
Hannah C. Cunningham-Hollinger

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Work Address

University of Wyoming
Department of Animal Science
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Home Address

24 Sage Ridge Road
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Education

Doctorate of Philosophy – August 2018

- University of Wyoming, Laramie, WY
- Animal and Veterinary Sciences (Animal Genetics); Minor in Statistics
- Dissertation: Maternal influence on the calf rumen microbiome and subsequent host performance.
- Advisors: Dr. Kristi Cammack and Dr. Mike Day

Master of Science – August 2014

- University of Wyoming, Laramie, WY
- Animal and Veterinary Sciences (Ruminant Nutrition)
- Thesis: Relationship of feed efficiency and small intestinal biology in beef cattle.
- Advisors: Dr. Allison Meyer and Dr. Kristi Cammack

Bachelor of Art – May 2012

- St. Olaf College, Northfield, MN
- Major: Biology

Professional Experience

Assistant Professor: August 2018-present

University of Wyoming, Department of Animal Science

- 60% research, 37.5% teaching, and 2.5% service nine-month, tenure track appointment. Primary focus is to establish a nationally recognized, externally funded research program that generates and/or uses genomic data to identify and explain trait variation. Duties include developing a research program, teaching undergraduate and graduate courses, advising/mentoring undergraduate students, and develop a dynamic graduate training program.

Graduate Research Assistant: August 2012-August 2018.

Animal Breeding & Genetics Laboratory, University of Wyoming, Laramie, Wyoming (2014-2018)

- Effects of late gestation maternal plane of nutrition on calf rumen microbiome
- Genetic and maternal influences on establishment of rumen microbiome in cattle
- Effects of high dietary sulfur on lamb performance and rumen microbiome
- Relationship of rumen microbiota and feed efficiency in sheep

AgResearch Limited; Invermay Agricultural Centre, Mosgiel, New Zealand (2017)

- Analytical approaches to metagenomic data from maternal plane of nutrition/calf microbiome samples collected at University of Wyoming

USDA Meat Animal Research Center, Clay Center, Nebraska (2015)

- Differential expression of transcripts in muscle and adipose tissue of cows differing in feed efficiency

Ruminant Nutrition Laboratory, University of Wyoming, Laramie, Wyoming (2012-2014)

- Effect of feed efficiency classification on visceral organ mass and small intestinal growth, vascularity, and gene expression of finishing steers
- Histological measures of vascularity and gene expression of angiogenic factors in calves from a gestational nutrient restriction model

Current Research

**Indicates collaborative research program*

Assistant Professor: August 2018-present

University of Wyoming, Department of Animal Science

The research objective of the Hollinger lab is to understand the genetic (host and/or microbial) and molecular mechanisms associated with phenotypes representing traits of economic importance to livestock producers. A priority area is understanding the variation associated with feed efficiency in cattle and sheep, and how those sources of variation may be optimized to improve feed efficiency in grazing and feedlot ruminants at several stages of the production cycle. This work has led to the investigation of the role of the rumen microbiome in feed efficiency and the programming potential of this critical ecological niche. Links between the rumen microbiome and that of the reproductive and respiratory tract as well as the milk, has generated several supported hypotheses for the role that these may be playing in animal health/disease, specifically pulmonary hypertension/heart failure, reproductive failure/success, mastitis, and respiratory disease. This has enhanced the collaborative research through combining the physiological and genetic component of the Hollinger lab with various labs expertise both within our department and outside of the institution including meat science, reproductive physiology, quantitative genetics, microbiology, range science, and precision livestock management.

Grants

Federal Grants

2024

USDA-AFRI-NIFA Animal Nutrition and Growth: Novel methods for characterization of beef steer temperament and association with feed efficiency, metabolic profile, stress, health, and methane flux. Funded. \$350,000. **Cunningham-Hollinger, H. C. (PI)**, A. K. Lindholm-Perry, J. F. Thorson, and C. L. Gifford.

Western SARE Producer + Professional Grant: Weaning strategy influence on pulmonary hypertension risk and respiratory disease. Funded. \$75,000. **Cunningham-Hollinger, H. C. (PI)**, C. L. Gifford, and C. Markel

National Association of Conservation Districts (USDA Partnerships for Climate Smart Commodities): The Grass is Greener on the Other Side: Developing Climate-Smart Sheep Commodities. Funded (Budget in negotiation). \$5,700,000 (\$634,459.72 UW Subaward). Cammack, K., A. Blair, J. Whaley, J. Brennan, H. Menendez, C. Schauer, **H. C. Cunningham-Hollinger (Co-PI)**, P. Lima, and C. Gifford.

2023

Western SARE Professional + Producer: Enhancing producer decision making: Lamb feeding strategies and meat quality assessment in the Katahdin sheep breed. Funded. \$75,0000. Gifford, C., W. Stewart, and **H. C. Cunningham-Hollinger (Co-PI)**

2022

USDA-NIFA-NLGCA: Building capacity and delivering beef cattle management training through multi-institutional collaboration: improving education and outreach through research on novel traits in bulls. Funded. \$750,000 (\$119,995.00 UW Sub-award). McFarlane, Z (Lead-PI, Cal Poly) Co-PI's: M. La Franco, J. Huzzey, M. Abo-Ismael, K. DeAtley, S. Rosasco and **H. Cunningham-Hollinger (Co-PI)**
USDA-NRCS: Creating sustainable beef. Funded. (Sub-award \$115,862). Byergo Angus Beef LLC, S. Lake, and **H. C. Cunningham-Hollinger (Co-PI)**

Industry Competitive Grants

2023

Wyoming Beef Council: Characterizing live animal performance, carcass characteristics, sensory and meat quality attributes of feedlot cattle with varying levels of pulmonary hypertension risk. Funded. (\$14,989). Gifford, C. and **H. C. Cunningham-Hollinger (Co-PI)**

2020

National Sheep Industry Improvement Center's Grant. Mitigation of subclinical mastitis during early lactation and effects of subclinical mastitis on milk yield, lamb growth, and lamb survival. Funded. \$29,700. Knuth, R., **H. C. Cunningham-Hollinger (Co-PI)**, B. Bisha, and W. Stewart.

2019

National Sheep Industry Improvement Center's Grant. Investigating the main mastitis causing pathogens plaguing Western sheep flocks. Funded. \$26,333.20. Knuth, R., **H. C. Cunningham-Hollinger (Co-PI)**, B. Bisha, and W. Stewart

Internal Competitive Grants

2024

Science Initiative Ideation Seed Grant: Community Oriented Research and Outreach. Funded. \$100,000. Garrison, J., M. Perkins, G. Taggart, S. Field, and **H. C. Cunningham-Hollinger (Co-PI)**.

Science Initiative Ideation Seed Grant: Innovations in Ranching. Funded. \$100,000. Dittoe, D., E. Case, D. Dutta, and **H. C. Cunningham-Hollinger (Co-PI)**.

