COGS
COUNCIL of GRADUATE STUDENTS
MICHIGAN STATE UNIVERSITY

18th Annual

ASGRF

Animal Science Graduate Research Forum

Thursday 10/19/23 9:00 am

Anthony Hall, Room 1310

Abstract Program

Event Program/Schedule

8:00 – 8:55 BREAKFAST/POSTER SESSION (*Room 2315*)
9:00 – 9:30 OPENING REMARKS: Dr. Catherine Ernst (*Animal Science Department Chair*), Dr. Laura Bix (CANR *Assistant Dean for Teaching, Learning, and Academic Analytics)*

Session 1 – Moderator: Lee Ackerson (Room 1310)

9:30 – 9:45 Alisson Santos *Effect of treatment with GnRh prior to breeding-oestrus on fertility to first service of lactating Holstein cows*
9:45 – 10:00 Thaniá Minela *Precise regulation of ovarian function increased fertility of lactating dairy cows compared to detection of oestrus*
10:00 – 10:15 Rachel Eck *Targeting the molecular clock to regulate uterine contractions during pregnancy*
10:15 – 10:30 Renee Harbowy *Incidence rate of lesions in the distal forelimb of growing, exercising sheep as a model for horses*
10:30 – 10:45 Nattawipa (Eye) Ampaiwan *Vibrations of accelerometers for use in kenneled dogs*

Session 2 – Moderator: Thaniá Minela (Room 1310)

10:45 – 11:00 Melanie Pimentel-Concepción *Growth performance, carcass traits, and feeder calf value of beef x Holstein and Holstein feedlot steers*
11:00 – 11:15 Maggie Miller *Evaluating the dose-response effect of docosahexaenoic acid abomasal infusions on production responses and plasma fatty acids in mid-lactation dairy cows*
11:15 – 11:30 Ghayyoor Ahmad *Abomasal infusion of branched chain amino acids (BCAA) or branched chain keto acids (BCKA) alters liver lipid metabolism in early lactation dairy cows*
11:30 – 11:45 Haylee Reisinger *Bovine monocyte-derived macrophages exhibit endotoxin tolerance after repeated stimulation with lipopolysaccharide*
11:45 – 12:00 Lee Ackerson *Analytical framework for estimating antimicrobial resistance gene abundance in metagenomic samples of animal agriculture origin*

12:00 – 1:00 LUNCH (*Room 2315*)

Session 3 – Moderator: Morgan Mills (Room 1310)

1:00 – 1:15 Jair Esteban Parales-Giron *Fatty acid supplementation interacts with starch content to alter production responses during the immediate postpartum in dairy cows*
1:15 – 1:30 Alycia Bales *Increasing dietary inclusion of high oleic acid soybeans increases milk production of high-producing dairy cows*
1:30 – 1:45 Anna Breithaupt *Development and validation of a behavioral assessment tool to monitor shelter dog coping behavior*
1:45 – 2:00 Katie Baugh *Assessing fear as a measure of welfare in cage-free laying hens*
2:00 – 2:15 Sarah Naughton *Feeding a fat supplement containing palmitic and oleic acid interacts with parity in peak lactation dairy cows during summer months*
2:15 – 2:30 Erika Eckhardt *Temperature fluctuations modulate molecular mechanisms in skeletal muscle and influence growth potential in beef steers*

Session 4 – Moderator: Haylee Reisinger (Room 1310)

2:30 – 2:45 Lautaro Garcia *Impacts of soil carbon sequestration and climate metrics on beef production's contribution to anthropogenic global warming*
2:45 – 3:00 Morgan Mills *Enhancing net food production by using "leftover" feeds for high-producing dairy cows*
3:00 – 3:15 Lynn Olthof *Assessment of greenhouse gas footprints on exemplary small and mid-sized U. S. Dairy Farms*
3:15 – 3:30 José Mauricio dos Santos Neto *Impact of abomasal infusion of linoleic and linolenic acids on the incorporation of n-6 and n-3 fatty acids into milk fat of lactating cows*
3:30 – 3:45 Jeff Mann *Disruption of catalytic RING2 domain in murine RNF216 impairs male fertility*
3:45 – 4:00 Andrea Luttman *Relationship of resilience to weaning stress with transcript abundance and phenotypic traits at slaughter*

4:00 – 4:15 AWARDS CEREMONY
4:15 – 4:30 CLOSING REMARKS: Dr. Teresa K. Woodruff (*University Interim President*)
4:30 – 5:00 ICE CREAM SOCIAL

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Animal Science
Michigan State University

Welcome from the 2023 ASGRF Organizing Committee

We are excited to welcome you to MSU's 18th annual Animal Science Graduate Research Forum. We, the ASGRF Organizing Committee, have worked hard to make sure that this experience helps to uplift and foster connections between students, faculty and staff of this vibrant and diverse scientific community. As you view the posters and listen to the oral presentations, we hope you will gain a deeper appreciation and understanding for all the hard work and long hours our graduate students and post docs put into their research to make our department what it is. Today, students throughout our many disciplines and species will come together to learn from one another. We are pleased to have 22 oral presentations and 3 posters this year representing research in nutrition, reproduction, genetics, immunology, behavior, welfare, physiology, and management.

We are honored to welcome Assistant Dean **Dr. Laura Bix** of CANR and MSU Interim President **Dr. Teresa K. Woodruff** to this year's event. We are grateful that they took the time out of their busy schedule to come and celebrate the research of our department. Their presence will encourage and strengthen us, and we believe that they will leave inspired by the work of our graduate students and post-docs.

The organizing committee would like to thank the attendees, presenters, and volunteers that made this event possible. We would especially like to thank the competition judges: **Dr. Zheng Zhou** and **Dr. Kwangwook Kim** for judging the oral presentations and **Dr. Janice Swanson** and **Melissa Elischer** for judging the posters. This group of outstanding judges have willingly granted their time and experience to join us and to provide feedback that will advance the research generated in our department. We would also like to thank our Department Chair, **Dr. Catherine W. Ernst** and our graduate program coordinator **Dr. Janice Siegford** for unconditionally supporting the graduate students throughout the year and helping to maintain the quality of ASGRF. Thank you to **Karla Macelli** for supporting the committee, taking care of the logistics of this event, and always helping us. Finally, thanks to the past organizing committees for their diligence in keeping records and providing continuous support to the following committees. Special thanks for last year's committee members **Melanie Concepción Pimentel, Isabelle Berenstein, Thaniá Minela**, and **Dr. Robert Tempelman** for your help and support. It has been an honor to work with each one of the students, faculty, and staff of this department. We could not have pulled off this event without their support and participation. It has been an honor to work with the students, faculty, and staff of this department. We could not have pulled off this event without their support and participation. We would also like to especially thank Council of Graduate Students and the Department of Animal Science for providing financial support for this event.

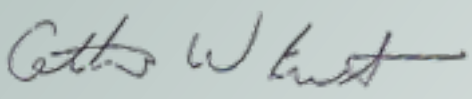
The 2023 ASGRF Organizing Committee,
Renee Harbowy, Maggie Miller, Ghayyoor Ahmad, and Dr. Zheng Zhou

Welcome from the Animal Science Department Chair

On behalf of the faculty and staff of the Department of Animal Science, I am pleased to welcome you to the 18th annual Animal Science Graduate Research Forum. This forum provides a unique opportunity for our graduate students and post-docs to share their research progress and accomplishments. Unlike our professional conferences, the forum crosses the boundaries of our disciplines and species, and showcases the breadth and diversity of our research activities in a single venue. It also fosters interactions with our graduate students and post-docs who represent diverse backgrounds and experiences, and who have come to MSU from across the US and the world. We come together for the forum with our shared interest in understanding the biological processes that enhance animal production and human health, and the forum provides opportunities to explore new ideas and foster collaboration.

Another unique feature of the forum is that the event is student-driven with all planning and organization led by a graduate student coordinating committee. This year's forum was made possible by the dedication and hard work of our organizers and hosts Renee Harbowy, Maggie Miller and Ghayyoor Ahmad. They have done an outstanding job planning today's program that includes a very impressive schedule with poster and oral presentations throughout the day. They have also arranged to have Interim President Teresa Woodruff join us at the end of the forum for closing remarks. I also wish to thank Dr. Zheng Zhou for his guidance and support in advising the organizing committee, and Karla Macelli for technical assistance and all that she does "behind the scenes".

This day is a highlight of the year for me that I look forward to every October. Graduate students and post-docs represent the next generation of creative scholars and leaders. It is exciting and energizing to witness their academic progress and share in their passion and enthusiasm.
Enjoy the day and celebrate the accomplishments of our graduate students and post-docs!



Catherine W. Ernst, PhD

Meet the Presenters

Poster Session

8:00 – 9:00 AM

Kaitlin Karl – PhD in Animal Science

Academic advisor/PI: Dr. James Ireland

Area of Research Interest: Reproductive and Developmental Sciences

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
Only Murderers in the Building – Hulu

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
Professional Organizer or Florist – Instant gratification while using creative energies.

Excessive FSH doses during ovarian stimulation of small ovarian reserve heifers induce premature cumulus expansion

K.R. Karl, L.R. Martins, Z.L. Clark, J.B. Cibelli, K.E. Latham, J.J. Ireland

Presented at the 2023 International Ruminant Reproduction Symposium

Introduction: Excessive doses of a commercial porcine pituitary FSH (cpFSH) during ovarian stimulation of small ovarian reserve heifer (SORH) result in follicular hyperstimulation dysgenesis (FHD) in ovulatory-size follicles. FHD is characterized by severe abnormalities in multiple cell-signaling pathways in granulosa, cumulus, and oocytes critical for ovulatory follicle function, supporting the hypothesis that excessive cpFSH doses during ovarian stimulation impair cumulus cell function.

Materials and Methods: The SORH received twice daily injections of the industry standard or excessive cpFSH doses for 4 d (n=10-18 heifers/dose). Ovaries were removed 12 h after the last cpFSH injection, follicles (≥10 mm) were excised, and cumulus-oocyte complexes (COCs) aspirated (Exp 1). Alternatively, oocyte pick-up 12 h after the last cpFSH injection in (Exp 2 and 3), or 24 h after hCG (Exp 4). Cumulus morphology was recorded. A cohort of COCs (n = 37) were also subjected to IVF.

