**Figure 1**). This period of embryo attachment and placental development is critical for pregnancy loss and have not yet been described in cattle.

These results are exciting and will provide great insight into the mechanism of placenta development in cattle, which will help understand and develop methods to

mitigate pregnancy loss during this period. Gabriela is excited that her research outcomes have made significant contributions to the area of beef reproductive physiology. \*\*\*

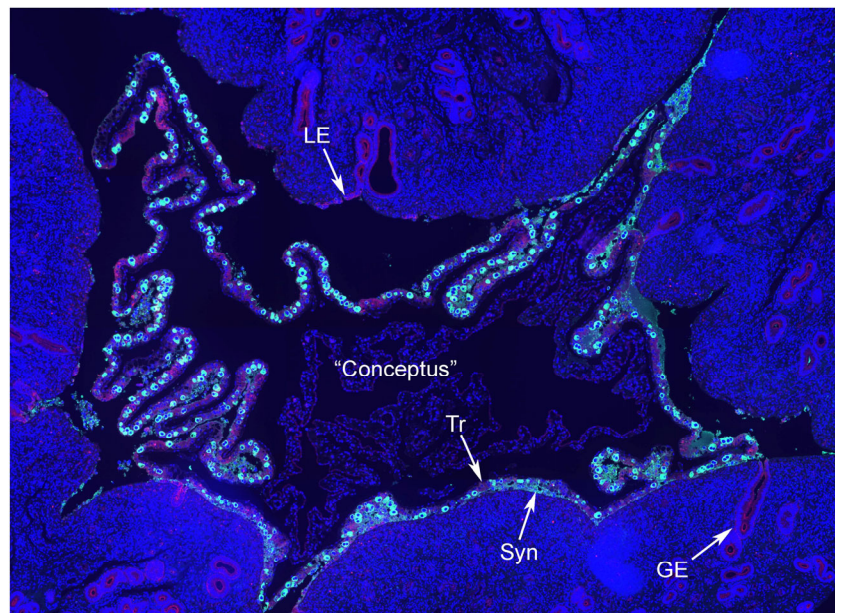
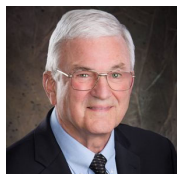


Figure 1. A conceptus implantation from Day 31 of bovine pregnancy. Bright immunofluorescence staining for pregnancy associated glycoprotein (PAG) identifies binucleate trophoblast and trophoblast giant cells. Image courtesy of Drs. H. Seo and G. Johnson.

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## Faculty Activities, cont'd from page 12



**\*Dr. Fuller Bazer** was the 2020 recipient of the Strauss Beacon Award from the Board of Scientific Counselors or the Frontiers in Reproduction Program.

**\*Dr. Rodolfo Cardoso** was the recipient of the 2019 Dean's Outstanding Achievement Award - Early Career Research, College of Agriculture and Life Sciences, Texas A&M University.

**\*Dr. Rodolfo Cardoso** and Dr. Xavier Donadeu (The Roslin Institute, University of Edinburgh) took over the role of co-Editors-in-Chief for *Domestic Animal Endocrinology* (DAE) from Stan Hileman, who had been Editor-in-Chief since January 2018.

**\*Dr. Greg Johnson** was selected as one of the 2020 Chancellor Enhancing Development and Generating Excellence in Scholarship (EDGES) Fellows which highlights Texas A&M's intentional commitment to intensively support, retain and recognize faculty with significant and sustained accomplishments and the promise of continued high-impact scholarship. **Dr. Johnson** also received an Association of Former Students Distinguished Achievement Award for Research.



in the ASAS Undergrad Competition. Not shown is another undergraduate, Grace Wesson who earned a 2nd place ASAS Undergrad Poster Competition at the meeting.