INBRE Graduate Assistantship. Ph.D. Student Funding. Funded. **Cunningham-Hollinger, H. C. (PI)**

Undergraduate NASA Space Grant Fellowship. Pulmonary Arterial Pressure and the Correlation to Health and Reproductive Soundness in Bovine. Funded. \$5,000. Lilly Masopust (Undergraduate) – **H. C. Cunningham-Hollinger** supervisor

Y Cross Foundation Graduate Student Tuition and Fee Award AY 2024-2025.
University of Wyoming College of Agriculture. Funded. \$10,500. Emily Barr (M.S. advised by **H. C. Cunningham-Hollinger**)

Y Cross Foundation Graduate Student Tuition and Fee Award AY 2023-2024.
University of Wyoming College of Agriculture. Funded. \$9,000. Emily Barr (M.S. advised by **H. C. Cunningham-Hollinger**)

2023

School of Computing Faculty Fellows: Addressing the Big Data Problem in Precision Agriculture: Developing Useful Production Tools and Analytics from Precision Cattle Trackers. Funded. \$30,000. **Cunningham-Hollinger, H. C. (Co-PI)** and S. Field

Cardiff Wyoming Seed Grant for Collaborative Projects: Evaluation of the resiliency of forages and plants unique to production systems in Wyoming. Funded. \$20,000. Lima, P.M.T., J. Pickett, H. D. Jones, **H. C. Cunningham-Hollinger (Co-PI)**, S. L. Rosasco, D. Harris, J. D. Scasta, S. L. Lake, E. Webster

Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Chase Markel (Ph.D. student advised by **H. C. Cunningham-Hollinger**)

2022

Faculty Grant-In-Aid. Inflammatory and microbiome markers of beef cattle for indicators of pulmonary hypertension in beef cattle. Funded. \$7,500. Gifford, C. and **H. C. Cunningham-Hollinger (Co-PI)**

Wyoming INBRE Community College Collaborative Grant: Effects of diet on indicators of metabolic health using a biomedical swine model. Funded. \$49,969. Gifford, C., **H. C. Cunningham-Hollinger (Co-PI)**, and J. Burkett.

2021

Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Madi Shults (M.S. advised by **H. C. Cunningham-Hollinger**)

Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Chase Markel (M.S. co-advised by **H. C. Cunningham-Hollinger**)

Faculty Grant-In-Aid. Maternal reproductive microbiome influences on pregnancy status, stage of gestation, and the developing rumen microbiome in cattle. Funded. \$7,500. **Cunningham-Hollinger, H. C. (Co-PI)** and S. Lake

2020

Wyoming INBRE Equipment Grant. Agilent Fragment Analyzer. Funded. \$73,337.44. **Cunningham-Hollinger, H.C. (PI)**, B. Bisha, J. Block, C. Gifford, and K. Austin.

Undergraduate NASA Space Grant Fellowship. Effect of maternal gestating cattle nutrition on calf feed and reproductive efficiency. Funded. \$5,000. Jordan Williams (Undergraduate) – **H. C. Cunningham-Hollinger** supervisor

Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Madi Shults (M.S. advised by **H. C. Cunningham-Hollinger**)

Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Ryan Knuth (Ph.D. student advised by **H. C. Cunningham-Hollinger**)

2019

- Wyoming INBRE Sequencing and Bioinformatic Analysis Program. Evaluation of the clinical, subclinical, and clean milk microbiome from ewes supplemented with zinc pre- and post-parturition. Funded. \$9,690.40. **Cunningham-Hollinger, H. C. (PI)** and B. Bisha
- Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Gwen Hummel (M.S. advised by **Cunningham-Hollinger, H.C.)**
- Y Cross Foundation Graduate Student Tuition and Fee Award. University of Wyoming College of Agriculture. Funded. \$9,000. Kelly Woodruff (M.S. advised by **Cunningham-Hollinger, H.C)**
- Summer Independent Study Award Willits Ethics Award. A comparative analysis of ethical approaches in genetic engineering and microbiome engineering to improve efficiency in feedlot cattle. Funded. \$3,000. Hummel, G. (M.S. Student) – **H. C. Cunningham-Hollinger (Advisor)**
- University of Wyoming Agricultural Experiment Station Competitive Grant Program. Late gestation maternal nutrition influence on the developing rumen microbiome in cattle. Funded. \$9,866.64. **Cunningham-Hollinger, H. C. (PI)** and S. L. Lake

2018

- Wyoming INBRE Sequencing and Bioinformatic Analysis Program. Survey of the maternal/reproductive microbiomes influence on the neonatal rumen microbiome in cattle. Funded. \$8,594.72. **Cunningham-Hollinger, H. C. (PI)** and S. Lake

Industry Non-Competitive Funding**2023**

- Red Angus Association of America: Evaluation of divergent Red Angus sires on progeny growth performance, fertility, and pulmonary arterial pressure. Funded. \$30,000. Rosasco, S. L., S. L. Lake, C. L. Gifford, and **H. C. Cunningham-Hollinger (Co-PI)**

2019

- Pacer Technology Inc. Private Funding. Impacts of natural product on prevalence of coccidiosis, feed efficiency, and animal performance. Funded. \$20,000. **Cunningham-Hollinger, H. C. (PI)** and S. L. Lake.
- ADM Animal Nutrition. Dietary zinc concentrations on lamb feedlot performance, rumen fluid parameters, and carcass characteristics. Funded. \$1,300. Stewart, W. C., **H. C. Cunningham-Hollinger (Co-PI)**, S. L. Lake, C. Gifford, C. M. Page, and A. Julian.

Internal Non-Competitive Funding**2024**

- Hatch/Multistate Proposal. Collaborative Request. Undergraduate Lab Research. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$8,400. Block, J. S. Rosasco, and **H. C. Cunningham-Hollinger.**
- Hatch/Multistate Proposal. Collaborative Request. Laboratory Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$4,230. **Cunningham-Hollinger, H. C.,** W. Stewart, B. Alexander, and S. Rosasco.

Hatch/Multistate Proposal. Collaborative Request. Laboratory Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$6,000. **Cunningham-Hollinger, H. C.**, S. Rosasco, and B. Alexander.

Hatch/Multistate Proposal. Collaborative Request. Laboratory Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$5,000. **Cunningham-Hollinger, H. C.**, W. Stewart, S. Rosasco, and B. Alexander.

Hatch/Multistate Proposal. Grazing Ruminant Efficiency and Precision Technology. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$12,000. **Cunningham-Hollinger, H. C.**

2023

Hatch/Multistate Proposal. Collaborative Request. Laboratory Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$4,024.27. Gifford, C., J. Block, **H. C. Cunningham-Hollinger**, S. Rosasco, B. Alexander, and W. Stewart.

Hatch/Multistate Proposal. Collaborative Request. Laboratory Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$15,050.90. Alexander, B., C. Gifford, S. Rosasco, **H. C. Cunningham-Hollinger**, W. Stewart, and J. Block.

Hatch/Multistate Proposal. Precision Technology Equipment. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$5,000. **Cunningham-Hollinger, H. C.**

2022

Hatch/Multistate Request for Funds Proposal. Utilization of individual feeding systems used at LREC – Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$5,000. **Cunningham-Hollinger, H. C.**

2021

Hatch/Multistate Proposal. Optimizing and characterizing sustainable beef cattle production in forage based systems on Western rangelands. Funded. \$6,000. **Cunningham-Hollinger, H. C.**

Hatch/Multistate Proposal. Evaluating long term impacts of supplementation methods on the rumen microbiome and feed efficiency. Funded. \$6,339.00. **Cunningham-Hollinger, H.C.**, S. Lake, and W. Stewart.

*Prior to 2021, faculty who had a Hatch/Multistate project automatically received \$4,000/year of which \$2,000 went to each faculty members research funds, the other \$2,000 went to the department. Thus, **H. C. Cunningham-Hollinger** received an addition \$2,000/year for research in years 2018, 2019, and 2020 totaling an additional \$6,000.*

Publications

**Indicates publication of graduate advisee*

*R. M. Knuth, 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. J. Anim. Sci. Accepted. skae163. doi: 10.1093/jas/skae163.

