Ryan M. Knuth, Ph.D.

Assistant Professor of Animal Science | Texas A&M University – Kingsville
MSC 228, Kleberg Agriculture Building Rm. 114 | Kingsville, Texas 78363
ryan.knuth@tamuk.edu | 361-593-4000

Education

DOCTOR OF PHILOSOPHY — ANIMAL AND VETERINARY SCIENCE — AUGUST 2022
UNIVERSITY OF WYOMING

- Major Professors: Dr. Hannah C. Cunningham-Hollinger
  Dr. Bledar Bisha

Dissertation: Investigating Ovine Mastitis:
Microbial Sources and Management
Methods to Reduce the Prevalence

MASTER OF SCIENCE — ANIMAL AND RANGE SCIENCES — AUGUST 2019
MONTANA STATE UNIVERSITY

- Major Professors: Dr. Thomas W. Murphy
  Dr. Megan L. Van Emon
- Thesis: Prevalence and Production Impacts
  of Subclinical Mastitis in Extensively
  Managed Ewes

GRADUATE CERTIFICATE — APPLIED STATISTICS — AUGUST 2019
MONTANA STATE UNIVERSITY

BACHELOR OF SCIENCE — ANIMAL SCIENCE — MAY 2017
UNIVERISTY OF WISCONSIN - PLATTEVILLE

- Major: Animal Science
- Emphasis: Science

Positions Held

Assistant Professor of Animal Science
- **Institution:** Texas A&M University - Kingsville
- **Location:** Kingsville, TX
- **Dates:** July 2026 - Present

Lamb and Wool Instructor
- **Institution:** Minnesota West Community & Technical College
- **Location:** Pipestone, MN
- **Dates:** September 2022 – June 2026

Graduate Teaching Assistant
- **Institution:** University of Wyoming
- **Location:** Laramie, WY
- **Dates:** August 2019 – August 2022

Graduate Research Assistant
- **Institution:** Montana State University
- **Location:** Bozeman, MT
- **Dates:** June 2017 – July 2019

Research Experience

PROFESSIONAL RESEARCH

Impacts of colostrum quality on fecal and rumen microbiomes and lamb health and performance
- **Project PI:** K. A. Froelich, B. St. Pierre, and R. M. Knuth
- **Location:** South Dakota State University Sheep Unit (Brookings, SD)
- **My Role:** Aided in training students on sample collection.

GRADUATE RESEARCH

Effects of subclinical mastitis on milk yield and components and lamb growth and survival
- **Project PI:** H. C. Cunningham-Hollinger, B. Bisha, W.C. Stewart, and R. M. Knuth
- **Location:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Obtained funding, collected samples and production data on ewes and lambs. Future roles include data analysis, interpretation, and dissemination of results.

Investigating the main mastitis causing pathogens plaguing Western sheep flocks
- **Project PI:** H. C. Cunningham-Hollinger, B. Bisha, W.C. Stewart, and R. M. Knuth
- **Location:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Obtained funding, collected samples and production data on ewes and lambs, extracted and purified bacterial DNA from samples, data analysis, interpretation, and dissemination of results.

Effects of dietary zinc concentrations on lamb feedlot performance, rumen fluid parameters, and carcass characteristics

- **Project PI:** W. C. Stewart, H. C. Cunningham-Hollinger, R. M. Knuth, and A. L. Julian
- **Location:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Aided in feeding of animals, monitoring animal health, collecting samples (fecal, rumen fluid, blood, and liver), data analysis, interpretation, and dissemination of results.

Effects of delayed high-energy concentrate diets in the feedlot setting on carcass and sensory characteristics and economic return compared to conventional finishing systems in commercial Rambouillet wethers

- **Project PI:** C. L. Gifford, W. C. Stewart, and C. R. Ritchie
- **Location:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Aided in feeding of animals, monitoring animal health, data analysis, interpretation, and dissemination of results.

Comparison of feed-additives on growth, feed-efficiency, rumen microbiome, and Eimeria spp. infection in post-weaning calves

- **Project PI:** H. C. Cunningham-Hollinger, S. Lake, and L. Despain
- **Location:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Aided in feeding of animals, monitoring animal health, and collecting samples (fecal and rumen fluid).