**\*Dr. Ky Pohler** (left center) was the recipient of the 2020 Southern Section of the American Society of Animal Science (ASAS) Outstanding Young Animal Scientist Award presented in January. He is shown here with **Dr. Becky Poole** (right) who received the Southern Section ASAS Emerging Scholar Award and undergraduate **Kate DeShazo** (left) who also earned a 2nd Place award

**\*Dr. Reinaldo Cooke** was the recipient of the Animal Management Award at the 2020 American Society of Animal Science annual meeting in July 2020. The award recognizes his accomplishments that are leading to the discovery, dissemination, and application of management systems that advance beef cattle production in the US and across the globe.

**\*Dr. Gary Williams** received the Texas A&M AgriLife Research Senior Research Fellow Award in January 2020. The award was presented to Dr. Williams by Dr. Patrick Stover, Vice Chancellor and Dean for Agriculture and Life Sciences and director of Texas A&M AgriLife Research.



### INVITED LECTURES

**\*Dr. Rodolfo Cardoso** was an invited lecturer at the D.H. Barron Reproductive and Perinatal Biology Research Program at the University of Florida. "Developmental Programming of the Neuroendocrine System in Ruminants", February, 2020.

**\*Dr. Greg Johnson** was an invited lecturer at the Triennial Reproduction Symposium, American Society of Animal Science Annual Meeting. The title of his lecture was: "Steroids regulate SLC2A1 and SLC2A3 to deliver glucose and fructose into trophoblast for metabolism via glycolysis." July, 2020.

**\*Dr. Qinglei** gave an invited Reproductive Biology Seminar at the College of Veterinary Medicine, University of Illinois at Urbana-Champaign, Urbana, IL, entitled "TGF-beta signaling and granulosa cell tumors," November, 2020.

### INTERNATIONAL LECTURES & BOOK CHAPTERS

**\*Williams GL, Cardoso RC.** Neuroendocrine Control of Estrus and Ovulation, in *Bovine Reproduction*, 2nd Edition, Wiley, Hoboken, NJ (In press).

**\*Drs. Gary Williams and Rodolfo Cardoso** were invited to serve as Co-Editors of a Special Issue of *Domestic Animal Endocrinology*: 'Advances in the Neuroendocrinology of Domestic Animals: A 2020 Perspective - Dedicated to the Memory of Dr. Marcel Amstalden (1970-2014)'.

**\*Fernandez, L., R.K. Poole, S.T. Reese, G.A. Franco, and K.G. Pohler\***. 2020. Managing the problem donor. *Bovine Reproduction*. \*\*\*

## IFRB Trainee News, cont'd from page 10

**\*Audrey Earnhardt**, Graduate Research Assistant and Physiology of Reproduction Ph.D. student in the laboratories of **Drs. Tom Welsh and Ron Randel** was the recipient of the Joseph P. Fontenot Travel Scholarship Award during the 2020 American Society of Animal Science's virtual annual meeting and trade show in July. She is also the recipient of the Animal Science Department Excellence Fellowship in the Department of Animal Science. Her doctoral research focuses on the physiological genomics of stress and the immune system in Brahman cattle, as well as determining the significance of a "sire effect" on the age at first calving in Brahman heifers.



**\*Grace Wesson** (left) and **Kate DeShazo** (right) Undergraduate students in **Dr. Ky Pohler's** lab earned 2nd place Awards at the 2020 Southern Section of the American Society of Animal Science meeting held in Chattanooga, TN in January.



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## Research Snapshot, cont'd from page 15



MHR | basic science of reproductive medicine

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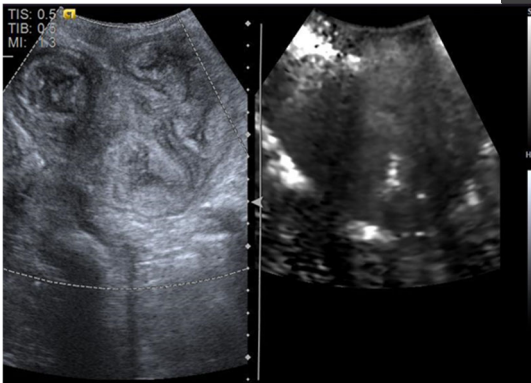


## IFRB Postdoctoral Research Associate Spotlight

**\*Dr. Renata Landers** joined **Dr. Rodolfo Cardoso's** research group in June 2020 as a Postdoctoral Research Associate. She received her D.V.M. in 2013 from the School of Veterinary Medicine in Garça, Brazil. Subsequently, she received a M.S. in Animal Reproduction from Sao Paulo State University (UNESP, Jaboticabal, Brazil) in 2015.