- Kern-Lunbery, R. J., A. R. Rathert-Williams, A. P. Foote, **H. C. Cunningham-Hollinger**, L. A. Kuehn, A. M. Meyer, and A. K. Lindholm-Perry. 2024. Genes involved in the cholecystokinin receptor signaling map were differentially expressed in the jejunum of steers with variation in residual feed intake. *Veterinary and Animal Science*. 24:100357. doi:10.1016/j.vas.2024.100357.
- Cunningham-Hollinger, H. C.**, Z. T. L. Gray, K. W. Christensen, W. J. Means, S. Lake, S. I. Paisley, K. M. Cammack, and A. M. Meyer. 2022. The effect of feed efficiency classification on visceral organ mass in finishing steers. *Can. J. Anim. Sci.* doi:10.1139/CJAS-2022-0015.
- *Hummel, G. L., K. Austin, and **H. C. Cunningham-Hollinger**. 2022. Comparing the maternal-fetal microbiome of humans and cattle: a translational assessment of the reproductive, placental, and fetal gut microbiomes. *Biology of Reproduction*. ioac067. doi:10.1093/biolre/ioac067.
- *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*. 100. doi:10.1093/jas/skac171.
- Lindholm-Perry, A. K., A. M. Meyer, R. J. Kern-Lunbery, **H. C. Cunningham-Hollinger**, T. H. Funk, and B. N. Keel. 2022. Genes Involved in Feed Efficiency Identified in a Meta-Analysis of Rumen Tissue from Two Populations of Beef Steers. *Animals*. 12:1514. doi:10.3390/ani12121514.
- *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*. 100:skac264. doi:10.1093/jas/skac264.
- Cunningham-Hollinger, H. C.**, L. A. Kuehn, K. M. Cammack, K. E. Hales, W. T. Oliver, M. S. Crouse, C. Chen, H. C. Freetly, and A. K. Lindholm-Perry. 2021. Transcriptome profiles of the skeletal muscle of mature cows during feed restriction and realimentation. *BMC Research Notes*. 14:361. doi:10.1186/s13104-021-05757-8.
- *Hummel, G., K. Woodruff, K. Austin, R. Knuth, S. Lake, and **H. C. Cunningham-Hollinger**. 2021. Late Gestation Maternal Feed Restriction Decreases Microbial Diversity of the Placenta While Mineral Supplementation Improves Richness of the Fetal Gut Microbiome in Cattle. *Animals*. 11:2219. doi:10.3390/ani11082219.
- Rathert, A. R., A. M. Meyer, A. P. Foote, R. J. Kern, **H. C. Cunningham-Hollinger**, L. A. Kuehn, and A. K. Lindholm-Perry. 2020. Ruminal transcript abundance of the centromere-associated protein E gene may influence residual feed intake in beef steers. *Anim Genet*. age.12926. doi:10.1111/age.12926.
- Ellison, M. J., G. C. Conant, W. R. Lamberson, K. J. Austin, E. van Kirk, **H. C. Cunningham**, D. C. Rule, and K. M. Cammack. 2019. Predicting residual feed intake status using rumen microbial profiles in ewe lambs. *J. Anim. Sci.* 97:2878-2888. <https://doi.org/10.1093/jas/skz170>
- Cunningham, H. C.**, D. Levy, S. Paisley, S. Lake, W. Lamberson, M. Day, and K. M. Cammack. 2018. Maternal influence on the calf rumen microbiome and subsequent host performance. University of Wyoming, Department of Animal Science, Dissertation. August 2018.

- Cammack, K. M., K. J. Austin, W. R. Lamberson, G. C. Conant, and **H. C. Cunningham**. 2018. RUMINANT NUTRITION SYMPOSIUM: Tiny but mighty: The role of the rumen microbes in livestock production. *J. Anim. Sci.* 96:752-770. <https://doi.org/10.1093/jas/skx053>
- Cunningham, H. C.**, K. M. Cammack, K. E. Hales, H. C. Freetly, A. K. Lindholm-Perry. 2018. Microarray analysis of subcutaneous adipose tissue from mature cows with divergent body weight gain after feed restriction and realimentation. *Data Brief.* 16:303-311.
- Cunningham, H. C.**, K. M. Cammack, K. E. Hales, H. C. Freetly, and A. K. Lindholm-Perry. 2018. Differential transcript abundance in adipose tissue of mature beef cows during feed restriction and realimentation. *PLOS ONE.* 13(3):e0194104. <https://doi.org/10.1371/journal.pone.0194104>
- A. K. Lindholm-Perry, **H. C. Cunningham**, L. A. Kuehn, J. L. Vallet, J. W. Keele, A. P. Foote, K. M. Cammack, and H. C. Freetly. 2017. Relationship between the genes expressed in the mesenteric adipose tissue of beef cattle and feed intake and gain. *Anim. Genet.* 48(4):386-394.
- Foote, A., C. Zarek, L. Kuehn, **H. Cunningham**, K. Cammack, H. Freetly, and A. Lindholm-Perry. 2017. Effect of abomasal butyrate infusion on gene expression in the duodenum of lambs. *J. Anim. Sci.* 95(3):1191-1196
- Kern, R., C. Zarek, A. Lindholm-Perry, L. Kuehn, W. Snelling, H. Freetly, **H. Cunningham**, A. Meyer. 2016. Ruminal expression of the NQO1, RGS5, and ACAT1 genes may be indicators of feed efficiency in beef steers. *Anim. Genet.* 48(1):90-92.
- Cunningham, H. C.**, J. J. Gatlin, S. I. Paisley, A. M. Meyer, and K. M. Cammack. 2014. Relationship of feed efficiency and small intestinal biology in beef cattle. University of Wyoming, Department of Animal Science, Thesis. August 2014.

Manuscripts Under Review (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 (Submitted). Maternal feed restriction and mineral supplementation have varying effects on calf rumen microbiome programming. *Journal of Animal Science*. Submitted September, 2024.
- *Markel, C. D., T. N. Holt, S. Lake, B. Webb, **H. C. Cunningham-Hollinger**, and C. L. Gifford. 2024 (Submitted). The effects of ovariectomy and degree of heart failure risk on live growth performance and adaptive cardiac anatomy in finishing beef heifers. *Journal of Animal Science*, Submitted September, 2024.
- *Markel, C. D., T. N. Holt, S. Lake, B. Webb, **H. C. Cunningham-Hollinger**, and C. L. Gifford. 2024 (Submitted). The effects of growth-promoting implant strategy and degree of pulmonary hypertension on live growth performance, carcass quality and sensory attributes in finishing beef steers. *Journal of Animal Science*. Submitted September 2024.

Abstracts/Proceedings/Bulletins/Presentations

***Indicates peer-reviewed publication*

- Knuth, R., K. Woodruff, G. Hummel, J. Williams, K. Austin, W. Stewart, **H. C. Cunningham-Hollinger**, and B. Bisha. 2023. Antimicrobial susceptibility of Ewe Mastitis-Associated Bacteria. University of Wyoming, Agricultural Experiment Station, Laramie Research and Extension Center. Annual Report.