Evaluation of the clinical, subclinical, and clean milk microbiome from ewes supplemented with zinc pre- and post-partum

- **Project PI:** H. C. Cunningham-Hollinger, B. Bisha, C. M. Page, and R. M. Knuth
- **Location:** University of Wyoming (Laramie, WY)
- **My Role:** Extracted and purified bacterial RNA from previously collected milk samples and prepared for library sequencing, data analysis, interpretation, and dissemination of results.

Investigating high altitude disease in cattle: Evaluating performance and genetic characteristics and relationships to the blood microbiome

- **Project PI:** H. C. Cunningham-Hollinger, S. L. Lake, and S. Davey
- **Location:** University of Wyoming (Laramie, WY)
- **My Role:** Assisted in animal feeding and care and training student on laboratory technique for host DNA isolation

Maternal reproductive microbiome influences on pregnancy status, stage of gestation, and developing rumen microbiome in Angus-influenced cattle

- **Project PI:** H. C. Cunningham-Hollinger, S. L. Lake, and M. A. Shults
- **Location:** University of Wyoming (Laramie, WY)
- **My Role:** Assisted in sample collection and animal care. Future roles include assisting in figure development and data interpretation.

Effects of feed restriction and mineral supplementation during the last trimester of gestating Angus-influenced cows on cow reproductive microbiome and calf rumen colonization

- **Project PI:** H. C. Cunningham-Hollinger, S. L. Lake, K. L. Woodruff, and G. L. Hummel
- **Location:** University of Wyoming (Laramie, WY)
- **My Role:** Assisted in sample collection, animal care, data interpretation, and dissemination of results.

Effects of supranutritional zinc supplements fed to gestating ewes on mastitis prevention, and ewe and progeny performance

- **Project PI:** W. C. Stewart and C. M. Page
- **Locations:** University of Wyoming Livestock Research and Extension Center (Laramie, WY)
- **My Role:** Aided in analysis of milk samples and interpretation of results

Mastitis in Western sheep systems: Economic impact, predisposing factors, and causative pathogens

- **Project PI**: R. M. Knuth, T. W. Murphy, W. C. Stewart, and J. B. Taylor
- **Locations:** Montana State University (MSU) Red Bluff Research Ranch (Norris, MT)
  U.S. Sheep Experiment Station (USSES; Dubois, ID)
  University of Wyoming (Laramie, WY)
- **My role:** Collected milk samples, udder morphology scores, and other production data on MSU and USSES ewes; analyzed 800+ milk samples for somatic cell count; prepared milk samples for bacterial speciation; assisted in data analysis, interpretation, and dissemination.

Evaluating the effect of maternal supranutritional zinc supplementation on ewe mastitis and lamb performance

- **Project PI**: R. M. Knuth, T. W. Murphy, W. C. Stewart, and J. B. Taylor
- **Location:** U.S. Sheep Experiment Station (Dubois, ID)
- **My role:** Collected milk and peri-parturient ewe and lamb blood serum; quantified milk somatic cell count; assisted in data analysis, interpretation, and dissemination.

Evaluating the effects of South African Meat Merino breeding on pre- and post-weaning lamb growth, feedlot performance, carcass traits, yearling body weights, and fleece characteristics

- **Project PI**: J. A. Boles, T. W. Murphy, and W. C. Stewart
- **Location:** Montana State University - Fort Ellis Research and Teaching Farm (Bozeman, MT) and Red Bluff Research Ranch (Norris, MT)
- **My role:** Collected and quantified wool metrics; assisted in data analysis, interpretation, and dissemination.

Evaluating the effect of merino breeding on ewe performance and fleece quality in Western rangeland production systems

- **Project PI**: T. W. Murphy, D. R. Notter, W. C. Stewart, and J. B. Taylor
- **Location:** U.S. Sheep Experiment Station (Dubois, ID)
- **My role:** Analyzed 500+ individual fleece samples for economically important characteristics.

Evaluating the effects of sire breed and harvest age on feedlot performance, carcass characteristics, and flavor profile in fine wool-cross wethers

- **Project PI**: J. A. Boles, T. W. Murphy, and W. C. Stewart
- **Location:** Montana State University - Fort Ellis Research and Teaching Farm (Bozeman, MT)
- **My role:** Experiment Manager – responsible for daily care and feed intake monitoring of feedlot wethers, collected body weights and wool samples, assisted in carcass data collection.

