Kelly Louise Woodruff, M.S.

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EDUCATION

University of Wyoming, Laramie, WY
- M.S. Animal & Veterinary Sciences (Genetics), January 2019-December 2020
- Thesis: Exploration of factors contributing to colonization and the programming potential of the early gut microbiome in cattle
- Advisor: Dr. Hannah Cunningham-Hollinger

University of Wyoming, Laramie, WY
- B.S. Animal & Veterinary Sciences (Concentration: Animal Biology), August 2014-December 2018

EMPLOYMENT

Assistant Research Scientist, University of Wyoming, Laramie WY, August 2022 - Present
- Assist 6+ Principal Investigators and associated students conduct research.
- Train and supervise undergraduate and graduate students in research practices.
- Operate, maintain, and repair highly complex research instruments/equipment.
- Determine or assist in developing appropriate advanced laboratory methods and procedures to accomplish required goals.
- Develop and maintain quality control procedures to ensure accuracy of results.
- Maintain supply and chemical inventories and purchase laboratory supplies, responsible for daily laboratory operational functions.
- Safely work with, properly store or eliminate various laboratory chemicals, mediums, and other lab materials.
- Implement and enforce University Laboratory Safety rules.
- Maintain safety records (proper training, safety data sheets, etc.).
- Assist with Academic Quadrathlon Team.
- Principal Investigators:

Dr. Hannah Cunningham-Hollinger
- H&E staining
- Tissue embedding and sectioning
- cDNA synthesis and RT-qPCR
- DNA and RNA extraction
- DNA and RNA quantification (nanodrop, Qubit)
- Automated DNA extraction (Qiacube)
- 16S Library Preparation
- MiSeq 16S sequencing (at WPHL)
- iSeq 100 16S sequencing (in-house)
- Gel electrophoresis
- Automated electrophoresis (Fragment Analyzer 5300)
- Multiplex cytokine detection with BioPlex 200
- Sequence data analysis (QIIME2, SAS, R studio)
- Centrifugation of blood (serum, plasma)
- Buffy coat collection

- Samples handled: rumen fluid, swabs (vaginal, uterine, nasal, meconium), fecal, blood, tissue (heart, liver, placenta), semen
- Animal handling work
- Equipment maintenance
- Ordering of supplies

Dr. Brenda Alexander

- cDNA synthesis and RT-qPCR
- RNA extraction
- ELISA (cortisol and testosterone)
- Preservation of organs (for teaching use)
- Radiation safety committee proxy
- Tissue fixation and embedding
- Tissue sectioning and staining
- Ordering of supplies

Dr. Jeremy Block

- DNA and RNA extraction
- DNA and RNA quantification (nanodrop, Qubit)
- Gel electrophoresis
- Automated electrophoresis (Fragment Analyzer 5300)
- cDNA synthesis and RT-qPCR
- Multiplex cytokine detection with BioPlex 200
- Assist with cell culture (media changes, cell counting)
- Observation of IVF
- Samples handled: rumen fluid, semen, tissue (epididymal, seminal vesicle, testicular), swabs (urethral, prostate)
- Animal handling work
- Surgery assistance – drug preparation and administration
- Ordering of supplies

Dr. Shelby Rosasco

- DNA extraction
- DNA quantification (nanodrop, Qubit)
- 16S library preparation
- Automated electrophoresis (Fragment Analyzer 5300)
- MiSeq 16S sequencing (at WPHL)
- iSeq 100 16S sequencing (in-house)
- Tissue fixation and embedding
- Tissue sectioining and staining
- Samples handled: swabs (vaginal, uterine), ovaries
- Assist with antral follicle counting in heifers (operated ultrasound to measure follicles)
- Centrifugation of blood (plasma)
- Animal handling work
- Ordering of supplies

Dr. Cody Gifford

- H&E staining
- Tissue embedding and sectioning
- Tissue sectioning and staining
- Trained sensory panelist for meat quality taste panels
- Multiplex cytokine detection with BioPlex 200
- Ordering of supplies