- Gifford, C., **H. C. Cunningham-Hollinger**, and C. Markel. 2023. Characterizing feedlot performance and carcass characteristics of high altitude disease risk in finishing cattle. University of Wyoming, Agricultural Experiment Station, Laramie Research and Extension Center. Annual Report.
- Shults, M., S. Rosasco, S. Lake, and **H. C. Cunningham-Hollinger**. 2023. Influences of pregnancy status, stage of gestation, and parity on the reproductive tract microbiome and the developing rumen microbiome in cattle. University of Wyoming, Agricultural Experiment Station, Laramie Research and Extension Center. Annual Report.
- Mills, B. D., C. D. Bedke, K. L. Woodruff, R. A. Cushman, S. L. Lake, A. P. Snider, **H. C. Cunningham-Hollinger**, and S. L. Rosasco. 2023. Influence of antral follicle classification on the maternal reproductive tract microbiome in beef heifers. University of Wyoming, Agricultural Experiment Station, Laramie Research and Extension Center. Annual Report.
- Markel, C., 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. Submitted. Abstr. Western Section ASAS Meeting.
- Markel, C., M. Shults, C. Ritchie, C. Newman, C. Bedke, B. Mills, T. N. Holt, S. Lake, **H. C. Cunningham-Hollinger**, C. Gifford. 2022. Evaluation of finishing performance and carcass characteristics of beef heifers with variable degrees of heart failure risk and differing reproductive tract type. J. Anim. Sci. Abstr. Western Section ASAS Meeting.
- Knuth, R. M., K. W. Woodruff, G. Hummel, J. Williams, K. J. Austin, W. C. Stewart, **H. C. Cunningham-Hollinger**, and B. Bisha. 2022. Young Scholar Ph.D.: Investigating ovine mastitis: microbial sources and management methods to reduce the prevalence. J. Anim. Sci. Abstr. Western Section ASAS Meeting.
- **Hummel, G. L., K. L. Woodruff, K. J. Austin, R. M. Knuth, J. D. Williams, and H. C. Cunningham-Hollinger. 2021. The materno-placental microbiome of gravid beef cows under moderate feed intake restriction. Translational Animal Science. 5:S159–S163. doi:10.1093/tas/txab172.**
- **Knuth, R. M., K. L. Woodruff, G. L. Hummel, J. D. Williams, W. C. Stewart, H. C. Cunningham-Hollinger, and B. Bisha. 2021. Post-weaning management strategies and impacts on ewe subclinical mastitis and antimicrobial susceptibility. Translational Animal Science. 5:S80–S85. doi:10.1093/tas/txab180.**
- Williams, J. D. K. L. Woodruff, G. L. Hummel, K. J. Austin, R. M. Knuth, and **H. C. Cunningham-Hollinger**. 2021. Effect of beef cow nutrition during late gestation on offspring feed efficiency. Abstract. Western Section Undergraduate Poster Competition. Western Section American Society of Animal Science Annual Meeting. October, 2021.
- **Hummel, G. L., K. L. Woodruff, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. 2020. Evidence for the amnion-fetal gut-microbial axis in late gestation beef calves¹. Translational Animal Science. 4:S174–S177. doi:10.1093/tas/txaa138.**
- **Julian, A. A. M., J. D. Scasta, B. R. Stam, B. M. Sebade, C. M. Page, B. E. Springer, W. T. Renner, H. Cunningham-Hollinger, and W. C. Stewart. 2020. Mineral element concentrations of common grass and shrub species on sheep winter range in Wyoming: insights for mineral supplementation strategies¹. Translational Animal Science. 4:S11–S16. doi:10.1093/tas/txaa088.**
- **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 performance¹. *Translational Animal Science*. 4:S6–S10. doi:10.1093/tas/txaa087.
- **Page, C. M., T. W. Murphy, J. B. 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 count¹. *Translational Animal Science*. 4:S17–S21. doi:10.1093/tas/txaa089.**
- **Whaley, J. R., W. J. Means, J. P. Ritten, T. W. Murphy, C. L. Gifford, H. C. Cunningham-Hollinger, K. L. Woodruff, H. N. McKibben, C. M. Page, and W. C. Stewart. 2020. 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 industry¹. *Translational Animal Science*. 4:S27–S31. doi:10.1093/tas/txaa091.**
- **Woodruff, K. L., G. L. Hummel, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. 2020. Influence of the maternal rumen microbiome on development of the calf meconium and rumen microbiome¹. *Translational Animal Science*. 4:S169–S173. doi:10.1093/tas/txaa136.**
- Hummel, G. L., K. L. Woodruff, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. 2020. The distance microbial ecology of the bovine placenta at parturition. Abstract. Accepted. Annual Meeting of the Society for the Study of Reproduction. Vancouver, BC. July 2020.
- Knuth, R. M., C. M. Page, K. J. Austin, W. C. Stewart, B. Bisha, and H. C. Cunningham-Hollinger. 2020. Ewe milk microbiome differences between lambing and weaning. Abstract. Front Range Microbiome Symposium. April, 2020. Cancelled due to COVID.
- Hummel, G. L., K. L. Woodruff, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. 2020. The cotyledonary placenta's microbiome and its nutritional amino acid framework. Abstract. Front Range Microbiome Symposium. April, 2020. Cancelled due to COVID.
- Woodruff, K. L., G. L. Hummel, K. J. Austin, T. L. Smith, and H. C. Cunningham-Hollinger. 2020. Development of the calf rumen microbiome and fermentation capabilities. Abstract. Front Range Microbiome Symposium. April, 2020. Cancelled due to COVID.
- Logar, J. G., C. Gifford, R. Knuth, **H. Cunningham-Hollinger**, A. Julian, C. Page, J. Whaley, B. Bisha, and W. Stewart. 2020. Evaluation of dietary zinc supplementation on lamb performance and carcass characteristics. Abstract. International Congress of Meat Science and Technology and Reciprocal Meat Conference Virtual Meeting.
- Nin-Velez, A. , J. Duncan, **H. Cunningham-Hollinger**, K. Austin, K. Cammack, W. Lamberson, and R. Cockrum. 2020. Changes in early milk composition has subsequent effects on microbial composition of the rumen. Abstract. Journal of Dairy Science. 103:270. American Dairy Science Association Annual Meeting.
- Cunningham-Hollinger, H. C. 2019. Maternal influences on the calf rumen microbiome and subsequent impacts on performance and efficiency. Proceedings paper. Range Beef Cow Symposium.**
- Woodruff, K. L., G. L. Hummel, K. J. Austin, T. L. Smith, and **H. C. Cunningham-Hollinger. 2019. Influence of the late gestation maternal rumen microbiome on the calf meconium and early rumen microbiome. Abstract. Poster Presentation. Midwest Section of the American Society of Animal Science. Omaha, NE. March 2020.**
- Hummel, G. L., K. L. Woodruff, K. J. Austin, T. L. Smith, and **H. C. Cunningham-Hollinger.**

2019. Identification of four nutrient transporters in the fetal membranes of the bovine placenta at parturition. Abstract. Poster Presentation. Perinatal Biology Symposium, Snowmass, CO. August, 2019.
- Christensen II, T. A., K. J. Austin, K. M. Cammack, and **H. C. Cunningham-Hollinger**. 2019. Metagenomic analysis of rumen populations in week old calves as altered by maternal late gestational nutrition and mode of delivery. Abstract. Undergraduate Poster Competition. Western Section of the American Society of Animal Science. Boise, ID. June, 2019.
- **Austin, K. J., H. C. Cunningham, S. R. Powell, K. T. Carpenter, and K. M. Cammack.** 2018. Investigation of maternal breed and rearing type on the calf rumen microbiome from day 28 through weaning. *Translational Animal Science*. 2:S125-S129. doi:10.1093/tas/txy034.
- Powell, S. R., **H. C. Cunningham**, K. J. Austin, and K. M. Cammack. 2018. Maternal influences on beef calf rumen microbiome in the first 4 weeks of life. Accepted Abstract. Undergraduate Student Poster Competition. (Proc. Western Section of the American Society of Animal Science). Bend, Oregon. June 2018.
- **Cunningham, H. C., K. J. Austin, S. R. Powell, K. T. Carpenter, and K. M. Cammack.** 2018. Potential response of the rumen microbiome to mode of delivery from birth through weaning. *Translating Animal Science*. 2:S35-S38. doi:10.1093/tas/txy029.
- **Cunningham, H. C., K. J. Austin, and K. M. Cammack.** 2018. Influence of maternal factors on the rumen microbiome and subsequent host performance. *Translating Animal Science*. 2:S101-S105. doi:10.1093/tas/txy058.
- Cunningham, H. C., K. J. Austin, K. T. Carpenter, S. R. Powell, and K. M. Cammack.** 2018. Mode of delivery influence on the early calf rumen microbiome. Accepted. (Abstr.) Poster presented at Rowett-INRA Gut Microbiology: No longer the forgotten organ. June, 2018. Aberdeen, Scotland.
- Cammack, K. M., **H. C. Cunningham**, K. J. Austin, H. C. Barton, and K. T. Carpenter. 2018. Effects of maternal breed on the early calf rumen microbiome. Accepted. (Abstr.) Poster presented at Rowett-INRA Gut Microbiology: No longer the forgotten organ. June, 2018. Aberdeen, Scotland.
- Powell, S. R., **H. C. Cunningham**, K. J. Austin, K. M. Cammack, and D. C. Rule. 2018. Maternal influences on early calf rumen volatile fatty acid profile. Accepted. (Abstr.) Undergraduate poster competition at Midwest Section of the American Society of Animal Science Annual Meeting. Omaha, NE. March, 2018.
- Cunningham, H. C., K. J. Austin, K. M. Cammack, G. Conant, and W. R. Lamberson.** 2018. The influence of maternal breed on early calf rumen microbiome. Accepted. (Proceedings) 11th World Congress on Genetics Applied to Livestock Production. W.R. Lamberson Presenting. Auckland, New Zealand. February, 2018.
- Cunningham, H. C., K. J. Austin, K. M. Cammack, J. C. McEwan, C. D. Moon, and A. McCulloch.** 2018. Effects of mode of delivery on the young calf rumen microbiome. Accepted. (Abstr.) Poster presented at Plant and Animal Genome XXVI. San Diego, CA. January 2018.
- Austin, K. J., **H. C. Cunningham**, K. M. Cammack, J. C. McEwan, C. D. Moon, and A. McCulloch. 2018. Potential role of maternal nutrition during late gestation on early calf rumen microbiome. Accepted. (Abstr.) Poster presented at Plant and Animal Genome XXVI. San Diego, CA. January 2018.