Results: Ovarian stimulation with excessive vs industry-standard cpFSH doses increased the proportion of expanded COCs per heifer in Exp 1 (72±3% vs 0%, P<0.001), Exp 2 (22±5% vs 0%, P<0.0001) and Exp 3 (32±5% vs 3±2%, P<0.0001). However, following hCG in Exp 4, excessive cpFSH reduced proportion of expanded COCs (24±4% vs 45±8%, P<0.05). Cleavage and blastocyst rates following IVF of prematurely expanded COCs from the excessive cpFSH treated heifers were 5% and 0%, respectively, compared with 68% and 28% for controls.

Conclusion: Excessive cpFSH doses induce premature cumulus expansion prior to an hCG ovulatory stimulus raising the risk of oocyte wastage and poor ART outcomes.

Acknowledgements

This study was supported by the USDA-NIH Dual Purpose Program Grant no. 2017-67015-26084, the Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health under Award Number T32HD087166, and MSU AgBioResearch.

Poster Presentation @ 8:00 am

Madison Sokacz – PhD in Animal Science

Academic advisor/PI: Dr. Tasia Kendrick

Area of Research Interest: Epidemiology of Bovine Leukosis and Undergraduate Education

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

My current favorite TV show is "Explained" on Netflix. I love it because it is a series composed of roughly 20-minute history lessons on different topics. So, each episode is short enough for my attention span to withstand and I become more educated in the process.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I think outside of Animal Science/Research I would choose a career as a flight attendant. I say this because I enjoy helping people and I also have a love for travel so it would be a win-win.

The Development of Practical Skills, Knowledge, and Soft Skills in an Experiential Animal Science Undergraduate Course

Madison Sokacz, Cara Robison, Alisson Da Mota Santos,
Melissa Elischer, Thaina Minela, Tasia M. Taxis

Presented at the North American Colleges and Teachers of Agriculture Annual Meeting

There is an increasing demand at which employers are intentionally seeking and expecting non-tangible skills, or “soft” skills, in new hires. Concurrently, there is a decreased rate at which recent college graduates are meeting anticipated expectations. This deficit in desired soft skill possession in college graduates has persisted over the past two decades and shows no indication of improvement. We aimed to investigate the development of practical skills, knowledge, and soft skills by incorporating experiential instruction and assessment in an advanced level undergraduate Animal Science course. A Dairy Cattle Handling, Welfare, and Sampling Techniques (ANS 490 – Independent Study) course was developed and taught during the Fall 2022 semester. The course included content-based assessments on practical skills and knowledge and the development and assessment of soft skills. Enrolled students (n=16) were assessed on practical skills, knowledge, and soft skills throughout the semester with quantitative grades assigned. Additionally, students were able to provide anonymous feedback on an end-of-semester survey. Following the completion of the course, students showed competency in all three assessment areas: practical skills (94.7% ± 7.2%), knowledge (79.3% ± 7.8%), and soft skills (92.0% ± 8.6%). We found a positive correlation, nearing significance, between a student’s competency on practical skills and knowledge ($p=0.10$). No association between either content-based assessment (practical skills and knowledge) and soft skills was found. The student feedback survey also indicated self-recognition of practical skills and knowledge as well as soft skill development. Consciously designing and implementing experiential learning environments enhances the acquisition and development of practical skills, knowledge, and the highly sought after soft skills. We were able to demonstrate that soft skill development can be successfully incorporated into a course without hindering the ability to meet the traditional standards of practical skills and knowledge. The proper implementation of soft skill development is key to preparing undergraduate students to surpass the standards of employment following graduation.

Poster Presentation @ 8:00 am

Bora Lee – MSc in Animal Science

Academic advisor/PI: Dr. Janice Siegford

Area of Research Interest: Swine behavior and welfare

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Right now, I'm really into "Moving," a Korean TV show available on Disney+. It's my top pick!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

If I had to choose a career outside of Animal science, I would love to pursue a career as a fashion designer. I think fashion is a powerful form of self-expression, and that’s why I like fashion!

Assessing the relationship between pigs' stress resilience and their behavior in response to weaning

Bora Lee, Andrea M. Luttman, Catherine W. Ernst, Nancy E. Raney, Janice M. Siegford

Considering the multiple stressors pigs are exposed to in production systems, it is essential that we understand a pig's ability to adapt or be resilient to a broad range of environmental challenges in order to maintain performance, production, and welfare. In the current study, we used a physiological marker (cortisol) to identify and characterize pigs that were resilient to weaning stress and compared this to their behavioral responses at weaning. We observed agonistic behavior, non-agonistic social behavior, and daily maintenance behaviors within the pigs' home pen. 52 focal gilts were used from a previous study in which our group selected stress-resilient (SR) and stress-vulnerable (SV) pigs. We conducted behavioral observations over two 4-hour periods (from 6 AM to 10 AM): one day after weaning (D1) and four days post-weaning (D4). We found behavioral differences associated with stress resilience. On D1, SV pigs displayed a higher average frequency of non-injurious contact behavior ($P = 0.0198$) compared to SR, while SR pigs exhibited a significantly longer average duration of lying down behavior ($P = 0.01796$) compared to SV. On D4, SV pigs exhibited a significantly longer duration of fighting behavior ($P = 0.0246$) on average when compared to SR pigs. Additionally, a significant effect of time on behavioral adaptation patterns was observed. On D1 post-weaning, pigs spent more time fighting ($P < 0.001$) and exploring ($P < 0.001$), and showed more frequent non-injurious contact ($P = 0.013$) and drinking behaviors ($P < 0.001$) compared to D4. Conversely, on D4, pigs spent more time feeding ($P = 0.004$) and lying down ($P = P < 0.001$) when compared to D1. Our findings imply that non-injurious contact, lying down behaviors observed immediately after weaning, and fighting behavior several days later may serve as promising indicators of pigs' ability to be resilient to the stress associated with weaning. However, to better understand how pigs change their behavior in response to the stress of weaning, we need to develop standard approaches for measuring their behavior and evaluating the degree of change. Understanding behavioral variation between SR and SV pigs can facilitate the development of robustness indexes that could be helpful in breeding programs, facilitating the selection of resilient pigs that overcome challenges associated with weaning.

Poster Presentation @ 8:00 am

Meet the Speakers

Oral Sessions

***Session 1*: 9:30 AM-10:45 AM**

***Session 2*: 10:45 AM-12:00 PM**

***Session 3:* 1:00 PM-2:30 PM**

***Session 4:* 2:30 PM-4:00 PM**

Allisson Santos – PhD in Animal Science

Academic advisor/PI: Dr. J. Richard Pursley

Area of Research Interest: Reproductive physiology and management of dairy cattle.

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

My current favorite TV show is FRIENDS on HBO. And my favorite podcast is The Ten Percent Happier on Spotify. FRIENDS is my number one pick simply because its funny and light-hearted spirit stands the test of time. The Ten Percent Happier podcast makes my mornings at the farm and at the office incredibly more productive with its weekly guided meditations and guests. You should check it out.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I would likely be working with some sort of exercise/sports training or human medicine. Aspects of physiology and medicine are fascinating to me.

Effect of treatment with GnRH prior to breeding-oestrus on fertility to first service of lactating Holstein cows

A. Santos, T. Minela and J. R. Pursley

Presented at the 2023 International Ruminant Reproduction Symposium (IRRS) in Galway, Ireland

Application: Improve fertility to first AI of lactating Holstein cows utilizing treatment with GnRH prior to breeding oestrus as a management strategy.

Introduction: Greater CL number and circulating progesterone during follicular development were associated with greater fertility in lactating dairy cows after timed AI (Martins et al. 2011; Ribeiro et al. 2012). Yet, there has been an increasing demand for implementation oestrus detection in reproductive programs of dairy farms. This study aimed to determine the effectiveness of treatment with GnRH to induce ovulation prior to and increase the fertility of breeding-oestrus as first service of lactating Holstein cows. We hypothesized that treatment with GnRH prior to breeding oestrus would increase the percentage of cows with CL prior to return to oestrus and improve fertility to first service compared to untreated controls.

Material and methods: Lactating Holstein cows (n = 1,109) were randomized weekly according to parity into one of two treatments: no treatment (controls) or 100 µg of cystorelin (T-ES) 5 to 8 days following non-breeding oestrus (45 – 62 DIM). Ultrasound examination of the ovaries were performed on the day of and 4 – 8 days after treatment. Only cows with functioning CL after non-breeding oestrus remained in the study and were treated. Cows were inseminated upon return to oestrus within the voluntary waiting period (69 – 92 DIM). Oestrus was detected using automated activity monitors and pregnancy diagnosis was performed on day 32 – 41 post-ovulation. Data were analysed using mixed (continuous) and logistic (binomial) models and percentages were reported using the frequency procedure in SAS® 9.4. Significant differences were considered when $P < 0.05$ and tendencies when $P \leq 0.10$.

Results: Non-breeding oestrus was detected in 35 % of all cows with equal distribution across treatments. A greater percentage of primiparous cows expressed non-breeding oestrus compared to multiparous (27 vs. 49 %). Treatment with GnRH increased the percentage of ovulation (82 % vs. none) and the percentage of cows with 2 or more CL (86 vs. 19 %) prior to breeding-oestrus. Breeding-oestrus was detected in 78 % of all cows in the study (n = 388). Treatment with GnRH did not affect average inter-oestrus interval. Yet, treatment decreased the percentage of primiparous (84 vs. 94 %) but not of multiparous (68 vs. 65 %) cows that expressed breeding-oestrus compared to controls. There was no effect of treatment on pregnancies per AI (P/AI) in primiparous (44 vs. 48 %, in controls and T-ES) or multiparous cows (33 vs. 31 %, in controls and T-ES).

Conclusion: Treatment with GnRH did not affect P/AI despite increasing the percentage of cows with 2 or more CL prior to breeding-oestrus.

Acknowledgements: Michigan Alliance for Animal Agriculture and Boehringer Ingelheim Animal Health, USA.

References: Martins, J. P. N. et al. (2011). *Journal of Dairy Science*, 94(6), 2815-2824.

Ribeiro, E. S. et al. (2012). *Theriogenology*, 78(2), 273-284.