Dr. Bledar Bisha

- Equipment maintenance (monthly: BioPlex 200, C6 BD Accuri)
- Trouble shoot equipment (C6 Accuri Flow Cytometer)
- Digital PCR (dPCR; Qiacuity)
- Ordering of supplies

Dr. Whit Stewart

- Centrifugation of blood (serum and plasma)
- Multiplex cytokine detection with BioPlex 200
- Ordering of supplies

Dr. Scott Lake

- Multiplex cytokine detection with BioPlex 200
- Ordering of supplies

Laboratory Technician I, University of Wyoming, Laramie, WY, January 2021 – July 2022
Manager of research project: Sampling wastewater influent as a surveillance tool for the presence of SARS-CoV-2 in Wyoming

- Funding: CARES grant
- Project practices: DNA and RNA extraction from wastewater, PCR (Quantitative and Digital), sterile techniques.
- Train and supervise undergraduate and graduate students in research practices.
- Operate, maintain, and repair highly complex research instruments/equipment.

- Determine or assist in developing appropriate advanced laboratory methods and procedures to accomplish required goals.
- Develop and maintain quality control procedures to ensure accuracy of results.
- Maintain supply and chemical inventories and purchase laboratory supplies; responsible for daily laboratory operational functions.
- Safely work with, properly store or eliminate various laboratory chemicals, mediums, and other lab materials.
- Coordinate with cooperators to ensure they have proper supplies to collect samples.
- Communication with research collaborators.
- Maintain result records and analyzing data to present to funders.

Other roles

- Implement and enforce University Laboratory Safety rules.
- Maintain safety records (proper training, safety data sheets, etc.).
- Order supplies for principal investigators in other laboratories.
- Assist with culturing and isolation of bacterial colonies for MALDI-TOF.
- Assist with histological tissue collection and staining.
- Run Bio-Plex Human Chemokine assays.
- Main contact for sequencing preparation (DNA extraction, library preparation, quality control, iSeq).

Graduate Research Assistant, University of Wyoming, Laramie, WY: January 2019-December 2020
Animal Breeding & Genetics Laboratory- Dr. Hannah Cunningham-Hollinger

- Late gestation maternal nutrition influences on the developing rumen microbiome in cattle
    - Responsible for feeding and monitoring health of the research animals.
    - Responsible for sample collection from cows and newborn calves, including rumen fluid, meconium, vaginal, and placental tissue collection.
    - Responsible for DNA extraction, sequencing, and data analysis.
    - Volatile fatty acid and pH analysis
    - Trained students in our sample collection and laboratory procedures.
- Survey of the maternal microbiomes and how they relate to the offspring rumen microbiome
    - Responsible for sample collection from cows and newborn calves, including rumen fluid, blood, meconium, vaginal, and placental tissue collection.
    - Responsible for DNA extraction, sequencing, and data analysis.
    - Management of undergraduates assisting on project to ensure roles and procedures were understood.

Ruminant Nutrition Laboratory- Dr. Scott Lake & Dr. Hannah Cunningham-Hollinger

- Comparison of feed-additives on growth, feed-efficiency, gut microbiome and coccidia presence in 70-day background study
    - Assisted with feeding and monitoring health of the research animals.
    - Assisted with sample collection from the calves, including rumen fluid and fecal samples.

Small Ruminant Laboratory- Dr. Whitney Stewart

- Assisted with sample collection from sheep and newborn lambs, including rumen fluid, milk, and blood.

Undergraduate Research Assistant, University of Wyoming, Laramie, WY: May 2018-Nov 2018
Small Ruminant Laboratory- Dr. Whitney Stewart

- Quantifying the impact of excessively fat lambs in the US processing sector
    - Help develop camera system for capturing lamb carcass data. Implement camera system in Mountain States Rosen plant in Greely, CO and Superior Farms, Inc., Denver, CO.
    - Use of Image J software to analyze carcass characteristics.