Teaching Experience

- Assistant Professor of Animal Science – Texas A&M University – Kingsville
    - AGRI 3372 – Contemporary Issues
        - Fall 2026
    - ANSC 3308 – Sheep and Goat Management
        - Fall 2026
    - ANSC 5390 – Livestock Production in the Modern Era
        - Fall 2026
- Lamb and Wool Instructor – Minnesota West Community and Technical College
    - Pipestone Home Study Course
        - Recurring course (Fall 2022 – Summer 2026)
    - Pipestone Lambing Time Short Course
        - Spring 2023 (virtual)
        - Spring 2024
        - Spring 2025 (virtual)
        - Spring 2026
    - Pipestone Sheep for Profit School
        - Summer 2023
        - Summer 2025
    - Pipestone Sheep Facilities Tour
        - Summer 2024
        - Summer 2026
- Graduate Teaching Assistant - University of Wyoming
    - Animal Science 1010 – Introduction to Animal Science
        - Fall 2019
    - Animal Science 4630 – Topics and Issues in Animal Science
        - Spring 2020
        - Spring 2021
        - Spring 2022
    - Animal Science 5180 – SAS Applications in Agriculture
        - Summer 2020

- Animal Science 4120 – Principles of Mammalian Reproduction
  - Fall 2020

- Animal Science 4230 – Advanced Sheep Production Management
  - Spring 2021

- Animal Science 44540/5540 – Principles of Animal Breeding
  - Fall 2021

- Graduate Teaching Assistant - Montana State University
  - Animal Science 222 – Livestock in Sustainable Systems
    - Fall 2017

  - Natural Resources Science and Management 102 – Montana Range Plants
    - Fall 2018

  - Animal Science 432 – Sheep Management
    - Spring 2018
    - Spring 2019

Manuscripts

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

Woodruff, K. L., G. L. Hummel, K. J. Austin, **R. M. Knuth**, S. L. Lake, and H. C. Cunningham-Hollinger. 2026. Impacts of late gestation maternal feed restriction and mineral supplementation on the calf rumen and meconium microbiome. Animals. J. Anim. Sci. *Submitted.*

Knuth, R. M., K. L. Woodruff, G. L. Hummel, J. D. Williams, K. J. Austin, W. C. Stewart, H. C. Cunningham-Hollinger, and Bledar 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. J. Anim. Sci. 100: 1-11. doi: 10.1093/jas/skac171.

Page, C. M., **R. M. Knuth**, T. W. Murphy, D. C. Rule, B. Bisha, J. B. Taylor, and W. C. Stewart. 2022. Effect of increasing dietary zinc sulfate fed to gestating ewes: II Milk somatic cell count, microbial populations, and fatty acid composition. Appl. Anim. Sci. 38(3):285-295. doi: 10.15232/aas.2022-02268.

***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. Trans. Anim. Sci. Vol. 5. Supp. 1, S80-S85. doi: 10.1093/tas/txab180.

*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. Trans. Anim. Sci. Vol. 5. Supp. 1, S159-S163. doi: 10.1093/tas/txab172.

Hummel, G. L., K. L. Woodruff, K. J. Austin, **R. M. Knuth**, S. L. 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.

Knuth, R. M., W. C. Stewart, J. B. Taylor, B. Bisha, C. J. Yeoman, M. L. Van Emon, and T. W. Murphy. 2021. Relationships among intramammary health, udder and teat characteristics, and productivity of extensively managed ewes. J. Anim. Sci. 99(4):1-10. doi: 10.1093/jas/skab059.

***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. Trans. Anim. Sci. Vol. 4. Supp. 1, S6-S10. doi: 10.1093/tas/txaa087.

*T. W. Murphy, W. C. Stewart, D. R. Notter, **R. M. Knuth**, T. T. Feagler, and J. B. Taylor. 2020. Fleece and fiber characteristics of Rambouillet, Targhee, and their reciprocal-crosses at first shearing. Trans. Anim. Sci. Vol. 4. Supp. 1, S108-S112. doi: 10.1093/tas/txaa115.

***Knuth, R. M.,** W. C. Stewart, J. B. Taylor, C. J. Yeoman, B. Bisha, C. M. Page, C. M. Rowley, B. C. Lindsey, M. L. Van Emon, and T. W. Murphy. 2019. Subclinical mastitis in sheep: etiology and association with milk somatic cell count and ewe productivity in three research flocks in the Western U.S. Trans. Anim. Sci. Vol. 3, Supp. 1, 1739-1743. doi: 10.1093/tas/txz078.