Oral Presentation @ 9:30 AM

Thaniá Minela – PhD in Animal Science

Academic advisor/PI: Dr. J. Richard Pursley

Area of Research Interest: Dairy cattle reproduction management and physiology

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

I am the department's greatest otaku, until proved otherwise. I am always looking for new anime to watch. HOWEVER, I have deleted all my streaming apps and am trying to focus on writing my dissertation (hopefully my committee reads this). I had a relapse the other day and watched a few episodes of Shaman King on Netflix. It was pretty good… But the manga is better.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

Something artsy, design-driven where I could choose colors that go well together all day long. No particular reason why, I just love color palettes.

Precise regulation of ovarian function increased fertility of lactating dairy cows compared to detection of oestrus.

Thaina Minela, Alisson Santos, J. Richard Pursley

Presented at the 2023 International Ruminant Reproduction Symposium (IRRS) in Galway, Ireland

Application: These data provide a robust comparison of fertility outcomes in lactating dairy cows receiving first service following Double-Ovsynch or oestrus detection. Novel aspects of these data, related to identifying embryonic viability/presence prior to the first pregnancy diagnosis, will help to elucidate key pathways influencing fertility of lactating dairy cows.

Introduction: Fertility programs, such as Double-Ovsynch, increase pregnancy probability in comparison with AI after oestrus detection (Kim et al., 2020). It is unclear which mechanisms favour pregnancy establishment following Double-Ovsynch compared with natural oestrus. Preliminary evidence (n=110 cows) suggested that a greater proportion of cows inseminated following oestrus had greater pregnancy loss from initial PSPB increase to 32-38 days post-AI in comparison with Double-Ovsynch (25.0 vs. 3.0%; Minela et al., 2022). Cows with delayed onset of PSPB increase (>21 days post-ovulation) had greater pregnancy losses in comparison to earlier onset (≤21 days post-ovulation; 25.0 vs. 2.4%, respectively). Based on these outcomes a follow-up study was designed with sufficient power to further investigate potential differences in pregnancies/AI. The hypothesis was that Double-Ovsynch would result in greater pregnancies/AI in comparison with oestrus detection.

Material and methods: Lactating dairy cows receiving first service (between 69-94 DIM) were blocked by parity and randomly assigned to receive AI following oestrus detection (n=360), or Double-Ovsynch (n=311). Pregnancy diagnosis (between days 32-41 post-ovulation) and confirmation of ovulation were performed via ultrasonography. All cows were equipped with an ear tag that tracked activity and rumination in 2-hour intervals (Allflex livestock intelligence). Oestrus characteristics and number of oestrus events prior to AI were collected on the Data Flow software.

Results: Cows inseminated following Double-Ovsynch had greater pregnancies/AI in comparison with oestrus detection (51.9 vs. 36.3%; P<0.01). Overall, primiparous cows had greater pregnancies/AI in comparison with multiparous cows (50.2 vs. 37.9%; P<0.01), but no interaction with treatments. Expression of oestrus in Double-Ovsynch cows near timed-AI (85/300 cows) had no effect on pregnancies/AI (57.7 vs. 50.5%, oestrus vs. no oestrus; P=0.52). Pregnancies/AI did not differ between cows in the oestrus group (n=334) with 0 vs. ≥ 1 oestrus' detected in the pre-voluntary waiting period (33.3 vs. 38.2%; P=0.91).

Conclusion: These data help to support the utilisation of Double-Ovsynch as a strategy to enhance fertility of lactating dairy cows for 1st AI. Ongoing data analyses of within-cow PSPB concentration could help to elucidate whether premature pregnancy losses are the main contributor to the gap in fertility between oestrus detection and Double-Ovsynch.

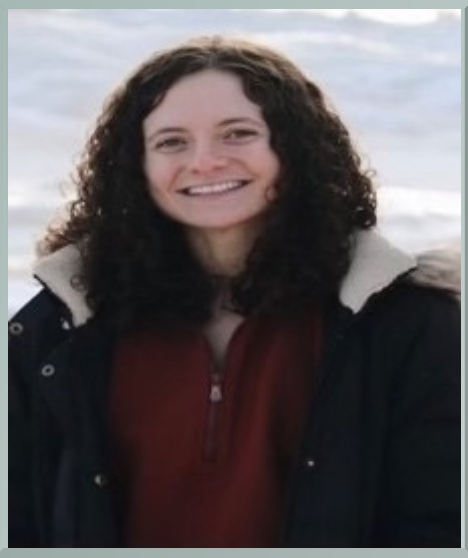
Acknowledgements: USDA-NIFA #2019-05303 and Boehringer Ingelheim Animal Health, USA.

References: Kim, I. H., Jeong, J. K., & Kang, H. G. (2020). *Theriogenology*, 156, 27–35.

Minela, T., Santos, A., Pursley, J. R. (2022). *J. Dairy Sci*., 105(1), p.144.

Oral Presentation @ 9:45 AM

Rachel Eck – PhD in Animal Science



Academic advisor/PI: Dr. Hanne Hoffmann

Area of Research Interest: Female Reproduction

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
Comedy Bang Bang, Apple Podcast

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
Some sort of academia or veterinary medicine; the main things I want from my career are intellectual challenges and the potential to help people.

Targeting the molecular clock to regulate uterine contractions during pregnancy

Eck R, Duong T, Hoffmann H

Background: Disruption of the body's internal 24-hour clock system, known as the molecular clock, causes poor pregnancy outcomes. Our previous work found one role of the molecular clock is to modulate uterine contractions, but the mechanism by which this occurs remains unknown.

Objective: Determine the mechanism by which the molecular clock regulates uterine contractions during late-pregnancy and labor in the mouse.

Methods: To study the role of the molecular clock, we deleted the core molecular clock gene, BMAL1, within the mouse uterine smooth muscle, the myometrium (cKO). Mouse uterine samples were collected between gestation day 18 (GD18) and active labor. On GD18, uterine samples were collected every four hours in a 24-hour period to test for time-of-day differences in tissue function. Uterine contractile function was evaluated ex vivo using a myograph in response to drugs. Pharmacological findings were compared to protein expression and immunoprecipitation data to determine the role of BMAL1 in uterine contractions in pregnancy.

Results: Comparing control and cKO mice crossed with circadian PER2::Luciferase reporter mice, we confirmed deletion of BMAL1 (cKO) disrupted circadian rhythms. To assess the functional impact of the cKO, spontaneous contractions were evaluated ex vivo. At 4/6 time-points studied, the cKO uterus was hypercontractile. Pharmacological rescue and pathway inhibitor experiments revealed complex interactions between gestational stage, time-of-day of drug application targeting downstream proteins of BMAL1, and protein kinases involved in contractile function.

Conclusion: BMAL1 regulates myometrium contractile function in late- and term-pregnancy and might drive time-of-day specific changes in drug sensitivity of the uterus.

Oral Presentation @ 10:00 AM

Renee Harbowy – MSc in Animal Science

Academic advisor/PI: Dr. Brian Nielsen

Area of Research Interest: Equine Exercise Physiology and Nutrition. Current work investigates the role of circle diameter and speed on bone and joint health, the efficacy of a popular joint supplement, and the physiologic effects and consumption preferences of four different fat sources in equine feeds.

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

A TV show I really liked and tend to recommend (especially as we approach Halloween) is The Haunting of Hill House on Netflix. This show follows a semi-estranged family as they try to make sense of their experiences as children growing up in a "haunted house" and face the lasting consequences of these experiences that have followed them into adulthood.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

If I were to pursue a career outside of animal science and/or research, I think I would enjoy being a book or copy editor. When I was younger, I always wanted to be a writer (mostly inspired by how much I love to read). I really enjoy the feeling a good book can give you, and the lasting effect that an impactful story can have on you. I think an important aspect to a good book is very likely a good editor, as major structural flaws or technical errors can very easily dissuade people from reading a story that might have otherwise been something great.

Incidence Rate of Lesions in the Distal Forelimb of Growing, Exercising Sheep as a Model for Horses

R.M. Harbowy, B.D. Nielsen, A. Colbath, C.I. Robison, D. Buskirk, and A.A. Logan

Presented at the 2023 Equine Science Society Symposium
June 2023, Grapevine, Texas

The use of circular exercise is prominent in the equine industry, but this practice may result in joint damage which can be indicated by macroscopic characteristics such as cartilage lesions. Compromised integrity of the joint often results in pain that presents as lameness and decreased performance. Cartilage lesions can also be indicative of chronic disabling conditions such as osteoarthritis. To evaluate the effects of circular exercise on joint health, 42 sheep (4 months old, 40±±1 kg) were used as a model for young horses. Animals were striated by sex and weight, then randomly assigned to the following treatments: straight line slow, straight line fast, small circle slow, small circle fast, large circle slow, large circle fast, and non-exercised control. Straight line exercise was conducted on a treadmill, and circular exercise was conducted via mechanical walker in a clockwise direction on a 12-m diameter circle (small) or an 18-m diameter circle (large). Exercise occurred 4 d/wk for 12 wks starting at 390 m/d (slow: 5.0 min/d at 1.3 m/s; fast: 4 min/d at 1.3 m/s and 0.7 min/d at 2.0 m/s). Exercise increased weekly until animals reached 2,340 m/d (slow: 30 min/d at 1.3 m/s; fast: 24 min/d at 1.3 m/s and 3.9 min/d at 2.0 m/s). Sheep were housed in group pens (34 m^2, bedded with straw) and fed a standard balanced diet with free choice grass hay. At the end of the study, animals weighed an average of 54±±1 kg and were humanely euthanized via captive bolt. All carpal and metacarpophalangeal joint capsules were opened and analyzed for number of lesions and lesion surface area using ImageJ software (NIH). Data were analyzed by Proc Freq and Proc Mixed in SAS 9.4. Only one sheep (straight line fast group) displayed an acute lameness for 5 days. At the completion of the study, sheep had reached 70% of their mature BW, increasing their size by 35% during the 3 months, averaging 0.17 kg/d. Within the 42 sheep, a total of 404 lesions were observed with 99% in the carpal joint and 1% in the metacarpophalangeal joint. Average lesion surface area in the carpal joint was 22±±1 mm^2 versus 1.6±±0.3 mm^2 in the metacarpophalangeal joint ($P < 0.05$). Within the carpal joint, 49% of lesions were found in the carpometacarpal joint, 39% in the middle carpal joint, and 12% in the radiocarpal joint. No differences were found among treatment groups or limbs. These data suggest exercise was not the sole contributor to lesion development, emphasizing that growth rate, diet, and genetic components must also be considered when evaluating the cause of cartilage lesions.