STUDENTS MENTORED

Rori Hankins-Masterson – B.S Animal Science; September 2025 – **Present**
- Work study student; basic laboratory maintenance, sample preparation (autoclaving, labeling tubes)

Gabe Wigington – B.S Animal Science; February 2025 – August 2025
- Sample preparation (autoclave, labeling tubes), DNA extraction, RNA extraction, sample collection (blood, nasal), 16S rRNA library preparation, gel electrophoresis, cytokine analysis

Sage Ward – M.S. Animal Science; February 2025 – **Present**
- Cytokine analysis

Lilly Masopust – B.S. Animal Science; December 2024 – **Present**
- Sample collection (nasal swab, blood), processing of blood, DNA extraction, 16S rRNA library preparation, Fragment Analyzer

Martin Akandawen – M.S. Animal Science; August 2024 – **Present**
- Tissue preservation and embedding, microtome, cryostat, tissue staining, RNA extraction, cDNA synthesis, RT-qPCR

Shelby Raber – M.S. Animal Science; July 2024 – **Present**
- Tissue fixation, embedding, sectioning, H&E staining

Kemsley Gallegos – M.S. Animal Science; July 2024 – September 2024
- Sample collection (gut mucosa)

Blake Fabrizius – M.S Animal Science; February 2024 – **Present**
- Blood centrifugation, tissue sectioning, tissue staining, cytokine analysis

Owen Hoal – M.S. Animal Science; May 2024 – August 2025
- Sample collection (nasal swab, blood), DNA extraction, Fragment Analyzer, 16S rRNA library preparation, 16S sequence data analysis (QIIME2)
- Thesis: Evaluating the Influence of Pulmonary Arterial Pressure Classification and Targeted Daily Gain Strategies on Feedlot Performance, Carcass Merit, Meat Quality, and Respiratory Microbiome in Beef Steers

Emily Barr – M.S. Animal Science; February 2024 – **Present**
- Sample collection (nasal swabs, rumen fluid), DNA extraction, 16S rRNA library preparation, 16S sequence data analysis (QIIME2), cytokine analysis, RNA extraction, RT-qPCR, cytokine analysis

Emily Eck – M.S. Animal Science; February 2024 – May 2024
- Sample collection (nasal swabs, semen), DNA extraction

Emi Ramirez – B.S. Animal Science; October 2023 – May 2025
- Work study student, equipment maintenance, DNA extraction, 16S rRNA library preparation, Fragment Analyzer, cytokine analysis

Olivia Ohm – M.S. Animal Science; August 2023 – May 2025
- RNA extraction, RT-PCR, mycoplasma PCR, gel electrophoresis
- Thesis: Effects of Modifying Pre-Culture Conditions on Differentiation of Bovien Embryonic Stem Cells Toward a Primordial Germ Cell-Like Lineage

Sarah Retherford – M.S. Animal Science; February 2023 – June 2024
- DNA extraction, method optimization, Fragment Analyzer
- Thesis: An Exploration of the Extent of the Bull Reproductive Microbiome and Its Relationship With the Rumen Microbiome

Brooke Mitrisin – M.S. Animal Science; February 2023 – July 2023
- qPCR, gel electrophoresis, Agilent Fragment Analyzer, cell culture media, cell counting
- Thesis: Effects of Activin A and Fibroblast Growth Factor 2 on Bovine Embryonic Stem Cell Differentiation

Michaela Kuzniar – M.S. Animal Science; February 2023 – May 2023
- Agilent Fragment Analyzer, RT-qPCR

- Thesis: Effects of Interleukin-1 Beta on Bovine Endometrial and Oviductal Gene Expression, Blastocyst Development, and Conceptus Survival

Chase Markel – M.S February 2023 – July 2023; PhD August 2023 - **Present**

- DNA and RNA extraction, tissue preservation, assist with sample collection (blood, nasal swabs)
- Thesis: Characterizing Effects of Management Strategy and Degree of Pulmonary Hypertension on Live growth Performance, Carcass Quality, and Respiratory Microbiome of Finishing Cattle

Whitney Brown – M.S. Animal Science; August 2022 – May 2023

- BioPlex Cytokine panel
- Thesis: Effects of Mycobacterium Cell Wall Fraction on Embryo Development, Pregnancy Establishment, and Fetal Survival

Bryson Mills – M.S. Animal Science; May 2022 – August 2023

- DNA extraction, 16S rRNA library preparation, DNA fragment analysis
- Thesis: Influence of Antral Follicle Classification on the Maternal Reproductive Tract Microbiomes and Uterine Health in Cattle