***Knuth, R. M.**, W. C. Stewart, J. A. Boles, C. M. Page, A. F. Williams, and T. W. Murphy. 2018. Evaluating the effect of South African Meat Merino breeding on pre- and post-weaning growth, feedlot performance, carcass traits, and wool characteristics in an extensive production setting. Trans. Anim. Sci. Vol. 2, Supp. 1, S163-166. doi: 10.1093/tas/txy036.

*Proceedings paper

Scientific Presentations

- *Investigating ovine mastitis: Microbial sources and management methods to reduce the prevalence*
    - Western Section of the American Society of Animal Science Annual Meeting
    - Young Scholar Presentation
    - Park City, UT
    - September 2022

- *Post-weaning management strategies and impacts on ewe subclinical mastitis and antimicrobial susceptibility*
    - Western Section of the American Society of Animal Science Annual Meeting
    - Graduate student oral competition
    - Fort Collins, CO
    - October 2021

- *Impacts of dietary zinc concentrations on lamb feedlot performance*
    - American Society of Animal Science – Canadian Society of Animal Society of Animal Science - Western Section of the American Society of Animal Science Annual Meeting
    - Madison, WI (virtual format due to SARS-CoV-2)
    - July 2020

- *Ewe milk microbiome differences between lambing and weaning*
    - Front Range Microbiome Symposium
    - Fort Collins, CO - (cancelled due to SARS-CoV-2)

- *Subclinical mastitis in sheep: etiology and association with milk somatic cell count and ewe productivity in three research flocks in the Western U.S.*
    - Western Section of the American Society of Animal Science Annual Meeting
    - Graduate student oral competition
    - Boise, ID
    - June 2019

- *Subclinical mastitis in sheep: Prevalence, etiology, and association with milk somatic cell count and ewe productivity in 3 research flocks in the Western U.S.*
    - Montana Nutrition Conference
    - Bozeman, MT
    - April 2019

- *Evaluating the effect of South African Meat Merino breeding on pre- and post-weaning growth, feedlot performance, carcass traits, and wool characteristics in an extensive production setting*
    - Western Section of the American Society of Animal Science Annual Meeting
    - Bend, OR
    - June 2018

- *Evaluating the effect of South African Meat Merino breeding on pre- and post-weaning growth, feedlot performance, carcass traits, and wool characteristics in an extensive production setting*
    - Montana Nutrition Conference
    - April 2018

Extension/Outreach Presentations

- *Accelerated Lambing and Keys to Success*
    - Pipestone Lamb & Wool Program
    - March 11, 2026

- *Creep Feeding & Design*
    - Pipestone Lamb & Wool Program
    - February 17, 2026

- *Getting Lambs off to a Good Start: Colostrum, Lamb Processing, and Artificial Rearing*
    - Pipestone Lamb & Wool Program
    - January 20, 2026

- *Preparing for Lambing*
    - Pipestone Lamb & Wool Program
    - January 6 & 8, 2026

- *Late Gestation Management, Economics, and Benchmarking & Roundtable Discussion: Profitability*
    - Pipestone Lamb & Wool Program
    - December 9 – 10, 2025

- *Ewe Management During Late Gestation*
    - Minnesota Lamb and Wool Producers Shepherd's Holiday
    - December 6, 2025

- *Lamb Harvest Summary & Weaning Time Management*
    - Pipestone Lamb & Wool Program
    - March 10, 2025

- *Lambing Time Workshops*
    - Pipestone Lamb & Wool Program
    - February 4 & 6, 2025

- *Preparing for Lambing & Roundtable Discussion: Economics*
    - Pipestone Lamb & Wool Program
    - January 7 – 9, 2025

- *Lamb Harvest Summary & Weaning Time Management*
    - Pipestone Lamb & Wool Program
    - March 12, 2024

- *Keys to Successful Artificial Rearing Systems*
    - Pipestone Lamb & Wool Program
    - January 25, 2024

- *Making Lambing Time Easier & Improving Lamb Survival*
    - Pipestone Lamb & Wool Program
    - January 18, 2024

- *Preparing for Lambing & Roundtable Discussion: Current Issues*
    - Pipestone Lamb & Wool Program
    - January 2 – 4, 2024