During her M.S. training, Dr. Landers developed an alternative approach for laparoscopic assessment for oocyte recovery in sheep. In 2018, Dr. Landers obtained her Doctoral degree in Animal Reproduction from the same institution where she worked with Drs. Wilter Vicente, Pedro Paulo Teixeira and Marcus Feliciano to investigate the postpartum events in sheep. Physiological events that take place during the postpartum period influence fertility during subsequent breeding and have important economic relevance. Her research focused on characterizing these physiological changes throughout uterine involution, evaluating uterine regression, changes in the uterine vasculature and uterine stiffness via B-mode ultrasonography, color Doppler, and elastography. Elastography ARFI (Acoustic Radiation Force Impulse) is a non-invasive technique based on ultrasonography used to evaluate stiffness of a tissue using a short acoustic push pulse, with the ability to qualitatively and quantitatively evaluate the elastic properties of tissues. In qualitative ARFI, short acoustic pulses of high intensity are utilized to transiently deform the fragments of the tissue and create a greyscale static map or matrix (elastogram) representing the relative stiffness of the area of interest. The quantitative approach utilizes a primary acoustic impulse sent towards a region of interest and promoting the formation of pressure waves capable of deforming the tissues to raise the speed of the wave propagation (shear wave velocity). The wave velocity and the attenuation of acoustic pressure waves are both related to the rigidity and viscoelasticity of the tissue. The elasticity of soft tissues provides valuable information used for the diagnosis of many diseases, such as inflammation, fibrosis, and tumoral tissues.

During her PhD work, Dr. Landers demonstrated through qualitative and quantitative elastography that the uterine parenchyma is not easily deformable during postpartum and the elasticity of the uterine wall is constant during the involution process, suggesting that a different elastographic pattern can potentially indicate alterations in the uterine parenchyma (**Figure 1**). These findings indicate that, even though the size of the uterus changes throughout postpartum involu-



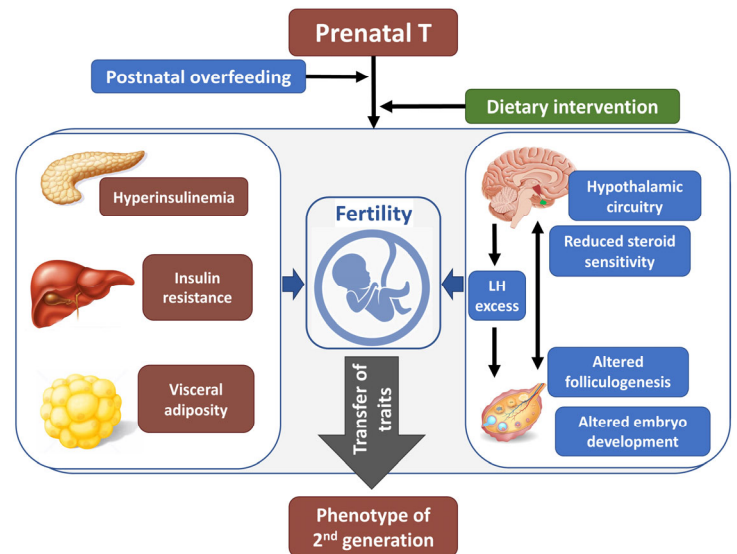
**Figure 1. Qualitative ARFI elastography analysis of a healthy ovine uterus during postpartum. Note the B-mode image (left) and the image of the elastography (right) of the uterus showing a homogeneous and dark (hard) image, respectively.**



tion, the elasticity of the uterus undergoes only minor changes, providing important insights into understanding the events between parturition and uterine involution.