Anahita Tajani – PhD Animal Science; May 2022 – August 2022

- DNA extraction and quantification

Megan Matthews – B.S. Molecular Biology; May 2021 – August 2022

- DNA and RNA extraction and quantification, quantitative real-time PCR, digital PCR, 16S rRNA library preparation, DNA fragment analysis, sterile techniques

Clara Bouley – M.S. Animal Science; May 2021 – July 2022

- RNA extraction, Digital PCR assay development and troubleshooting

Olivia Chase – B.S. Molecular Biology February 2021 – May 2021; M.S. Animal Science June 2022 – July 2024

- DNA and RNA extraction and quantification, quantitative real-time PCR, digital PCR, 16S rRNA library preparation, DNA fragment analysis, sterile techniques, laboratory protocol development
- Thesis: A Comparative Analysis of dPCR and qPCR Limit of Detection, Sensitivity, Specificity, Exclusivity, and Absolute Quantification of Salmonella enterica subsp. Enterica and Campylobacter jejuni Without Enrichment in Raw Chicken Breasts

Ryan Knuth – PhD Animal Science; January 2021 – July 2022

- DNA extraction and quantification, 16S rRNA library preparation, DNA fragment analysis, QIIME2 analysis

Alexys McGuire – M.S. Animal Science; January 2021 – May 2022

- DNA and RNA extraction and quantification, sterile techniques, digital PCR

Grace Corrette – B.S. Animal Science; January 2021 – June 2021

- DNA and RNA extraction and quantification, quantitative real-time PCR, sterile techniques

MEMBERSHIPS

American Society of Animal Science – Western Section Member (2019 – **Present**)

SKILLS

Animal handling/sample collection:

- Animal husbandry (cattle, sheep, swine & equine)
- Processing animals (tagging, weighing, weaning, castration, vaccinations)
- Basic animal health (wound care, drenching, etc.)
- Low stress animal handling
- Blood collection on cattle, sheep
- Oral lavage for rumen sample collection (cattle and sheep; young and mature animals)
- Smart Feed Pro System
- Grow-Safe

Molecular laboratory techniques:

- cDNA synthesis and RT-qPCR

- DNA and RNA extraction, quantification, and purification
- Qiacube Connect automatic nucleic acid extraction
- Gel electrophoresis
- 16S rRNA sequencing
- Fragment Analyzer 5300 (automated electrophoresis)
- Quantitative real-time PCR
- Digital PCR
- Bio-Rad BioPlex Cytokine Assays
- BD Accuri C6 Flow Cytometer

Microbiology laboratory techniques:

- Bacterial culturing and isolation
- MALDI-TOF
- Autoclaving

Data analysis:

- Image J
- QIIME2
- R Commander
- SAS

AWARDS and SCHOLARSHIPS

- Nominated for Agricultural Experiment Station Outstanding Research Support Award (Spring 2024)
- A member of the team who won the Institutional Award for the graduate student competition at the American Society of Animal Science Western Section Annual Meeting (July 2020)
- Nominated for Gamma Sigma Delta outstanding master student (2020).
- Recipient of Y Cross Ranch Graduate Scholarship. University of Wyoming, Laramie, WY. 2019-2020.
- Recipient of Y Cross Ranch Endowment Scholarship and Joe & Arlene Watt Scholarship. University of Wyoming, Laramie, WY. 2017-2018.
- Nominated Animal Science Junior of the Year, University of Wyoming, Laramie, WY. 2017.
- Recipient of Wheel of Brands Scholarship. University of Wyoming, Laramie, WY. 2016-2017, 2015-2016.