- Cunningham, H. C.**, K. M. Cammack, K. Hales, H. C. Freetly, and A. K. Lindholm-Perry. 2017. Lipid metabolism and mitochondrial energy production are key pathways involved in adipose tissue of cows transitioning from feed restriction to ad libitum diets. In print. (Abstr.) ASAS-CSAS Annual Meeting, Baltimore, MD, July 2017.
- R. R. Cockrum, **H. C. Cunningham**, K. J. Austin, E. M. Bart, and K. M. Cammack. 2017. Postpartum calf management influences dam colostrum components. Accepted. (Abstr.). ADSA Annual Meeting. Pittsburgh, PA. June 2017.
- Cunningham, H. C.**, K. J. Austin, K. M. Cammack, H. C. Freetly, and A. K. Lindholm-Perry. 2016. Key metabolic pathways associated with differences in weight maintenance and gain in mature cow skeletal and adipose tissue. Accepted. Graduate Student Oral Presentation Competition (Proc. West. Sect. Amer. Soc. Anim. Sci.) Salt Lake City, UT. July 2016.
- Lindholm-Perry, A., **H. Cunningham**, L. Kuehn, J. Keele, K. Cammack, H. Freetly. 2016. Transcriptome profile of genes differentially expressed in the mesenteric adipose tissue of cattle with variation in feed intake and gain. In print. (Abstr.) International Society for Animal Genetics. July 2016.
- Abrams, A. N., C. J. Clarkson, K. J. Austin, M. J. Ellison, **H. C. Cunningham**, G. Conant, W. R. Lamberson, T. Taxis, and K. M. Cammack. 2016. Altered rumen microbial populations in response to high sulfate water in lambs. Accepted. Young Scholars Recognition Program. (Proc. West. Sect. Amer. Soc. Anim. Sci.) Salt Lake City, UT. July 2016.
- Ellison, M. J., G. Conant, W. R. Lamberson, T. Taxis, E. A. Van Kirk, D. C. Rule, **H. C. Cunningham**, K. J. Austin, K. M. Cammack. 2016. The effect of residual feed intake on rumen microbial profiles in growing ewe lambs. In print. (Abstr.) Poster presented at Plant and Animal Genome XXIV. San Diego, CA. January 2016.
- Abrams, A. N., K. J. Austin, M. J. Ellison, **H. C. Cunningham**, G. Conant, T. Taxis, W. R. Lamberson, K. M. Cammack. 2016. Effect of high sulfate water on rumen microbial populations in lambs. In print. (Abstr.) Poster presented at Plant and Animal Genome XXIV. San Diego, CA. January 2016.
- Powell, S., A. N. Abrams, K. J. Austin, E. A. Van Kirk, M. J. Ellison, **H. C. Cunningham**, G. Conant, W. R. Lamberson, T. Taxis, and K. M. Cammack. 2016. High sulfate water affects volatile fatty acid profiles in lambs. In print. (Abstr.) Poster presented at Plant and Animal Genome XXIV. San Diego, CA. January 2016.
- Cunningham, H. C.**, K. M. Cammack, K. J. Austin, H. C. Freetly, A. K. Lindholm-Perry. 2016. Potential metabolic pathways associated with differences in weight maintenance and gain in mature cow skeletal and adipose tissue. In print. (Abstr.) Poster presented at Plant and Animal Genome XXIV. San Diego, CA. January 2016.
- Cunningham, H. C.**, K. J. Austin, K. M. Cammack, M. A. Berg, A. E. Radunz, and A. M. Meyer. 2015. Effect of maternal mid- to late gestational energy source on expression of angiogenic factors in fetal lamb jejunal tissue. Accepted. Graduate Student Oral Presentation Competition (Proc. West. Sect. Amer. Soc. Anim. Sci.) Ruidoso, NM. June 2015.
- M. J. Ellison, G. C. Conant, W. R. Lamberson, T. M. Taxis, **H. C. Cunningham**, K. J. Austin, and K. M. Cammack. The effect of residual feed intake status on rumen microbial profiles in ewe lambs. Accepted. (Proc. West. Sect. Amer. Soc. Anim. Sci.) Ruidoso, NM. June 2015

- C. J. Clarkson, A. N. Abrams, K. J. Austin, M. J. Ellison, **H. C. Cunningham**, G. C. Conant, W.R. Lamberson, T. M. Taxis, and K. M. Cammack. Effect of high sulfate water on rumen microbial populations in lambs. Accepted. (Proc. West. Sect. Amer. Soc. Anim. Sci.) Ruidoso, NM. June 2015.
- Cunningham, H. C.**, L. E. Speiser, C. J. Clarkson, M. J. Ellison, K. J. Austin, G. Conant, W. R. Lamberson, and K. M. Cammack. 2014. Rumen microbial populations associated with feed efficiency in lambs fed an antibiotic supplemented forage diet. In print. (Abstr.) Poster presented at Plant and Animal Genome XXIII. San Diego, CA. January 2015.
- Cunningham, H. C.**, K. J. Austin, S. I. Paisley, J. C. Gatlin, K. M. Cammack, and A. M. Meyer. 2014. The relationship of feed efficiency with organ mass and small intestinal vascularity in finishing cattle. Invited Presentation. High Plains Nutrition and Management Roundtable. Brule, NE. August 2014.
- Cunningham, H. C.**, Z. T. L. Gray, S. I. Paisley, K. J. Austin, K. M. Cammack, and A. M. Meyer. 2014. Expression of nutrient transporter mRNA in the jejunum of high and low efficiency steers. Accepted (Abstr.) ADSA, ASAS, CSAS Joint Annual Meeting. Kansas City, MO. July 2014.
- Cunningham, H. C.**, K. J. Austin, S. I. Paisley, J. C. Gatlin, K. M. Cammack, and A. M. Meyer. 2014. The relationship of feed efficiency with small intestinal biology in finishing cattle. Accepted. (Proc. West. Sect. Amer. Soc. Anim. Sci.) San Angelo, TX. June 2014.
- Cunningham, H. C.**, Z. T. L. Gray, S. I. Paisley, K. J. Austin, K. M. Cammack, and A. M. Meyer. 2013. Expression of cationic amino acid transporters mRNA in the jejunum of high and low efficiency steers. Accepted. (Abstr.) M.S. Graduate Student Oral Competition Midwest Animal Science Meetings. Des Moines, Iowa. March 2014.
- Z. T. L. Gray, **H. C. Cunningham**, K. W. Christensen, S. I. Paisley, W. J. Means, and A. M. Meyer. 2013. Serum amino acid concentrations in high and low efficiency finishing steers. Accepted. (Abstr.) Anticipated Poster Presentation Midwest Animal Science Meetings. Des Moines, Iowa. March 2014.
- Cunningham, H. C.**, Z. T. L. Gray, K. J. Austin, S. I. Paisley, K. M. Cammack, and A. M. Meyer. 2013. Expression of angiogenic factor mRNA in the jejunum of high and low efficiency steers. In print. (Abstr.) Poster presented at Plant and Animal Genome XXII. San Diego, CA. January 2014.
- C. J. Clarkson, **H. C. Cunningham**, M. J. Ellison, K. J. Austin, K. M. Cammack, and A. M. Meyer. 2013. Jejunal expression of intestinal growth –promoting genes in high and low efficiency lambs. In print. (Abstr.) Poster presented at Plant and Animal Genome XXII. San Diego, CA. January 2014.
- Clarkson, C. J., **H. C. Cunningham**, M. J. Ellison, K. J. Austin, K. M. Cammack, and A. M. Meyer. 2013. Effects of diet and feed efficiency on small intestinal gene expression of angiogenic factors in growing lambs. Proc. West. Sect. Amer. Soc. Anim. Sci. 64: 396-399.
- J. D. Garrison, K. J. Austin, **H. C. Cunningham**, M. A. Berg, A. E. Radunz, and A. M. Meyer. 2013. Effects of mid- to late gestational energy source on jejunal mucosal angiogenic factor mRNA expression in mature ewes. Proc. West. Sect. Amer. Soc. Anim. Sci. 64: 415-418.
- Cunningham, H. C.**, K. J. Austin, S. I. Paisley, and A. M. Meyer. 2013. Effect of feed efficiency classification on mRNA expression of angiogenic factors in the jejunum of finishing steers. Proc. West. Sect. Amer. Soc. Anim. Sci. 64: 368-371. Poster