Oral Presentation @ 10:15 AM

Nattawipa (Eye) Ampaiwan – PhD in Animal Science

Academic advisor/PI: Dr. Jacquelyn Jacobs

Area of Research Interest: Companion animals, behavior and welfare, shelter dogs, community cats

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

"Happiness" is an apocalyptic thriller that takes place in a time in which infectious diseases have become the new pandemic. People who got infected will lose their consciousness and will bite people (like zombies). Two agents who just got married got lock down in the apartment and need to find other people who got infected. I like how the story develops and how cool these two agents are!

I usually watch videos from YouTube, and Viki (or Netflix) depending on the movies they have that month.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I think I want to work as a screenwriter or maybe writing a novel. It would be fun to create the story of your own and share your characters with others via words.

Validation of accelerometers for use in kenneled dogs

Ampaiwan, N., Chen, E., Breithaupt, A., Yi, B., Jacobs, J.

The Actigraph is an accelerometer which measures movement on a three-dimensional plane. These accelerometers have been previously validated to identify three levels of activity in dogs, 'sedentary', 'light-to-moderate', and 'vigorous', through comparison of induced non-active and active behavior (i.e., standing and walking on leash, playing off leash) to count per minute output from the Actigraph. However, kenneled dogs have restricted space and ability to express vigorous activity, and therefore it is unknown if the Actigraph would accurately identify activity-related behaviors in a shelter setting. A total of 37 shelter dogs were fitted with an Actigraph on their collars and video recorded in their kennel for one hour via a GoPro camera. Behavioral data was decoded from video and continuously scored by second for each of the following categories: sitting, lying, standing still, walking, running, jumping, play bowing, and pawing on door. The activity count per second (cps) was extracted from the Actigraph for comparison to behavioral data, and linear mixed models were created to assess the relationship between cps output and scored behavior data. Interestingly, the range of cps values overlapped between all behavioral categories, and all included multiple instances of a vector magnitude of zero, which theoretically represents no movement. Least square means comparisons revealed that the majority of the active and non-active behaviors had unexpected relationships. For example, lying (33.6 ± 1.55), sitting (32.1 ± 1.52), play bowing (50.8 ± 9.52), and pawing at door (35.4 ± 5.08), were all not significantly different from one another. Standing (35.6 ± 1.62), walking (35.9 ± 1.69), and running (39.1 ± 2.15) were significantly different from the former group of behaviors, but not from each other. After reorganizing the data into the binary categories of 'active behaviors' (i.e., play bowing, walking, running, jumping, and pawing on door) and 'non-active behaviors' (i.e., lying, sitting, and standing), a significant difference was revealed (1.09 ± 0.01; p = <0.0001), although the range in cps values remained overlapping and means were numerically similar (active: 37.3 ± 1.73; non-active: 34.4 ± 1.55). Overall, it was not possible to identify cut-off ranges due to overlapping values, and categories of shelter dog behavior were not clearly identifiable from cps output. Therefore, we conclude the Actigraph accelerometer should not be used to measure activity behavior in shelter dogs. Researchers should practice caution when attempting to utilize accelerometers in kenneled dogs that have been validated in non-kenneled environments.

Oral Presentation @ 10:30 AM

Melanie Pimentel-Concepción – PhD in Animal Science

Academic advisor/PI: Dr. Dan Buskirk

Area of Research Interest: Beef cattle production and management/nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
Two Hot Takes on Spotify

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
Law, because I like to fact check people

Growth performance, carcass traits, and feeder calf value of beef x Holstein and Holstein feedlot steers

M. Pimentel-Concepción, J. R. Jaborek, J. P. Schweihofer, A. J. Garmyn, M.-G.-S. McKendree, B. J. Bradford, A. Hentschl, and D. D. Buskirk

Presented at ASAS Midwest Section

The objectives of this study were to compare feedlot performance, carcass traits, and value of beef × Holstein (**B×HO**) and Holstein (**HO**) feedlot steers. After a 21-d acclimation to the feedlot, steers (B×HO, n = 60 and HO, n = 60) were blocked by weight into 10 pens per breed type. Steer weight gain, DMI, and G:F were measured on a 28-d basis. Steers were harvested at a commercial abattoir on d 245 for B×HO and 266 for HO, after reaching an average predicted empty body fat of 31.1%. Following a 48-h chill, carcass data were collected. The B×HO steers tended to have 5% greater ADG (1.75 vs. 1.70 kg/d; $P = 0.07$) compared with the HO steers, but similar DMI (10.40 vs. 10.35 kg/d; $P = 0.79$). The B×HO steers had 4% greater G:F compared with HO steers (0.172 vs. 0.165; $P = 0.03$). Cost of gain was 14% less for B×HO compared with HO steers ($2.64 vs. $2.81/kg; $P = 0.01$). Although final live weight tended to be less for B×HO compared with HO steers (621.3 vs. 634.8 kg; $P = 0.08$), carcass weights were similar between breed types (365.4 vs. 366.6 kg; $P = 0.78$). The B×HO steers had 20% greater LM area (87.8 vs. 73.1 cm^2; $P < 0.0001$), greater backfat thickness (1.18 vs. 0.79 cm; $P < 0.01$), and a lesser average USDA YG (2.9 vs. 3.2; $P = 0.02$) than HO steers. The B×HO and HO steers had similar average marbling scores (426 vs. 437; $P = 0.62$) and USDA QG ($P = 0.40$). Based on abattoir prices, carcass revenue tended to be greater for B×HO steers ($1,836/carcass) when compared with HO steers ($1,800/carcass; $P < 0.05$). Calculated breakeven feeder calf value was greater for B×HO compared with HO steers ($368.46 vs. $305.02/100 kg; $P < 0.05$). Overall, B×HO steers were more feed efficient and produced carcasses with more desirable carcass yield, resulting in greater feeder calf value when compared with HO steers.

Oral Presentation @ 10:45 AM

Maggie Miller – MSc in Animal Science

Academic advisor/PI: Dr. Adam Lock

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

My all-time favorite TV show is The Office, so naturally, my favorite podcast to currently listen to is Office Ladies where two of the cast members go over each episode and provide some fun behind-the-scenes details. They know how to make an old show feel new again!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I always had this dream of being a fantasy novel writer, so maybe I'd be that. Or I would write screenplays for movies. I have a big imagination, so creating stories for people to enjoy would put it to good use!

Evaluating the dose-response effect of docosahexaenoic acid abomasal infusions on production responses and plasma fatty acids in mid-lactation dairy cows

M. L. Miller, H. L. Reisinger, B. J. Bradford, and A. L. Lock

Long-chain omega-3 (n3) fatty acids such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) have been shown to have potent anti-inflammatory effects in humans and animals that are beneficial to overall health and several biological functions. The objective of this study was to evaluate the dose-response effect of abomasal infusions of DHA on production outcomes, milk fatty acids, and plasma fatty acids in mid-lactation dairy cows. Eight multiparous ruminally cannulated Holstein cows (97 ± 37 DIM, 49.2 ± 3.3 kg/d milk) were used in a 4 x 4 Latin Square design. Treatments were abomasal infusions of 0, 2, 4, and 6 g/d of DHA over an 11-day treatment period with10-day washout periods. Milk yield was recorded, and milk and blood samples were collected on the last 4 days of each infusion period. The statistical model included the random effect of cow nested within square and fixed effects of treatment, square, period, and their interactions. Preplanned contrasts tested the linear, quadratic, and cubic effects of increasing doses of DHA. Results are presented in the following order: 0, 2, 4, 6 g/d of DHA. No effects were observed for yields of milk, FCM, ECM, milk fat, or milk protein. Treatment tended to quadratically increase milk fat content (3.42, 3.50, 3.51, 3.45 %; $P = 0.10$) and milk protein content (3.08, 3.09, 3.08, 3.03 %; $P = 0.07$). Increasing DHA also linearly decreased SCC (13.3, 12.0, 10.4, 10.8 x 103/mL; $P = 0.05$). DHA treatment linearly increased total plasma DHA content (0.13, 0.22, 0.27, 0.30 g/100g FA; $P < 0.001$) and linearly decreased total plasma oleic acid content (4.59, 4.60, 4.28, 4.33 g/100g; $P < 0.01$). Increasing doses of DHA did not impact total n3 fatty acids or the n6:n3 ratio in plasma. DHA treatment linearly increased the content of DHA in milk fat (0.01, 0.04, 0.06, 0.08 g/100g; $P < 0.0001$) and total n3 fatty acids (0.56, 0.57, 0.63, 0.63 g/100g; $P < 0.05$). DHA treatment also linearly increased the yields of DHA in milk (0.19, 0.58, 0.91, 1.18 g/d; $P < 0.0001$). In conclusion, increasing doses of DHA did not impact production responses in mid-lactation cows, but increased plasma DHA, increased n3 fatty acids in milk, and reduced SCC.

Oral Presentation @ 11:00 AM

Ghayyoor Ahmad – PhD in Animal Science

Academic advisor/PI: Dr. Zheng Zhou

Area of Research Interest: Amino acids supplementation to reduce the risk of fatty liver in dairy cows.

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

I enjoy watching "Little Big Shots" hosted by Steve Harvey. I love to watch historical movies on Netflix.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I would be inclined to pursue a role in the armed forces, particularly as a member of a special forces unit. The reason for this choice is rooted in my admiration for the selfless actions of these individuals, who often operate in extremely challenging circumstances to safeguard and rescue people. Even though I would be keeping my animal husbandry passions.