GRANTS

- **USDA-NIFA-CARE 2025** – Influence of nutritional management and pulmonary hypertension risk on fertility in developing beef bulls ($299,989.03; submitted)
- **Illumina Agricultural Greater Good Initiative 2023** ($350,000; unfunded)
- **USDA-NIFA 2023** – the reproductive microbiome of heifers divergent in antral follicle count and its influence on calf microbiome and productivity ($649,982.06; unfunded)

SERVICE

- Faculty Recognition & Development Committee (University; May 2025 – **Present**)
- Departmental judge for the 3M PhD Presentations (March 2025)
- Building Emergency Action Plan Coordinator (Spring 2024 – **Present**)
- Ad Hoc Reviewer – Microbiome, BMC Veterinary Research, npj Biofilms and Microbiomes – Nature, Animal Microbiome, Scientific Reports (Spring 2024 – **Present**)
- Poster judge for the Front Range Microbiome Symposium (Spring 2024)
- Department Safety Coordinator (Fall 2022 – **Present**)
- Distribute Lab Coats
- Teach summer high school institute students on gel electrophoresis (July 2023)
- Judge for American Society of Animal science Western Section Academic Quadrathlon presentations (April 2023)
- Radiation Safety Committee Proxy – April 2023, Sept 2022

PROFESSIONAL DEVELOPMENT

- American Society of Animal Science Perinatal Biology Symposium (Snowmass, CO; August 16-19th, 2025)
- 10x Genomics scRNAseq mini-workshop (UWYO INBRE, Laramie, WY; July 17th, 2025)
- 10x Genomics scRNAseq and Visium HD Spatial Gene Expression Mapping Workshop (UWYO Sensory Biology Center, Laramie, WY; June 26th, July 7th-11th, July 14th, 2025)
- American Society of Animal Science Southern/Western Section Joint Annual Meeting (Arlington, TX; April 6th – 9th, 2025)
- Front Range Microbiome Symposium (Denver, CO; April 25th, 2025)
- Microbiome Amplicon Workshop (Colorado State University, Fort Collins, CO; June 10-12th, 2024)
- Lunch and Learn; Single Cell and Spatial Multiomics Research Advancements (Laramie, WY; May 1st, 2024; Hosted by 10x Genomics)
- Front Range Microbiome Symposium (Fort Collins, CO; April 19th, 2024)
    - Poster Presentation Judge
- Metagenomic Sequencing Training (Cheyenne, WY; Wyoming Public Health Laboratory, 2024)
- Fundamentals of Bioinformatics (Online YouTube videos hosted by QIIME2; Fall 2023 - Spring 2024)
- Responsible Conduct of Research Training Seminar Series (Laramie, WY; Fall 2023; Hosted by UWYO Safety Office)
- American Society of Animal Science Annual/Western Section Meeting (Albuquerque, NM; July 2023)

PROJECTS

- Novel methods for characterization of beef steer temperament and association with feed efficiency, metabolic profile, stress, health, and methane flux (Hannah Cunnigham-Hollinger and Cody Gifford; USDA-AFRI Competitive; May 2025 - **Present**)
    - Not included in the grant but responsible for ordering sample collection and laboratory supplies, preparation for sample collection and harvest days. Train students and collect various sample types, responsible for sample handling/storage
    - Animal handling completed September 2025.
    - Will work with graduate students to process various sample types for DNA and RNA for 16S rRNA sequencing and gene expression analysis. Will also perform cytokine analysis and other laboratory techniques.
- Weaning strategy influence on pulmonary hypertension risk and respiratory disease (Hannah Cunningham-Hollinger and Cody Gifford; USDA Western SARE; October 2024 – **Present**)
    - Not included in the grant but responsible for ordering sample collection and laboratory supplies for sample collection days. Train students and assist in collecting various sample types, responsible for sample handling/storage.
    - Animal handling completed September 2025.
    - Trained graduate and undergraduate students in DNA extraction, library preparation, and quality control for 16S rRNA sequencing.
    - Will continue to process samples for 16S rRNA sequencing.
- Effects of Choline Supplementation on Reproductive Performance of Ewe Lambs in the Breeding and Non-breeding Seasons (Jeremy Block, Whit Stewart, Cody Gifford; UWYO AES; Fall 2023)
    - Not included on the grant but assisted with administration of the Choline in addition to blood collection.
- Effects of Intrauterine Administration of CXCL12 on Pregnancy Rates Following Embryo Transfer in Mature Rambouillet Ewes (Jeremy Block; UWYO AES; Fall 2023)
    - Not included on the grant but assisted with surgeries to collect oocytes.
- Antimicrobial Susceptibility of Ewe Mastitis-Associated Bacteria (Bledar Bisha, Hannah Cunningham-Hollinger; UWYO AES; April 2023 – August 2023)
    - Not included on grant but performed DNA extraction, library preparation, quality control for 16S rRNA sequencing. Helped with sample collection as a graduate student.