presented at Western Animal Science Meetings. Bozeman, Montana. Poster presented Colorado Nutrition Roundtable. Ft. Collins, Colorado.

Cunningham, H. C., R. D. Yunusova, B. W. Hess, J. S. Caton, and A. M. Meyer. 2013. Correlation of jejunal vascularity with feed efficiency and angiogenic factor mRNA expression in calves from a gestational nutrient restriction model. *J. Anim. Sci.* 91 (Suppl. 2):126 (Abstr.). Poster competition at Midwest Animal Science Meetings. Des Moines, Iowa.

Invited Presentations – Scientific

University of Wyoming Department of Animal Science. Departmental Seminar Series. “Host microbiome and the implication on animal performance”. February, 2023.

American Society of Animal Science Annual Meeting. 2023. Albuquerque, NM. Comparative Gut Physiology Symposium. “The Rumen Microbiome: Realizing the potential for mediating host performance”. July, 2023.

Animal Microbiome USA 2020, Chicago, IL. “The Programming Potential of the Rumen Microbiome”. March, 2020.

Colorado State University ARBL Seminar Series. Fort Collins, CO. “Understanding the Developing Rumen Microbiome and the Potential Impacts on Host Performance”. October, 2019.

Plant and Animal Genome Conference, San Diego, CA. “Maternal Influences on the Calf Rumen Microbiome and Subsequent Host Performance”. January, 2019.

Front Range Microbiome Symposium, Fort Collins, CO. “Factors influencing the Calf Rumen Microbiome and Subsequent Host Performance”. April, 2019.

Teaching Experience

University of Wyoming

University of Wyoming, Laramie, Wyoming

Assistant Professor:

Animal Science 4540/5540 – Principles of Animal Breeding (Fall semester)

- 2018-Present
- 3 credits
- 30-60 students (undergraduate and graduate level)
- Course objective: Aid students in gaining an understanding of genetics as applied to the improvement of populations of livestock by focusing on prediction of genetic merit and response to selection and systems of mating.

Animal Science 1010 – Livestock Production (Fall semester)

- 2018-Present
- Guest instructor – Breeding and Genetics Section
- 80-100 students
- 2-3 lectures, 1 laboratory (4 credit course)

Animal Science 5880 – UW High Altitude Bull Test (Fall semester)

- 2022
- Co-instructor
- 3 graduate students

- 1 credit
- Course objective: Provide leadership and guidance to graduate students in organizing and generating materials for the UW High Altitude Bull Test.

Animal Science 4630 – Topics and Issues (Spring semester)

- 2019-Present
- Co-instructor with McKensie Philips
- 3 credits
- 20-40 students (undergraduate level)
- Course objective: Students will gain a greater understanding of issues related to animal and veterinary sciences by utilizing the conventions of the discipline to prepare several assignments encompassing written, oral, and digital forms of communication. Students will improve their critical thinking skills by researching, analyzing, evaluating, and documenting information appropriate to the discipline.

Animal Science 4500 – UW High Altitude Bull Test Class (Spring & Fall semester)

- 2023 – Present
- Co-instructor (Primary)
- 8-15 students
- 1-3 credits
- Course objective: Enhance student knowledge and skills related to bull growth and development, nutrition, reproduction, and health, as well as provide students practical experience in the management, performance testing, and marketing of animals.

Animal Science 5180 – SAS Applications in Agriculture (Summer term)

- 2018 – Present
- 5-10 graduate students
- 2 credits
- Course objective: This course is designed to prepare students for analysis of data generated from thesis and dissertation projects using SAS software package. The instructor will introduce students to the SAS (and R as of 2024) software system and provide instruction on programming. Students will be provided data sets for analysis.

Animal Science 5870 – Genetics Seminar (variable semester)

- 2018-Present
- Variable offerings dependent on need
- 1 credit
- 3-10 students (graduate level)
- Course objective: Provide graduate students training in developing their communication skills in a professional setting, such as a presentation at a scientific meeting, an extension meeting with producers, a job interview, or a thesis/dissertation defense. Such skills include preparation, organization, delivery, and evaluating the presentation of scientific information.

Professional Involvement**American Society of Animal Science**

- Member since 2012 (Western and Midwestern Section)
- Western Section of the American Society of Animal Science
 - Graduate Student Competition Committee Member (2018, 2019, 2020)
 - Undergraduate Student Competition Committee Member (2018, 2019, 2021, 2022)

- Western Section of the American Society of Animal Science Executive Board member
 - Graduate Director (2015-2017)
- Host 2023 Western Section Academic Quadrathlon Competition
 - Coordinating with Shelby Rosasco and Brenda Alexander

Wyoming Computational Biology Workshop and Hackathon

- Participant Summer, 2024
 - 2nd place winner in Hackathon

International Society of Animal Genetics

- Member since 2017

Grant Review Panel Participant

- USDA-NIFA-AFRI Program (2022)

Ad Hoc Reviewer

- AFEMS Microbiology
- Applied Animal Science – Editorial Board
(Breeding and Genetics)
- Journal of Animal Science
- Animals
- Small Ruminant Research
- Ruminants
- Access Microbiology
- BMC Genomics
- Nature Communications

Rumen Microbial Genomics Network

- Member since 2018

Global Research Alliance – Enteric Fermentation Flagship

- Collaborator since 2019
- Rumen microbiome to predict methane emissions from cattle
- Lead PI – Suzanne Rowe Ag Research, New Zealand

Front Range Microbiome Symposium

- Meeting coordinator board member (2019-2022)
- Participant 2018-present

Service and Activities

University Level

- Summer High School Institute Faculty Fellow
 - Summer 2023: STEM Course Instructor
 - Animal Science: The Applied & Basic Science
- ROAMWyo Steering Committee
 - Electronic research administration system
 - IACUC platform
- Advanced Resource and Computing Center
 - Advisory board
- University of Wyoming Academic Writing Fellows Initiative
 - Writing Fellow Participant (2019-2020)
 - Writing Fellow Mentor (2021-2022)
- Ellbogen Center for Teaching and Learning New Faculty and Lecturer Series