Abomasal infusion of branched chain amino acids (BCAA) or branched chain keto acids (BCKA) alters liver lipid metabolism in early lactation dairy cows

Ghayyoor Ahmad, Cynthia Collings, Isabelle Bernstein, Kristen Gallagher, Michael Vandehaar, and Zheng Zhou

Presented at 2023 ADSA Annual Meeting

The capacity of fatty acid oxidation in the liver is crucial for minimizing the negative impact of negative energy balance in dairy cows during early lactation. The objective of this study was to assess the extent to which BCAAs and BCKAs alter liver lipid metabolism during early lactation. Thirty-six multiparous Holstein cows were used in a randomized block design experiment. Cows were blocked according to expected calving date and were abomasally infused for 21 d after parturition with solutions of saline (CON, n = 12); BCAA (n = 12) including 67 g valine, 50 g leucine, and 34 g isoleucine; and BCKA (n = 12) including 77 g ketovaline, 57 g ketoleucine, and 39 g ketoisoleucine. All cows received the same diet. Liver tissue was harvested at 1, 7, 14, and 21 d relative to calving for 14C-palmitate oxidation assays and mRNA abundance of genes regulating lipid metabolism. Blood samples were taken at 0, 3, 7, 14 and 21 d postpartum for quantification of 18 acylcarnitines (fatty acid oxidation intermediates) with LC-MS. Data were analyzed using PROC MIXED in SAS. Cows receiving BCKA increased oxidation of palmitate to CO2 compared to CON ($P = 0.05$). Similarly, oxidation of palmitate to CO2 also tended to be greater in cows receiving abomasal BCAA infusion during early lactation ($P = 0.10$). In agreement with these results, plasma concentration of Acylcarnitine (8:0), a medium chain acylcarnitine metabolized to CO2 and water in mitochondria, was also greater in BCKA cows compared with CON ($P < 0.01$). Although mRNA abundance of Peroxisome Proliferator Activated Receptor Alpha, Acyl-CoA Oxidase 1, Carnitine Palmitoyltransferase 1A, and Acyl-CoA Dehydrogenases were not changed in response to BCAA or BCKA infusion ($P > 0.05$), expression of uncoupling protein 2 was greater in BCAA cows compared with CON ($P = 0.03$), suggesting enhanced fatty acid oxidation in the mitochondria. Overall, results indicate that abomasal BCAA or BCKA infusion enhanced fatty acid oxidation in the liver of dairy cow during early lactation. Further work is required to understand the underlying mechanisms of the changes observed in this study.

Keywords: BCAA, BCKA, lipid metabolism, early lactation

Oral Presentation @ 11:15 AM

Haylee Reisinger – MSc in Animal Science

Academic advisor/PI: Dr. Barry Bradford

Area of Research Interest: Nutritional Immunology

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
My current favorite TV show is Gilmore Girls on Netflix.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
I would choose to be an outdoor educator or wildlife biologist. I love being outside, so why not get paid for it and teach others about the outdoors!

Bovine monocyte-derived macrophages exhibit endotoxin tolerance after repeated stimulation with lipopolysaccharide

Haylee L. Reisinger, Laman K. Mamedova, Barry J. Bradford

Presented at the 2023 American Dairy Science Association Annual Meeting

Prolonged infection or repeated exposure to bacterial endotoxins can lead to the development of endotoxin tolerance in immune cells, and in some cases, the animal as a whole. Endotoxin tolerance occurs when cells become less responsive to endotoxin stimulation, resulting in an immune-tolerant state. To study endotoxin tolerance, bovine monocytes from healthy late-lactation dairy cows (n =3) were maintained in cell culture media for 7 d until they had differentiated into macrophages. On d 7, cells were stimulated with 0 or 100 ng/mL (HI) of lipopolysaccharide (LPS) for 24 h then re-stimulated for an additional 6 h with 0, 10 (LO), or 100 (HI) ng/mL LPS (3-6 replicates per treatment). Cells were harvested for RNA immediately following 6-h restimulation to analyze mRNA abundance via RT-qPCR. Control genes were UXT and YZ; the geometric mean Ct value was unaffected by treatment and was used as a control to determine target gene relative transcript abundance. Data were analyzed to assess the fixed effect of treatment while accounting for the random effect of source cow. Cell viability, measured by resazurin metabolism, was unaffected by treatment ($P = 0.36$). Following a single stimulation with 100 ng/mL LPS for 24 h, TNFα and IL-6 abundance were similar to unstimulated cells but elevated for IL-1β by 33 ± 16-fold and IL-10 by 1.7 ± 0.25-fold (both $P < 0.05$), suggesting that some but not all targets returned to baseline. Cells treated with HI followed by LO LPS exhibited signs of endotoxin tolerance; transcript abundance of proinflammatory cytokines TNFα and IL-6 were reduced after LO restimulation by 85 ± 33% and 68 ± 36%, respectively, compared to LO LPS without pre-treatment (both $P < 0.05$). LO restimulated cells showed a 71 ± 12% reduction in IL-10 mRNA compared to LO LPS without pre-treatment; the HI restimulation also reduced IL-10 mRNA by 53 ± 14% compared to HI LPS without pre-treatment (both $P < 0.05$). Reduced cytokine mRNA abundance following repeated LPS stimulation in bovine monocyte-derived macrophages suggests that prolonged Gram-negative infections may reduce immune cell function.

Oral Presentation @ 11:30 AM

Lee Ackerson – PhD in Animal Science

Academic advisor/PI: Dr. Wen Huang

Area of Research Interest: Livestock genomics and bioinformatics

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Currently, my favorite TV show is *Yellowstone* as well as the spin off shows of *1883* and *1923*. When it comes to podcasts, I often find myself listening to *The Pat McAfee Show* or *The Joe Rogan Experience*. I use Spotify and various streaming services on Roku!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

If I had to choose a career outside of Animal Science and Research, I would likely have ended up as an engineer; simply because I enjoy the process of problem solving and I have always been very mathematically oriented.

Analytical Framework for Estimating Antimicrobial Resistance Gene Abundance In Metagenomic Samples of Animal Agriculture Origin

Lee Ackerson & Wen Huang

Antimicrobial resistance (AMR) has become an apex global public health threat that requires a multifaceted One Health approach. According to the CDC, 2.8 million antimicrobial resistant infections occur in the United States each year, resulting in more than 35,000 deaths. Although the development of AMR is incredibly intricate, it is widely recognized that the employment of antibiotics is one of the largest selective pressures of AMR. In many countries, antimicrobial consumption in animal agriculture surpasses that of human usage, and it is estimated that nearly 73% of global antibiotics can be attributed to livestock. Monitoring AMR emergence and historical data on a global scale is crucial when working towards the large-scale mitigation of this public health threat. One tool that can contribute to monitoring AMR is shotgun metagenomics, which entails comprehensive evaluation of the genetic material extracted from all the organisms in a complex sample. This subsequently gives genomic insights into the microorganisms residing in the sample of interest. The Sequence Read Archive (SRA) is a public repository housed by the National Center for Biotechnology Information (NCBI) containing extensive sequence data from metagenomic samples in animal agriculture, as well as the associated spatiotemporal attributes. Here we proposed to develop analytical framework to leverage the SRA and estimate relative antimicrobial resistant gene abundances across animal agriculture on a global scale from publicly available metagenomic sequence information. The developed analytical framework was then employed to evaluate metagenomic samples from cattle and swine housed in the SRA. Estimated abundances are utilized as a proof of concept for evaluating AMR characteristics on a global scale using publicly available, highly heterogenous data. The resulting abundance estimation will offer insights into AMR emergence and dynamics as well as inform further development of mitigation strategies.

Oral Presentation @ 11:45 AM

Jair Esteban Parales-Giron – PhD in Animal Science

Academic advisor/PI: Dr. Adam Lock

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Breaking Bad/Better Call Saul. I watch those shows at least once time year on Netflix.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

Probably food critic that travels the world. I love food too (except seafood and fish), and it would be cool to know different cultures.

Fatty acid supplementation interacts with starch content to alter production responses during the immediate postpartum in dairy cows

J. E. Parales-Giron, A. C. Benoit, J. M. dos Santos Neto, J. de Souza, and A. L. Lock

Presented at the 2023 Tri-State Nutrition Conference and American Dairy Science Association Annual Meeting

We evaluated the interaction between increasing dietary starch content and fatty acid (FA) supplementation on production responses of early-lactation cows. Sixty multiparous cows were used in a randomized complete block design with a 2×2 factorial arrangement of treatments. Treatment diets were fed from 1 to 24 DIM and contained 22% or 28% diet DM starch (LS and HS) and 0% or 2% diet DM supplemental FA (NF and HF). The FA supplement was a Ca-salt containing 70% palmitic and 20% oleic acid. Treatment diets were formulated to contain 17% CP and 22% forage NDF. The statistical model included the random effect of block, cow within block and treatment, Julian date, and the fixed effects of starch content, FA supplementation, time, and their interactions. Results are presented in the following order: LSNF, HSNF, LSHF and HSHF. We observed interactions between dietary starch and FA supplementation for the yields of milk (43.1, 47.4, 43.4, 43.6 kg/d; $P < 0.05$), milk fat (1.95, 2.12, 2.13, 2.07 kg/d; $P = 0.06$), and 3.5% FCM (50.3, 55.1, 53.7, 52.7 kg/d; $P < 0.05$) because FA supplementation increased the yields of milk fat ($P < 0.05$), and tended to increase the yield of 3.5% FCM ($P = 0.09$) in the low starch diet but decreased milk yield in the high starch diet ($P < 0.05$). Overall, high starch increased the yield of milk ($P < 0.05$), tended to increase milk lactose yield (2.08, 2.27, 2.11, 2.17 kg/d; $P = 0.07$), and reduce milk protein content (3.46, 3.30, 3.38, 3.33%; $P = 0.06$), and had no effect on the yields of milk fat and protein. Overall, FA supplementation increased milk fat content (4.57, 4.48, 4.83, 4.71%; $P < 0.01$) and had no effect on the yields of milk fat and protein. In conclusion, feeding high starch diets increased milk yield during the immediate postpartum. The effect of FA supplementation on the yields of milk fat and 3.5% FCM of early-lactation cows depended on dietary starch level.

Key Words: starch, fatty acid, early-lactation

Oral Presentation @ 1:00 PM

Alycia Bales– PhD in Animal Science

Academic advisor/PI: Dr. Adam Lock

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
Gilmore Girls (TV) and My Favorite Murder (podcast)

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
I would want to own a bookstore/library that has a coffee and bakery shop in it. Then I could just read and sip on lattes all day, every day.