For her postdoctoral training, Dr. Landers will lead a NIH-funded project that will investigate the multigenerational effects of prenatal exposure to androgen excess using the sheep as the animal model. Female sheep prenatally treated with testosterone develop reproductive and metabolic alterations that closely recapitulate those seen in women with polycystic ovary syndrome (PCOS). More specifically, this ongoing project will determine the transfer of the deleterious effects of prenatal testosterone excess on first-generation (F1) to second-generation (F2) females and elucidate the epigenetic, transcriptional and functional

changes in the neuroendocrine, ovarian, and metabolic systems to identify the mechanisms mediating the vertical transmission of PCOS-



**Figure 2. Overall working model. Prenatal testosterone (T) excess impacts reproductive and metabolic functions in the F1 and F2 female offspring.**

like traits (**Figure 2 above**). PCOS is one of the most common infertility disorders, affecting over 100 million women worldwide. Currently, information is limited as to which traits get transmitted from PCOS mothers to their daughters and, importantly, how early reproductive and metabolic perturbations become evident. Therefore, a better understanding of these processes can help develop strategies for preventing not only progression and severity of disease but also transfer of disease to the offspring. Findings from this sheep model will provide crucial biological information for improving reproductive function across generations and are of clinical relevance to women with PCOS and other hyperandrogenic fertility disorders. This project also involves Dr. Vasantha Padmanabhan and other investigators from the University of Michigan Health System.

During her career, Dr. Landers has published 8 first author manuscripts, served as co-author for 29 manuscripts, one book chapter, and presented numerous abstracts in national and international scientific meetings. She is enthusiastic to join the TAMU IFRB and looking forward to interacting with IFRB members. \*\*\*

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# 53rd SSR Virtual Annual Meeting, 2020 ASAS-CSAS-WSASAS Virtual Annual Meeting



## 2020 ASAS-CSAS-WSASAS Virtual Annual Meeting and Trade Show

July 19-23, 2020

The 2020 ASAS Virtual Annual meeting held July 9-23, 2020 replaced the face-to-face annual meeting due to the COVID-19 pandemic. Texas A&M University was well-represented at the annual meeting with more

**The 53rd Annual Meeting of the Society for the Study of Reproduction** was scheduled to be held 9 – 12 July 2020 at the Shaw Centre, Ottawa, Ontario, Canada. Due to the COVID-19 pandemic, the face-to-face meeting was cancelled. In its place, a SSR Virtual meeting was held July 8-12. The event drew 892 attendees from 38 countries. Three IFRB trainees received SSR 2020 Awards. IFRB participants at the meeting included 16 IFRB faculty and 20 trainees who contributed to the annual program. This included 14 trainees who submitted first-authored

abstracts accepted for presentation at the Annual SSR meeting. The 2021 SSR Annual Meeting is currently being planned for Aug 4-7, in St. Louis, MO.

## 54th SSR Annual Meeting

Starts: Aug 4, 2021 12:00 AM (CT)  
Ends: Aug 7, 2021 12:00 AM (CT)

Save the Date!  
54th SSR Annual Meeting  
St. Louis, MO  
4-7 August, 2021

### Location

St. Louis Union Station Hotel  
1820 Market Street  
St. Louis, MO 63103



than 20 trainees and 7 faculty presenting posters and more than 15 trainees and 18 faculty contributing oral presentations. Seven faculty from the TAMU CVMBS also presented at the meeting. As noted in trainee and faculty awards and honors sections of this newsletter, Texas A&M received a solid share of the major awards presented at the annual meeting. The 2021 annual meeting is currently being planned for July 14-18, in Louisville, KY.

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Dana Gaddy  
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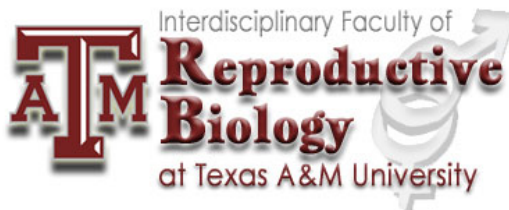
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### IFRB RESEARCH AND TRAINING MISSION:

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.

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