- 2018 Participant
- Ellbogen Center for Teaching and Learning Tenure, Promotion, and Reappointment
 - 2018 Participant
- Ellbogen Center for Teaching and Learning – Certification Program
 - Started 2018

College Level

- College of Agriculture and Natural Resources Scholarship Committee (2020 – present)
- College of Agriculture and Natural Resources Ag Ambassador Selection Committee (2021)
- Search committee member:
 - Pathologist and Faculty Member, Department of Veterinary Science (2020-2021)
 - LREC Farm Manager (Spring 2020)
 - Whitney Professorship in Plant Genetics, Department of Plant Sciences, Sheridan Research and Extension Center/Sheridan College (Fall 2019)

Department Level

- Department of Animal Science Awards Committee (Spring 2024 – Present)
 - Development of internal department awards for undergraduate and graduate students to be recognized by their peers and mentors
- University of Wyoming Academic Quadrathlon Coach (Spring 2023 – Present)
 - Co-coach with Shelby Rosasco
 - Hosted Western Section American Society of Animal Science Regional AQ Competition in Laramie, Wyoming April 2023
 - Coached/mentored UW AQ Team at National American Society of Animal Science AQ Competition. July 2023. Albuquerque, NM.
- Department of Animal Science Academic Affairs Committee Member (Spring 2019- present)
 - Sub-committee member for the ANSC and VETSC curriculum revisions
- Co-advisor University of Wyoming Collegiate Farm Bureau (Fall 2018 – 2021)
- Department of Animal Science ASMB Building Space Reorganization committee (2021 – present)
- Search committee member:
 - Meat Lab Manager, Department of Animal Science (2024)
 - Assistant Professor – Meat Microbiologist, Department of Animal Science (2021-2022)
 - Precision Livestock/Climate Resiliency Faculty Member, Department of Animal Science (2021-2022)
 - Accountant, Department of Animal Science (2020)
 - Rochelle Chair, Department of Animal Science (2019-2020)
 - Reproductive Physiologist, Department of Animal Science (2019)
- Ellbogen Center for Teaching and Learning Summer Course in Active Learning
 - 2019 Animal Science team participant

Honors and Awards

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- Recipient of 2019 Lawrence Meeboer Agricultural Classroom Teaching Award.

- Nominee for 2018 Lawrence Meeboer Agricultural Classroom Teaching Award.
- Recipient of Ph.D. 2018 Western Section Young Scholar Award. Invited presentation at American Society of Animal Science Western Section Meeting, Bend, OR, June 2018.
- Recipient of Gamma Sigma Delta Outstanding Doctoral Student. University of Wyoming, College of Agriculture and Natural Resources, Laramie, WY. April 2017.
- Recipient of Dick and Lynn Cheney Fellowship for Excellence in Study Abroad. University of Wyoming, Laramie, WY. April 2016.
- Recipient of Wyoming Women in Science and Engineering Travel Grant. University of Wyoming, Wyoming EPSCoR, Laramie, WY. September 2015.
- Recipient of Gamma Sigma Delta Outstanding Masters Student. University of Wyoming, College of Agriculture, Laramie, WY. May 2015
- Recipient of M.S. 2014 Western Section Young Scholar Award. Invited presentation at American Society of Animal Science Western Section Meeting, San Angelo, TX, June 2014
- 1st Place Graduate Student Presentation, Colorado Nutrition Roundtable, Fort Collins, Colorado, 2013
- 3rd Place M.S. Student Poster Presentation, American Society of Animal Science Midwest Section Meeting, Des Moines, Iowa, 2013.

Invited Presentations/Panels – Extension/Education

Hereford World Magazine. Interview. “Bovine Congestive Heart Failure Impacts on the Beef Industry: University of Wyoming Research Team at Work”. August, 2024.

Range Beef Cow Symposium. Panel Moderator and Organizer. “Using Selection Indices in Bull Selection”. Loveland, Colorado. December, 2023.

Dr. J’s Beef Podcast. Podcast invited guest. “Selection Index”. Host: Dr. Jaymelynn Farney, Kansas State University.
https://traffic.libsyn.com/drjsbeef/1_selection_indexes_final.mp3

Wyoming Livestock Roundup. Interview. “UW Professor Utilizes Platform”. October 15th, 2021. <https://www.wylr.net/2021/10/15/uw-professor-utilizes-platform/>

Ellbogen Center for Teaching and Learning Seminar. Purposeful Implementation of Critical Thinking Instruction in the Classroom. Co-Presenter with McKensie Harris. September 24, 2020.

Range Beef Cow Symposium. “Maternal Influences on the Calf Rumen Microbiome and Subsequent Impacts on Performance and Efficiency.” Gering, NE; November 20, 2019.

Wyoming Wool Growers Summer Meeting. “Residual Feed Intake and the Relationship to Other Traits”. Laramie, WY; August 10th, 2019.

Wyoming White-Face Ram Test Field Day. “Residual Feed Intake”. Laramie, WY; April 13th, 2019.

Wyoming Stock Growers Association Winter Meeting, 2017. “Feed Efficiency – Understanding the underlying mechanisms”. Casper, WY. November 27, 2017.

Extension Experience

University of Wyoming

University of Wyoming, Laramie, Wyoming

Program Involvement:**Wyoming Stock Growers Association**

- June 2024
- Trade-show booth: information gathering for developing of communication network for applied research, teaching, and extension

University of Wyoming High Altitude Bull Test

- 2022-Present
- Co-founder
- Program development and execution
 - Student course design and organization
 - Producer recruitment
 - Bull management
 - Marketing materials
 - Field Day organization and execution
 - Feed efficiency, performance, and index data management
- 2nd year (2023-2024)
 - 80 bulls consigned from 12 producers
 - 43 bulls consigned to live sale
 - Sale average~\$4,650
- Inaugural year (2022-2023)
 - 41 bulls consigned from 9 producers
 - 21 bulls included in private treaty sale

University of Wyoming/Wyoming Wool Growers Ram Test

- 2018-Present
- Monitoring individual feed intake
 - Vytelle SENSE TM (formerly GrowSafe)
 - SmartFeed C-Lock, Inc.
- Feed intake and efficiency data analysis
 - Quality control and filtering of data
 - Residual feed intake calculation

Graduate Students***M. S. Students*****Completed (6)****Chase Markel:** August 2021 – May 2023

- Co-advisor with Cody Gifford
- Research focus: Variation in hormone, growth, feed efficiency, inflammation, and microbial characteristics in high and low risk cattle for high altitude disease.
- B.S. Animal and Veterinary Sciences, University of Wyoming

Madi Shults: August 2020 – December 2022

- Thesis title: *Maternal reproductive microbiome influences on pregnancy status, stage of gestation, and the developing rumen microbiome in cattle*

Shanan Davey: August 2020 – May 2022

- Thesis title: *Identification of inflammatory markers in high and low pulmonary arterial pressure cattle*
- Co-advisor with Scott Lake
- Gwendolynn Hummel:** January 2019 – May 2021
- Thesis title: *Maternal influence on microbial inoculation of the bovine placental and fetal microbiome in late gestation*
- Awards earned:
 - Western Section of the American Society of Animal Science 2020 Graduate Competition Winner
 - 2019 Ellbogen Outstanding Graduate Student Award
- M.S. Biomedical Sciences – Assisted Reproductive Technologies, Colorado State University
- B.S. Equine Sciences, Colorado State University
- B.A. Journalism and Technical Communication, Colorado State University
- Laurel Rigby:** August 2019 – July 2021
- Thesis title: *Effects of probiotics and tannins on growth performance, gastrointestinal tract fermentation, and measures of Eimeria species in cattle*
- Co-advisor with Scott Lake
- Research focus: Alternative feed additives to improve feed efficiency and reduce coccidiosis in post-weaned calves
- B.S. Animal and Veterinary Sciences, University of Wyoming
- Kelly Lomagno:** January 2019 –December 2020
- Thesis Title: *Exploration of factors contributing to colonization and the programming potential of the early gut microbiome in cattle*
- B.S. Animal and Veterinary Sciences, Animal Biology Option, University of Wyoming