Increasing dietary inclusion of high oleic acid soybeans increases milk production of high-producing dairy cows

Alycia M. Bales and Adam L. Lock

Presented at the 2023 Tri-State Nutrition Conference and American Dairy Science Association Annual Meeting

We determined the effect of increasing dietary inclusion of roasted and ground high oleic acid soybeans (HOSB) on production responses of high-producing dairy cows. Conventional soybeans contain ~15% oleic acid and ~50% linoleic acid whereas HOSB contain ~75% oleic acid and ~7% linoleic acid. Twenty-four multiparous Holstein cows (50.7 ± 4.45 kg/d of milk; 122 ± 57 DIM) were randomly assigned to treatment sequences in a replicated 4x4 Latin square design with 21-d periods. Treatments were increasing doses of HOSB at 0, 8, 16, and 24% DM. HOSB replaced conventional soybean meal and hulls to maintain diet nutrient composition (%DM) of 28.0% NDF, 21.3% forage NDF, 27.3% starch, and 17.8% CP. Ether extract of each treatment was formulated to contain 3.25, 4.52, 5.80, and 7.08 %DM, respectively. The statistical model included the random effects of period and cow within square and the fixed effect of treatment. Pre-planned contrasts included the linear (L), quadratic (Q), and cubic (C) effects of increasing HOSB. Results in the text are presented in the following order: 0%, 8%, 16%, and 24% HOSB. Increasing dietary inclusion of HOSB decreased DMI (31.2, 31.3, 30.8, 30.5 kg/d; L P=0.01) and milk urea nitrogen (11.3, 10.5, 9.57, 8.46 mg/dL; L P<0.001) and increased yields (kg/d; all P<0.001) of milk (47.8, 51.2, 51.7, 52.5; L), 3.5% FCM (48.5, 50.9, 51.7, 52.5; L), ECM (49.1, 51.3, 51.9, 52.5; L), milk fat (1.67, 1.75, 1.77, 1.83; L), and milk protein (1.57, 1.63, 1.63, 1.61 kg/d; Q P<0.001). Due to the increase in milk component yields and decrease in DMI, there was an increase in feed efficiency (ECM/DMI; 1.57, 1.65, 1.69, and 1.72, L P<0.001). There was no effect of treatment on BW, BW change, BCS, or BCS change (all P>0.20). In summary, increasing dietary inclusion of HOSB up to 24% DM increased production responses of high-producing dairy cows by increasing yields of milk, milk fat, and milk protein. Future research will examine differences between raw vs. roasted HOSB and interactions with other dietary nutrients and fatty acid supplements that may support improvements in yields of milk fat and protein.

Oral Presentation @ 1:15 PM

Anna Breithaupt – MSc in Animal Science

Academic advisor/PI: Dr. Jacquelyn Jacobs

Area of Research Interest: Animal Behavior and Welfare

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Currently I am watching What we do in the Shadows on Hulu. It is mindless humor which can be very helpful when your brain is tired from research!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

Hahaha, I was an interior designer so I did choose that at one point. But I would do something new if I changed careers again. I always wanted to be a surgeon but didn't want to go through years of med school (enter current me going through grad school).

Development and Validation of a Behavioral Assessment Tool to Monitor Shelter Dog Coping Behavior

Anna Breithaupt, Marie Hopfensperger, Jacquelyn Jacobs

Presented at:
CCSAW 2023 at University of Guelph (poster)
VBS 2023 in Philly (talk)
ABS 2023 in Portland, Oregon (talk)

We Dogs that enter animal shelters experience a variety of well-documented environmental stressors that may lead to chronic stress. Stress response can become maladaptive when shelter dogs are unable to effectively cope with their environments. Often pharmaceutical intervention is necessary to prevent further behavioral decline. However, access to pharmaceuticals is dependent on shelter resources with many lacking veterinary behaviorists on staff. Furthermore, a reliable assessment that would accurately communicate shelter dogs' needs to clinicians does not exist. In response, a novel behavior assessment was developed based on extant literature and expertise of a board-certified veterinarian behaviorist and doctorate in ethology, designed to provide enrichment while remaining feasible for shelter staff to implement. During the preliminary pilot, the tool went through several iterations based on evaluation of reliability and biological significance. June-October 2022, 91 single-housed shelter dogs, ≥12 weeks of age were assessed either indoors (n=43) or outdoors (n=48). Dogs were assessed in real-time by 2 raters for inter-rater reliability and video recorded for intra-rater reliability. Inter- and intra-rater percent agreement was moderate to near perfect. To establish validity criterion, a board-certified veterinarian behaviorist blinded to coping score diagnosed participating dogs as either adaptive coping (AC), maladaptive coping anxious-avoidant (MC-AA) or excessive-aroused (MC-EA) using assessment video. There was no evidence of a difference in coping score between assessment areas; therefore, indoor and outdoor assessments were pooled for validity analysis. At statistical significance, the tool was able to differentiate MC-AA dogs from AC and MC-EA but was unable to differentiate MC-EA from AC, although MC-EA dogs had higher marginal mean total score than AC dogs. As expected, the marginal mean for MC-AA dogs was negative and MC-EA positive, between which fell the marginal mean for AC dogs. Based on reliability and validity, the tool was further refined for use in future studies including, establishment of a diagnostic scale for interpreting coping score, and evaluation of tool's ability to track changes in coping behavior over time and in response to pharmaceutical interventions.

Oral Presentation @ 1:30 PM

Kathryn Baugh – MSc in Animal Science

Academic advisor/PI: Dr. Janice Siegford

Area of Research Interest: Animal Behavior and Welfare

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

My favorite Spotify podcast is Beach Too Sandy, Water Too Wet, which is hosted by a pair of siblings that read the dramatic (and hilarious) reviews that people write online. It has gotten me through a lot of data collection this summer!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I would go into human medicine, specifically radiology. I think diagnostic imaging is really fascinating!

Assessing fear as a measure of welfare in cage-free laying hens

K. Baugh, A. Ali, & J. Siegford

Consumer and legislative pressures have prompted fundamental shifts in agricultural management, with the intensive raising of laying hens for egg production being one of the primary targets. As more producers in the U.S. laying hen industry begin to transition away from conventional systems to cage-free housing options like aviaries, balancing animal welfare with long-term sustainability has become an important research focus. This study examines the effects of both housing style and management strategy on overall productivity and hen well-being. Two types of aviaries (NATURA 60 and NATURA Step) house research hens, with one room of each type receiving a specific management technique, such as disruption by human workers, presence of robots, or partial restriction from the litter area. The study includes a variety of behavioral assays to determine any potential welfare consequences of these treatments. Fear can be a useful indicator of bird well-being and is often assessed through response to novelty or startling stimuli. In this study, two fear tests are used in the home pens: the novel object test, which involves placing a foreign item in the middle of the litter area and observing hen behavior, and the human avoidance test, which targets a specific bird to determine her reaction to an approaching human. Outside of the home pen, the manual restraint procedure tests for a tonic immobility response, indicating high levels of fear. Additionally, three new individual fear tests were created: an individual novel object test, an emergence test, and a human approach test. Before the arrival of the Hyline Brown flock, these three protocols were designed, practiced, and modified using available mature Dekalb White hens, and further troubleshooting took place upon research bird arrival. Formal in-pen fear and manual restraint data have been collected at 17, 20, 27, and 32 weeks of age, with the three newly developed individual tests collected over a five-week period from 21-25 WOA. Going forward, all tests will have additional data collection timepoints/periods to give a complete picture of levels of fear over time.

Oral Presentation @ 1:45 PM

Sarah Naughton – MSc in Animal Science

Academic advisor/PI: Dr. Mike VandeHaar

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

New girl is my favorite show right now. I'm watching it on Hulu.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I really enjoy cooking and could see myself doing something related to that if I HAD to do something other than animal science/research.

Feeding a fat supplement containing palmitic and oleic acid interacts with parity in peak lactation dairy cows during summer months

S. R. Naughton *, M. N. Mills, J. M. Dos Santos Neto, J. S. Liesman, A. L. Lock, M. J. VandeHaar

Presented at ADSA 2023

Heat stressed dairy cows experience decreased intake, milk production, and altered milk components resulting in significant financial losses. Fat supplements sometimes mitigate these effects of heat stress. We hypothesized that a blend of palmitic and oleic acid would be effective. Cows (12 primiparous and 28 multiparous) in peak lactation were blocked by parity, days in milk, and energy correct milk/body weight and randomly assigned to a standard control diet (CON) or a high fat diet (HiFat). We blocked cows by parity, days in milk, and energy corrected milk/body weight. Diets were corn silage based and contained 27%NDF (HiFat), 30%NDF (CON), 17.4%CP (HiFat), 16.8%CP (CON), and 29.3%starch. HiFat contained Spectrum Distinct (50% C16:0, 25% C18:0, 15%Ca; Perdue Agribusiness) at 2.3% of the diet DM and extra protein in place of soyhulls in CON. Cows were fed the CON diet for two weeks starting in mid-July and then the treatment diets for 6 weeks. Average barn temperatures were 66-81 degrees Fahrenheit, reaching 87 degrees Fahrenheit. Milk yield and DM intake were measured daily. Body weights were measured 3x/wk and milk was sampled for component analysis 2 d/wk. Barn temperatures were measured continuously. Our data was analyzed as repeated measures. The statistical model included the random effect of block, cow nested in block, diet, and parity, and the fixed effects of diet, parity, time, and their interactions. Significance was declared at $P \leq 0.05$ for main effects and $P \leq 0.10$ for interactions. We observed an overall effect of diet on feed efficiency variables, with HiFat increasing FCM/DMI (0.15 kg/kg) and ECM/DMI (0.13 kg/kg, P=0.01) regardless of parity. We observed interactions between diet and parity for some production response variables ($P \leq 0.09$). In multiparous cows, HiFat did not affect DMI (P=0.90), increased milk energy content (1.44 Mcal/d, P=0.05), and the yields of milk (2.06 kg/d, P=0.02), FCM (2.06 kg/d, P=0.03) and ECM (2.06 kg/d) compared with CON. On the other hand, HiFat decreased DMI in primiparous cows (1.67 kg/d, P = 0.04) with no effects on the other production response variables. In conclusion, adding a fat supplement improved feed efficiency regardless of parity and increased the production responses in multiparous but with no effects in primiparous cows.