- Influence of Antral Follicle Classification on Maternal Reproductive Tract Microbiome in Beef Heifers (Shelby Rosasco, Hannah Cunningham-Hollinger; UWYO AES; Fall 2022-Spring 2023)
    - Not included on the grant but trained graduate student Bryson Mills in DNA extraction, 16S libaray preparation, quality control for 16S rRNA sequencing. Also tested samples on use of the iSeq 100.
- Sampling wastewater influent as a surveillance tool for the presence of SARS-CoV-2 in Wyoming (Bledar Bisha; Wyoming Department of Health; January 2021 – October 2022)
    - Laboratory technician for coordinating sample collection, processing, and reporting for UW campus operations of this project. Processed samples for RNA to detect SARS-CoV-2 via PCR. See previous employment for further details.

MONEY SPENT

Month	2022	2023	2024	2025
January		$4,439.54	$6,935.88	$3,752.77
February		$8,826.14	$9,799.86	$6,044.20
March		$12,770.41	$17,651.71	$7,316.71
April		$13,651.02	$27,512.61	$13,560.96
May		$7,615.87	$5,381.78	$5,788.26
June		$24,774.80	$11,141.76	$13,804.86
July		$6,868.95	$3,217.99	$1,452.89
August	$14,278.91	$13,022.71	$9,387.27	$2,201.67
September	$20,430.01	$23,274.03	$3,006.92	$2,455.02
October	$6,256.02	$7,072.65	*maternity leave	
November	*maternity leave	$4,456.45	*maternity leave	
December	*maternity leave	$5,712.88	$10,129.22	
TOTAL	**$41,064.94**	**$132,485.45**	**$104,165.00**	

PUBLICATIONS

Manuscripts

Retherford, S. A., **K. L. Woodruff**, B. R. Harstine, D. K. Dittoe, and J. B. Block. 2025. The bull reproductive microbiome: a comparative analysis of microbial communities within semen and organs of the bull reproductive system. Biology of Reproduction. *Submitted*.

Woodruff, K. L., G. L. Hummel, K. J. Austin, J. D. Williams, R. M. Knuth, S. L. Lake, C. L. Gifford, and H. C. Cunningham-Hollinger. 2024. Effects of late gestation maternal feed restriction on development of the calf rumen microbiome. Journal of Animal Science. *Under Review.*

Knuth, R. M., C. M. Page, W. C. Stewart, G. L. Hummel, **K. L. Woodruff**, J. R. Whaley, A. L. Springer, K. J. Austin, T. W. Murphy, B. Bisha, and H. C. Cunningham-Hollinger. 2024. Milk microbiome in the first month of lactation and at weaning from ewes supplemented with zinc pre- and postpartum. Journal of Animal Science. skae163. doi:10.1093/jas/skae163.

Brown, W., M. Oliveira, R. Reis Silva, **K. Woodruff**, B. Bisha, D. Demetrio, and J. Block. Effects of mycobacterium cell wall fraction on embryo development following in vitro embryo production and pregnancy rates following embryo transfer in virgin dairy heifers. 2023. Theriogenology. https://doi.org/10.1016/j.theriogenology.2023.12.019.

Woodruff, K. L., G. L. Hummel, K. J. Austin, S. L. Lake, and H. C. Cunningham-Hollinger. 2022. Calf rumen microbiome from birth to weaning and shared microbial properties to the maternal rumen microbiome. Journal of Animal Science. https://doi.org/10.1093/jas/skac264.

Knuth, R. M., **K. L. Woodruff**, G. L. Hummel, J. D. Williams, K. J. Austin, W. C. Stewart, H. C. Cunningham-Hollinger, and B. Bisha. 2022. Effects of management strategies during early lactation and weaning on etiological agents of ovine subclinical mastitis and antimicrobial susceptibility of milk-derived bacterial isolates. Journal of Animal Science. https://doi.org/10.1093/jas/skac171.