In-Progress (4)

- Kemsley Gallegos:** January 2023 – present (anticipated December 2024 graduation)
 - Co-advisor with Cody Gifford
 - Research focus: Effects of diet on indicators of metabolic health using a biomedical swine model
 - B.S. Animal and Veterinary Sciences, University of Wyoming
- Caitlin Garcia:** Spring 2023 – Present (anticipated December 2024 graduation)
 - Plan B M.S. Student – Animal Science, University of Wyoming
 - Project focus: Curriculum development for equine program
- Emily Barr:** Spring 2024 – Present (anticipated December 2025 graduation)
 - B.S. Animal Science, University of Findlay
 - Project focus: Integration of precision technology tools in beef production systems and the implications of the rumen microbiome and temperament in feedlot performance.
- Owen Hoal:** Fall 2023 – Present (anticipated May 2025 graduation)
 - Co-advisor with Cody Gifford
 - B.S. Animal Science, University of Wyoming
 - Project focus: Influence of rate of gain on pulmonary arterial pressure and carcass characteristics in feedlot steers.

Ph.D. Students

Completed (2)**Ryan Knuth:** August 2019 – July 2022

- Co-Chair with Bledar Bisha
- Research focus: Sheep mastitis: Investigating farm-to-fork microbiome.
- Job placement: Minnesota West Community and Technical College. Pipestone Lamb and Wool Program
- Awards: 2022 Ph.D. Western Section Animal Science Young Scholar
- M.S. Animal and Range Sciences, Montana State University
- B.S. Animal Science, University of Wisconsin -- Platteville

Kelly Carpenter: August 2016 – May 2020

- Dissertation Title: Factors influencing ewe productivity in extensive rangeland environments
- Co-Chair with Whit Stewart

In-Progress (1)**Chase Markel:** August 2023 – present

- Co-advisor with Cody Gifford
- Research focus: Physiological mechanisms associated with pulmonary hypertension in beef cattle and potential impacts on performance, health, and carcass metrics
- B.S. Animal and Veterinary Sciences, University of Wyoming
- M.S. Animal and Veterinary Sciences, University of Wyoming

Committee Member**Completed: Ph.D. (4), M.S. (11), M.A. (2)****Lindsey Freeman:** Fall 2022 – May 2024

- Ph.D. Student – Science Education, University of Wyoming
- Advisor – Timothy Slater

Mallory Lai: Fall 2022 – May 2024

- Ph.D. Student – Biomedical Sciences Program, University of Wyoming
- Advisor – Tim Robinson and Shaun Wulff

Muhammad Saqib: Spring 2023 – May 2024

- M.A. Student – Molecular Biology, University of Wyoming
- Advisor – Mark Gomelsky

Sarah Retherford: Fall 2021 – May 2024

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Jeremy Block

Bryson Mills: August 2021 – Fall 2023

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Shelby Rosasco

Mary Freeman: August 2021 – Summer 2023

- Plan B M.S. Student – Animal Science, University of Wyoming
- Advisor – Brenda Alexander

Jordan Williams: August 2021 – Spring 2023

- M.S. Student – Animal Science, Cal Poly
- Advisor – Zach McFarlane

Averi Reynolds: August 2019 – Spring 2023

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Steve Paisley and Justin Derner

Clara Ritchie: Fall 2020 – Fall 2022

- M.S. Student – Food and Animal Sciences, University of Wyoming
- Advisor – Cody Gifford

Codi Broten : August 2018 – Spring 2022

- Ph.D. Student – Animal Science, University of Wyoming
- Advisor – Bledar Bisha

Colby Hales: August 2019 – December 2021

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Scott Lake

Harneel Kaur: August 2019 – August 2021

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Bledar Bisha

Chad Page: January 2018 – December 2020

- Ph.D. Student – Animal Science, University of Wyoming
- Advisor – Whit Stewart

Alexis Julian: August 2019 – December 2020

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Whit Stewart

Jaelyn Whaley: June 2018 – August 2020

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Whit Stewart

Kristina Boss : August 2018 – August 2020

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Brenda Alexander

Dylan Freeman: August 2018 – May 2019

- JD/MA Thesis
- Ammonia Emissions: the next great environmental threat on the regulatory horizon

In-Progress

McKensie Philips: Fall 2022 – Present

- Ph.D. Student – Animal Science, University of Wyoming
- Advisor – Cody Gifford

Jake Gillespie: Fall 2022 – Present

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Cody Gifford

Josie Hernandez: Fall 2023 – Present

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Cody Gifford

Shelby Raber: Spring 2024 – Present

- M.S. Student – Animal Science, University of Wyoming
- Advisor – Cody Gifford

Michelle Kilpatrick: August 2020 – present

- M.S. Student – Veterinary Science, University of Wyoming
- Advisor – Berit Bangoura

Undergraduate Students

- **Lily Masopust:** September 2023 – Present
 - B.S. Animal Science, University of Wyoming (present)
 - Undergraduate research student employee
 - NASA Undergraduate Research Fellow (Funded)
 - Pulmonary Arterial Pressure and the Correlation to Health and Reproductive Soundness in Bovine
- **Emi Ramirez:** September 2023 – Present
 - B.S. Animal Science, University of Wyoming (present)
 - Undergraduate work study
- **Macy Collins:** January 2021 – May 2022
 - M.S. Animal Science, University of Montana (present)
 - B.S. Animal Science, University of Wyoming
 - Grant funded undergraduate student worker
 - Undergraduate on NSIIC grant with Ryan Knuth
- **Jordan Williams:** January 2020 – May 2021
 - M.S. Animal Science, Cal Poly (present)
 - B.S. Animal Science, University of Wyoming (in progress)
 - LREC Student Intern (Spring 2020)
 - NASA Undergraduate Research Fellow (Funded)
 - Influence of maternal gestational nutrition on post-weaning calf performance and heifer development
 - 2nd Place in Undergraduate Research Poster Competition
- **Shanan Davey:** January 2020 – May 2020
 - B.S. Animal Science, University of Wyoming
 - LREC Student Intern (Spring 2020)
 - Assisted on two research projects
- **Thomas Christensen:** January 2019 – June 2019
 - B.S. Chemical Engineering, University of Wyoming
 - Research project: The rumen microbiome and VFA profile of calves differing in rearing and delivery method – an analytical approach.
 - Presented at Western Section American Society of Animal Science: 1st Place Undergraduate poster competition
- **Sierra Powell:** January 2016 – May 2018 (during Ph.D. program)
 - B.S. Animal Science, University of Wyoming
 - Research project: The rumen microbiome and VFA profile of calves differing in rearing and delivery method during the first four weeks of life.
 - Presented at Midwest Section American Society of Animal Science: 1st place undergraduate poster competition
 - Presented at Western Section American Society of Animal Science: Undergraduate poster competition
- **Hailey Barton:** January 2016 – May 2018 (during Ph.D. program)
 - B.S. Animal Science and Zoology, University of Wyoming, May 2019
 - Research project: Comparing methods for DNA extraction from rumen fluid.
 - Participant on two research projects

- Maternal Nutrition and the Effect on the Calf Rumen Microbiome (January 2016 – May 2016)
- Maternal Influences on the Calf Microbiome (August 2016 – January 2018)