Oral Presentation @ 2:00 PM

Erika Eckhardt – PhD in Animal Science

Academic advisor/PI: Dr. Jongkyoo Kim

Area of Research Interest: Bovine Muscle Biology

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

TV Show: Fire Country (Paramount +)

Podcast: Murder with My Husband (Spotify)

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

If I had to choose another career outside of Animal Science, I would choose to be a Museum Curator. Being a huge history/antique buff, the possibility of being able to work, evaluate, read stories, and view pieces of the past that have shaped the world both culturally and historically would be pretty fascinating.

Temperature Fluctuations Modulate Molecular Mechanisms in Skeletal Muscle and Influence Growth Potential in Beef Steers

Zachary K. Smith, Erika Eckhardt, Won Seob Kim, Ana Clara Baio Menezes, Warren C. Rusche, Jongkyoo Kim

Temperature stress in livestock is defined by the occurrence of temperature fluctuations, under certain bounds, which could result in adverse or lethal ramifications. We hypothesized that severe temperature fracture may induce physiological changes in skeletal muscle. This study aimed to elucidate the effects of severe temperature fluctuations on cellular and physiological responses in beef cattle. Eighteen Red Angus beef steers with an average body weight of 351 ± 24.5 kg were divided into three treatment groups: Steers were randomly assigned one of three treatment groups (n=6 steers/trt): 1) Control (CON), exposed to a temperature-humidity index (THI) of 42 for 6 hours without any temperature changes; 2) Transport (TP), subjected to a one-mile trailer trip with a THI of 42 for 6 hours; and 3) Temperature swing (TS), exposed to a one-mile trailer trip with a THI shift from 42 to 72-75 for 3 hours. Throughout the duration of the thermal stress treatment, samples were taken including BW, feed intake, behavior, rectal and environmental temperature, hourly respiratory rates, blood, and muscle biopsies of the longissimus dorsi. Our findings indicate that TS can induce thermal stress in cattle, regardless of whether the overall temperature level is excessively high or not. Behavioral indications of extreme heat stress in the cattle were observed, including extended tongue protrusion, reduced appetite, excessive salivation, and increased respiratory rate at a range of 50 – 150 breaths/min. Furthermore, we observed a pronounced overexpression ($P < 0.05$) of heat shock proteins (HSPs) 20, 27, and 90 in response to the TS treatment in the longissimus muscle (LM). Alterations in signaling pathways associated with skeletal muscle growth were noted, including the upregulation ($P < 0.01$) of Pax7, Myf5, and myosin heavy chain (MHC) isoforms. Additionally, an increase ($P < 0.05$) in transcription factors associated with adipogenesis was detected ($P < 0.05$), such as PPARγ, C/EBPα, FAS, and SCD in the TS group, suggesting the potential for adipose tissue accumulation due to temperature fluctuations. Our data illustrated the potential impacts of these temperature fluctuations on the growth of skeletal muscle and adipose tissue in beef cattle.

Keywords: thermal stress, beef cattle, skeletal muscle, adipose tissue

Oral Presentation @ 2:15 PM

Lautaro Garcia – MSc in Animal Science

Academic advisor/PI: Dr. Jason Rowntree

Area of Research Interest: Grazing Management and Beef Sustainability

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Andrew Huberman's podcast on Spotify is my top pick. We've had a one-sided "friendship" for a while now, where I like to explore neuroscience, psychology, personal development, and science communication.

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

Probably a full-time farmer! I'd focus on improving our small family's cow-calf operation, but I'd also be excited to diversify with enterprises like pastured poultry and silvopastoral systems. Reasons... farming offers constant opportunities for experimentation and learning, close connections with people and animals, and the inspiring challenge of setting an example for the area and sparking young interest in agriculture.

Impacts of soil carbon sequestration and climate metrics on beef production's contribution to anthropogenic global warming

L. Garcia, J. Sacramento, J. Rowntree

Beef production is the primary contributor to greenhouse gas (GHG) emissions in the livestock sector, and reducing these emissions—largely methane—is thought to play a significant role in mitigating anthropogenic global warming. In contrast, adaptive multi-paddock (AMP) grazing holds promise as a strategy to lower beef GHG intensity by sequestering soil organic carbon (SOC). However, there is limited literature assessing net GHG emissions in beef production systems employing AMP grazing for extended periods (>10 years) and considering measured SOC changes. Furthermore, Global Warming Potential Star (GWP*) remains underutilized within the context of beef life cycle assessments (LCAs), despite its potential advantages in weighing the global temperature impacts of methane-intensive sectors compared to traditional GWP CO2-equivalent (CO2-e) metrics. This study has two primary objectives: firstly, to assess net GHG emissions, including 11 years of measured SOC change data in two beef production scenarios, where the cow-calf and backgrounding phases remain consistent, and the finishing phase differ. Secondly, we examine the implications of reporting emissions using 100-year GWP (GWP100) CO2-e versus GWP* CO2-warming equivalent (CO2-w.e.) in the comparative assessment of these two beef production systems. To achieve these objectives, we are conducting a comparative 'farm gate' LCA, using on-farm data from the Lake City AgBioResearch Center and relevant literature. The cow-calf and backgrounding phases are grass-fed, and AMP practices are applied during the grazing season. The two evaluated finishing methods are AMP grazing and feedlot (FL), resulting in two distinct cow-calf to-finishing production systems: AMP and AMP-FL. This approach seeks to assess the potential of these two schemes for reducing the carbon intensity of Upper Midwest beef operations while addressing land use tradeoffs. Impact scope includes emissions from enteric methane, manure, feed production (hay, mineral supplement, nitrogen fertilizer, and lime application), on-farm energy, transportation, as well as the potential C sink from SOC sequestration and C loss from soil erosion. Beef GHG intensity annual averages utilize 11 years of data for the AMP model and 2 years for the FL segment. Soil C measurements for the AMP system were taken in 2012, 2016, and 2023. Data collection and analysis is ongoing. After obtaining the disaggregated GHG balance for the systems, we will compare the results using both the GWP100 and the GWP* metrics. Ultimately, these findings will deepen our understanding of AMP grazing's longer-term potential for SOC sequestration and reducing beef's carbon footprint, while also shedding light on beef production systems' role in global climate stabilization goals.

Keywords: beef production, life cycle assessment, greenhouse gas emissions, soil carbon sequestration.

Oral Presentation @ 2:30 PM

Morgan Mills – MSc in Animal Science

Academic advisor/PI: Dr. Mike VandeHaar

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

Current favorite TV show is American Horror Story on Hulu and current favorite podcast is the Broski Report with Brittany Broski on Spotify!

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?

I would want to be an author of fantasy or romance books because I love to read them, and I would love to write my own story some day! I just have to come up with a good idea.

Enhancing net food production by using “leftover” feeds for high-producing dairy cows.

M. Mills, S. Naughton, J. Liesman, M. VandeHaar

Presented at ADSA 2023

The environmental impact of dairy production is a concern for consumers. However, cows can convert human-inedible byproduct foods, or “ecological leftovers,” such as wheat straw or bakery waste, into high quality foods for people. Our goal was to demonstrate that feeding carefully-formulated diets high in byproducts will increase net food production for humans with minimal effects on milk production. Multiparous Holstein cows (n = 30; 113 ± 28 DIM, 700 kg BW) were fed a control diet containing 20% byproducts (CON) or a diet containing 70% byproducts (BYP). BYP was 25% corn silage, 8% straw, 15% gluten feed, 15% bakery waste, 12% beet pulp, 8% soyhulls, and 17% supplements. CON was mostly corn silage, alfalfa, and corn grain. Cows were fed a 50:50 mix of both diets for 1 wk, then CON or BYP for 4 wk, mix for 1 wk, and then opposite diet for 4 wk. Data were analyzed using PROC MIXED of SAS 9.4 with treatment and period as fixed effects and cow as random. Cows fed CON consumed 30.8 kg DM, produced 53.9 kg milk with 3.47% fat, 2.94% protein and 4.98% lactose, and gained 0.1 kg BW per day. Cows fed BYP consumed 1.0 kg more feed ($P = 0.02$) and produced 0.8 kg less milk ($P = 0.2$) with 0.18% less fat ($P < 0.01$), 0.04% less protein ($P = 0.02$), and 0.05% less lactose ($P < 0.01$). BW and BCS gain were not altered. Cows fed CON converted 44% of feed energy (using Atwater energy values), 32% of feed protein, and 64% of feed lysine to milk energy, protein, and lysine. These values were similar for cows fed BYP. Corn grain, soybean meal, the grain portion of corn silage, and the leaves of alfalfa were considered human edible. When evaluating efficiency on a human-edible nutrient basis, cows fed BYP were much more efficient than those fed CON (190 vs. 66% for energy, 186 vs. 84% for protein, and 284 vs. 163% for lysine; all $P < 0.01$). Although the BYP diets resulted in a slight decrease in the yield of milk components, dairy cattle can increase the amount of food available for people when they are fed diets high in human-inedible byproducts. A food production system without dairy cattle might emit less methane but also require more land to grow food.

Oral Presentation @ 2:45 PM

Lynn Olthof – PhD in Animal Science

Academic advisor/PI: Dr. Barry Bradford

Area of Research Interest: Dairy Management

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
"Whoa That's Good" Podcast by Sadie Robertson on Spotify

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
A basketball coach because I enjoy investing in people, helping them achieve their athletic goals, and being competitive through sports.