Hummel, G, **K. Woodruff**, K. Austin, R. Knuth, S. Lake, and H. C. Cunningham-Hollinger. Late gestation maternal feed restriction decreases microbial diversity of the placenta while mineral supplementation improves richness of the fetal gut microbiome in cattle. 2021. Animals. 11 (8): 2210 doi: https://doi.org/10.3390/ani11082219.

*Knuth, R. M., **K. L. Woodruff**, G. L. Hummel, J. D. Williams, W. C. Stewart, H. C. Cunningham-Hollinger, and B. Bisha. Post-weaning management strategies and impacts on ewe subclinical mastitis and antimicrobial susceptibility. Submitted (Proceedings) 2021 American Society of Animal Science Western Section Annual Meeting.

*Hummel, G. L., **K. L. Woodruff**, K. J. Austin, R. M. Knuth, J. D. Williams, and H. C. Cunningham-Hollinger. The materno-placental microbiome of gravid beef cows under moderate feed intake restriction. Submitted (Proceedings) 2021 American Society of Animal Science Western Section Annual Meeting.

*Rigby, L. B., R. M. Knuth, **K. L. Woodruff**, G. L. Hummel, S. L. Lake, B. Bangoura, and H. C. Cunningham-Hollinger. Effects of prebiotics and tannins on measures of *Eimeria* spp. and growth performance of post-weaned calves. Submitted (Proceedings) 2021 American Society of Animal Science Western Section Annual Meeting.

***Woodruff, K. L.**, G. L. Hummel, K. J. Austin, T. L. Smith, and H.C. Cunningham-Hollinger, Influence of the maternal rumen microbiome on development of the calf meconium and rumen microbiome. 2020. Translational Animal Science, Volume 4, Issue Supplement_1, S169–S173.

*Hummel, G. L., **K. L. Woodruff,** K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. Evidence for the amnion-fetal gut-microbial axis in late gestation beef calves. 2020. Translational Animal Science. Volume 4, Issue Supplement_1, December 2020, Pages S174–S177.

*Page, C. M., T. W. Murphy, J. Bret Taylor, A. A. M. Julian, J. R. Whaley, **K. L. Woodruff**, G. L. Hummel, C. F. Demarco, D. M. Laverell, H. C. Cunningham-Hollinger, D. C. Rule, and W. C. Stewart. 2020. Effects of dietary Zn on ewe milk minerals and somatic cell count. Translational Animal Science. Volume 4, Issue Supplement_1, December 2020, Pages S17–S21.

*Whaley, J. R., W. J. Means, J. P. Ritten, T. W. Murphy., C. L. Gifford, H. C. Cunningham-Hollinger, **K. L. Woodruff**, H. N. McKibbin, C. M. Page, and W. C. Stewart. Harvest season, carcass weight, and fat measurement effects on lamb carcass characteristics and economic comparison of moderate and heavy weight lamb carcasses in the Western lamb processing industry, *Translational Animal Science*, Volume 4, Issue Supplement_1, December 2020, Pages S27–S31.

*Knuth, R. M., H. C. Cunningham-Hollinger, B. Bangoura, A. L. Julian, C. M. Page, G. L. Hummel, **K. L. Woodruff**, J. R. Whaley, K. D. Bardsley, S. L. Lake, C. L. Gifford, B. Bisha, and W. C. Stewart. 2020. Impacts of dietary zinc concentrations on lamb feedlot performance. Translational Animal Science. Volume 4, Issue Supplement_1, December 2020, Pages S6–S10.

*Proceedings paper

Posters

Woodruff, K. L., G. L. Hummel, and H. C. Cunningham-Hollinger. 2025. Late gestation maternal feed restriction alters specific rumen microbiota of the neonatal beef calf. Submitted (Abstr.) 2025 American Society of Animal Science Perinatal Biology Symposium.

Retherford S., **Woodruff K. L.**, Dittoe D. K., and Block J. 2025. Characterization of the extent and composition of the bull reproductive microbiome. Reproduction, Fertility and Development. Doi: 10.1071/RDv37n1Ab158.

Barr, E. R., L. R. Masopust, C. D. Markel, **K. L. Woodruff**, H. C. Cunningham-Hollinger, and S. Field. 2025. Using GPS enabled smart ear-tags to determine cow movement predictability and associations with

cow/calf interactions and production metrics. Accepted (Abstr.). 2025 American Society of Animal Science Southern/Western Section Annual Meeting.

Masopust, L. R., C. D. Markel, E. R. Barr, S. L. Lake, S. L. Rosasco, **K. L. Woodruff**, T. N. Holt, B. P. Hollinger, and H. C. Cunningham-Hollinger. 2025. Investigating potential relationships among key selection metrics of feed efficiency, pulmonary arterial pressure, and fertility metrics in beef bulls at high elevation. Accepted (Abstr.). 2025 American Society of Animal Science Southern/Western Section Annual Meeting.

Woodruff, K. L., J. D. Williams, G. L. Hummel, S. L. Lake, and H. C. Cunningham-Hollinger. 2023. Long-term impacts of late gestation maternal feed restriction on calf rumen microbiome. Accepted (Abstr.). 2023 American Society of Animal Science Annual Meeting.

McGuire, A. M., K. G. Gerow, S. M. Collins, **K. L. Woodruff**, and B. Bisha. SARS-CoV-2 Prevalence in Wastewater. Submitted (Abst.) 2022. American Society for Microbiology Annual Meeting.

Williams, J. D., **K. L. Woodruff**, G. L. Hummel, K. J. Austin, R. M. Knuth, and H. C. Cunningham-Hollinger. Effect of beef cow nutrition during late gestation on offspring feed efficiency. Submitted (Abstr.) 2021 American Society of Animal Science Western Section Annual Meeting.

Woodruff, K. L., G. L. Hummel, K. J. Austin, T. L. Smith, H. C. Cunningham-Hollinger. Development of the calf rumen microbiome and fermentation capabilities. Submitted (Abstr.) 2020 Front Range Microbiome Symposium Annual Meeting. (Meeting cancelled due to COVID-19).

Hummel, G. L., **K. L. Woodruff**, K. J. Austin, T. L. Smith, H. C. Cunningham-Hollinger. The cotyledonary placenta's microbiome and its nutritional amino acid framework. Submitted (Abstr.) 2020 Front Range Microbiome Symposium Annual Meeting. (Meeting cancelled due to COVID-19).

Knuth, R. M., C. M. Page, **K. L. Woodruff**, G. L. Hummel, K. J. Austin, W. C. Stewart, B. Bisha, and H. C. Cunningham-Hollinger. Ewe milk microbiome differences between lambing and weaning. Submitted (Abstr.) 2020 Front Range Microbiome Symposium Annual Meeting. (Meeting cancelled due to COVID-19).

Woodruff, K. L., G. L. Hummel, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. Influence of the late gestation maternal rumen microbiome on the calf meconium and early rumen microbiome. Accepted (Abstr.) 2020 American Society of Animal Science Midwest Section Annual Meeting.

Hummel, G. L., **K. L. Woodruff**, K. J. Austin, T. L. Smith and H. C. Cunningham-Hollinger. Identification of four nutrient transporters in the fetal membranes of the bovine placenta at parturition. Accepted (Abstr.) 2019 ASAS-PAG Annual Meeting.

Whaley, J. R., W. J. Means, J. P. Ritten, H. N. McKibben, M. R. Becker, **K. L. Lomagno**, A. A. Julian, C. M. Page, W. C. Stewart. Wyoming Wool Growers Association summer meeting, 08/07/18 (poster).

Presentations

Markel, C. D., T. N. Holt, S. L. Lake, **K. L. Woodruff**, B. Mills, C. Bedke, C. Gifford, and H. C. Cunningham-Hollinger. 2023. Evaluation of live growth performance and carcass characteristics of late finishing phase beef cattle with varying degrees of pulmonary hypertension. Accepted (Short Talk). 2023 American Society of Animal Science Annual Meeting.