Assessment of Greenhouse Gas Footprints on Exemplary Small and Mid-Sized U.S. Dairy Farms

Lynn Olthof, Dr. Kaitlyn Briggs, Dr. Barry Bradford

Presented at the 2023 Tri-State Nutrition Conference and American Dairy Science Association Annual Meeting

Greenhouse gas (GHG) emissions from the dairy industry are receiving increased scrutiny as climate change concerns grow. Our objective was to estimate GHG footprints for 4 dairy farms (150 to 850 lactating cows; 89 to 353 ha) representing different regions of the U.S. using the Farmers Assuring Responsible Management: Environmental Stewardship (FARM ES) life cycle analysis model. Herds averaged 10,782 ± 2,037 kg/yr fat- and protein-corrected milk (FPCM; 4.0% fat, 3.3% protein) and 24 ± 2.8 kg/d dry matter intake during lactation. Data from 2021 were gathered from farm management software, producer interviews, and on-farm evaluations. Soil organic matter data for ≥ 7 yr were available on 3 of the farms. Emissions intensity was quantified as net CO_2 equivalents (CO_2e) emitted per unit of FPCM sold. Mean (± SD) GHG emissions intensity for all farms was 0.97 ± 0.16 kg CO_2e/kg FPCM. The Northeast dairy had the greatest FPCM/cow and the least GHG emissions intensity at 0.73 kg CO_2e/kg FPCM. Methane accounted for the largest share of GHG emissions on all farms at 57 ± 7%. Enteric methane and manure were the two greatest sources of GHG emissions on these 4 farms. FARM ES attributed 42 ± 6% of the farms' emissions to enteric methane and 28 ± 9% to manure. Two farms that utilized manure separation had an average footprint 0.20 kg CO_2e/kg FPCM less than farms that did not. Average annual soil carbon sequestration rates ranged from -0.82 to 3.52 Mg carbon/ha. Farms which produced more FPCM/cow had lesser GHG emissions per unit of milk. Manure management and cropping strategies also impacted emissions estimates. In conclusion, productivity, manure management, and cropping systems are important determinants of the GHG emissions intensity of milk produced on a given farm, and quantifying soil carbon sequestration is an important factor in accurately estimating net GHG emissions for a dairy farm.

Oral Presentation @ 3:00 PM

José M. dos Santos Neto – Post Doc in Animal Science

Academic advisor/PI: Dr. Adam Lock

Area of Research Interest: Dairy Nutrition

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?

I don't have a favorite TV show or Podcast. I like several TV shows, but I cannot name my favorite. I usually watch YouTube and other streaming services like Netflix and HBO Max.

If you HAD to choose a career outside of Animal Science/Research, what would you choose?

Outside of other biological science careers or chemistry, I would like to have studied history. I'm very enthusiastic about several human history topics, especially ancient history. I've read several books about the Roman Empire.

Impact of abomasal infusion of linoleic and linolenic acids on the incorporation of n-6 and n-3 fatty acids into milk fat of lactating cows

J. M. dos Santos Neto, L. C. Worden, M. Miller, J. E. Parales-Giron, A. L. Lock

Presented at ADSA 2023

We evaluated the effects of abomasal infusions of linoleic (18:2n-6) and linolenic acids (18:3n-3) on the incorporation of n-6 and n-3 fatty acids (FA) into milk fat using 6 rumen-fistulated Holstein cows (252 ± 33 DIM; 44 ± 6 kg milk/d) in a completely randomized design (3 cows per treatment). Treatments were abomasal infusions of 43 g/d 18:2n-6 and 8 g/d of 18:3n-3 (N6); or 43 g/d 18:3n-3 and 8 g/d 18:2n-6 (N3). Infusions were at 6-h intervals for 20 d. Cows received the same diet containing (%DM) 29.5% NDF, 17.9% CP, 28% starch, and 3.25% FA. Milk FA were evaluated throughout the treatment period (d 1 to 20) and during a 16-d carryover period (d 21 to 36). The model included the fixed effects of treatment, time (day), and their interactions ($P \leq 0.05$ for main effects; $P \leq 0.10$ for interactions). We used repeated measures. During the treatment period, we observed interactions between treatment and time for the yields of some milk FA ($P \leq 0.06$). Compared with N6, N3 increased the yields of total n-3 FA (16.7 g/d), 18:3n-3 (15.8 g/d) and 20:5n-3 (0.44 g/d) from d 4 to 20 ($P < 0.01$), decreased total n-6 FA from d 8 to 20 (16.4 g/d, $P \leq 0.01$), 18:2n-6 from d 8 to 16 (18.7 g/d, $P \leq 0.02$), and tended to decrease 20:4n-6 at d 12 and 16 ($P \leq 0.08$). A similar pattern was observed for milk FA content. During the carryover period, we observed an interaction between treatment and time for the yield of total n-3 FA ($P = 0.10$), where N3 increased or tended to increase it from d 22 to 28 (3.02 g/d, $P \leq 0.08$) compared with N6. Overall, N3 increased 20:5n-3 yield compared with N6 (0.32 g/d, $P = 0.03$). A similar pattern was observed for milk FA content, but with an additional interaction between treatment and time ($P < 0.01$); N3 increased 18:3n-3 from d 22 to 24 (0.16 g/100 g, $P \leq 0.03$) compared with N6. We did not observe any effect of N6 ($P \geq 0.20$) or detect 22:6n-3 during the treatment or carryover periods. In conclusion, abomasal infusions of 18:2n-6 and 18:3n-3 increased the yields and contents of n-6 and n-3 FA in milk fat, respectively, although increases in n-3 were more consistent than n-6 FA. Furthermore, carryover effects were observed for n-3 but not for n-6 FA.

Oral Presentation @ 3:15 PM

Jeffrey Mann – PhD in Cell & Molecular Biology

Academic advisor/PI: Dr. Chen Chen

Area of Research Interest: Male Reproduction

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
Caught Offside Soccer Podcast on Spotify

If you HAD to choose a career outside of Animal Science/Research, what would you choose?
Chemical engineering

Disruption of Catalytic RING2 Domain in Murine RNF216 Impairs Male Fertility

Jeffrey Mann & Chen Chen

Presented at:
Society of the Study of Reproduction (2023)
Michigan Alliance of Reproductive Technologies and Sciences (MARTS) (2022)
MSU Cell & Molecular Biology Symposium (2023)

Male infertility is attributed to disruptions in spermatogenesis caused by genetic mutations, culminating in substantial financial and emotional burdens when trying to conceive. Ring finger protein 216 (RNF216) is a E3 ubiquitin ligase in the RING-between-RING (RBR) subfamily with mutations identified in patients afflicted with Gordon Holmes Syndrome (GHS), some of which carry point mutations in the catalytic RING2 domain. Along with ataxia and hypogonadotropic hypogonadism exhibited in humans, global deletion of ubiquitous RNF216 in mice revealed essentiality of RNF216 in male fertility. However, the molecular mechanisms of RNF216 in male infertility etiology are incomplete. To further investigate its role as an E3 ubiquitin ligase, we generated a novel point mutation mouse model of GHS on the catalytic cystine residue within the RING2 domain (R739C). RNF216 R739C homozygous mice exhibit a strikingly progressive germ cell degenerative phenotype. Drastic germ cell loss also contributed to decreased testis mass and size and exhibit azoospermia, prompting infertility in adults. The phenotype of GHS mice also resembles the global RNF216 KO model in males, suggesting RNF216-mediated ubiquitination of specific target(s) within male germ cells is required for fertility. Furthermore, immunofluorescence of epitope tagged RNF216 mice testes revealed temporal and predominant nuclear localization notably in spermatogonial stem cells (SSCs) and its expression and localization in these early stem cells suggest key actions of ubiquitination in early gonadal development and SSC biology. Together, these results will help further elucidate the molecular mechanisms of RNF216 in SSCs, GHS, infertility, and male reproduction.

Oral Presentation @ 3:30 PM

Andrea Luttman – PhD in Animal Science

Academic advisor/PI: Dr. Cathy Ernst

Area of Research Interest: Social stress in pigs, epigenetic response to social stress

What is your current favorite TV show or podcast (or both)? What platform do you use to watch/listen?
TV shows, primarily Netflix and Hulu

If you HAD to choose a career outside of Animal Science/Research, what would you choose and why?
A baker, because everyone loves cookies and I make pretty good ones!

Relationship of resilience to weaning stress with transcript abundance and phenotypic traits at slaughter.

Andrea M. Luttman, Grace E. Schmidt, Nancy E. Raney,
Juan P. Steibel, Catherine W. Ernst

Presented at Midwest ASAS 2023

Acute stress prior to slaughter has been demonstrated to have a detrimental impact on pork quality, but it is not known if early life stress has a similar effect. Our objective was to identify if stress response at weaning characterized by serum cortisol, had an impact on long-term performance resulting in differences in carcass or meat quality traits. At weaning, blood samples were collected from all gilt piglets of 26 crossbred litters (n=170) at -1d, 0d, and +4d pre- and post-weaning. For each litter, serum cortisol was used to identify the gilt most capable to return to baseline levels by +4d as stress resilient (SR, n=26) and the gilt least capable as stress vulnerable (SV, n=26). SR and SV gilts were followed to finishing weight and processed at the Michigan State University Meat Laboratory. Liver, longissimus dorsi, and subcutaneous backfat samples were collected from a subset of 18 gilts. Carcass traits included live slaughter weight, hot carcass weight, dressing percent, loin muscle area, and 10th rib backfat depth. Meat quality traits included pH, marbling score, subjective color score, Minolta colorimeter, drip loss, cook yield, and Warner-Bratzler shear force. Tissue-specific transcript abundance of NR3C1 and NR3C2, coding for the two receptors that bind cortisol, was quantified using RT-qPCR. Differences between SR and SV gilts were analyzed using Gaussian linear mixed effects model or linear regression where appropriate. The model included a fixed effect of stress group, covariates of slaughter age and weight, and random effect of day of slaughter. Associations between transcript abundance and phenotypic measures were analyzed using the above model with transcript abundance in place of stress group. We found no differences in weights, carcass composition, meat quality, or transcript abundance between SR and SV gilts. NR3C1 transcript abundance in subcutaneous backfat was significantly associated with marbling score ($p=0.042$), 45-min pH ($p=0.020$), pH decline ($p=0.005$), and subjective color score ($p=0.042$). NR3C2 transcript abundance was not found to be associated with any carcass composition or meat quality traits. However, adipose NR3C1:NR3C2 ratio was significantly associated with marbling ($p=0.044$), 45-min pH ($p=0.012$), pH decline ($p=0.003$), and subjective color score ($p=0.015$). Collectively this data suggests that future selection for resiliency to weaning stress should not impact carcass composition or meat quality, but tissue-specific genetic mechanisms involved in cortisol binding may influence these traits.

Oral Presentation @ 3:45 PM

Thank you for supporting research in animal science!