- *Roundtable Discussion: Vision for the Future of the Industry*
    - Pipestone Lamb & Wool Program
    - December 12 – 14, 2023

- *Record Keeping Options: Apps and Software Products*
    - Pipestone Lamb & Wool Program
    - December 5, 2023

- *Late Gestation Management & Ration Evaluator*
    - Pipestone Lamb & Wool Program
    - November 28, 2023

- *Harvest Summary & Weaning Time Management*
    - Pipestone Lamb & Wool Program
    - March 9, 2023

- *Creep Feeding & Design*
    - Pipestone Lamb & Wool Program
    - February 7, 2023

- *All About the Udder and Milk*
    - Pipestone Lamb & Wool Program
    - January 31, 2023

- *Preparing for Lambing*
    - Pipestone Lamb & Wool Program
    - January 3 – 5, 2023

- *Late Gestation Management & Industry Update*
    - Pipestone Lamb & Wool Program
    - December 13, 2022

- *Ewe Milk Production and Mastitis*
    - Minnesota Lamb and Wool Producers Annual Conference
    - December 10, 2022

- *Practical Mastitis Management*
    - Rocky Mountain Katahdin Association
    - June 10, 2022

- *The Forefronts of Mastitis*
    - Pipestone Lamb & Wool Program
    - April 5, 2022

- *Managing Mastitis*
    - University of Idaho – University of Wyoming – Utah State University Extension Sheep & Goat Monthly Webinar
    - March 9, 2022

- *Ewe Milk Production and Mastitis*
    - Minnesota Lamb and Wool Producers Shepherd's Holiday
    - December 3, 2022

- *Ewe subclinical mastitis bacteria and management to reduce them*
    - Laramie Research and Extension Center Field Days
    - December 2021

- *Mastitis in sheep: What we know, what we don't and current research at UW*
    - Johnson County Sheep Seminar
    - Buffalo, Wyoming
    - February 2020

- *An Introductory Lesson on Sheep and Wool Genetics*
    - Montana State University Extension Sheep Program's Wool Handling School
    - March 2019

Funding

- *Increasing profitability and survivability of sheep production by minimizing mass metaphylaxis through genetic markers and management practices*
    - **Project PI:** Kelly Froehlich, **Ryan Knuth**, Kimberly Davenport
    - **Funding Source:** North Central Sustainable Agriculture Research & Education
    - **Amount:** $250,000
    - **Status:** Not funded

- *Mitigation of subclinical mastitis during early lactation and effects of subclinical mastitis on milk yield, lamb growth, and lamb survival*
    - **Project PI: Ryan Knuth**, Hannah Cunningham-Hollinger, Bledar Bisha, Whit Stewart
    - **Funding Source:** National Sheep Industry Improvement Center
    - **Amount:** $29,155.13
    - **Status:** Funded January 2021

- *Investigating the main mastitis causing pathogens plaguing Western sheep flocks*
    - **Project PI: Ryan Knuth**, Hannah Cunningham-Hollinger, Bledar Bisha, Whit Stewart
    - **Funding Source:** National Sheep Industry Improvement Center
    - **Amount:** $20,000
    - **Status**: Funded January 2020

- *An investigation of environmental bacteria communities in sheep environments and the links to animal health and performances*
    - **Project PI: Ryan Knuth**, Hannah Cunningham-Hollinger, Bledar Bisha, Whit Stewart
    - **Funding Source:** Western Sustainable Agriculture Research & Education
    - **Amount:** $24,998
    - **Status**: Not funded

Honors and Awards

- Western Section of the American Society of Animal Science Young Scholar Award (2022)
- National Western Stock Show Scholarship (University of Wyoming – 2020 and 2021)
- Y-Cross Scholarship (University of Wyoming – 2020 and 2021): Student tuition and fee award. College of Agriculture and Natural Resources. Funded. $9000.
- 2020 International Livestock Forum Fellow (Colorado State University and National Western Stock Show Awardee)
- Graduate Student Teaching Award of Merit (Montana State University and North American Colleges and Teachers of Agriculture)
- Verl M. Thomas Memorial Scholarship (Montana State University - 2018)

Memberships in Professional Societies

- National Association of Agricultural Educators – member 2022 – Present
- Association for Career and Technical Education – member 2022 – Present
- American Society of Animal Science – Midwest Section member 2022 – Present
- American Society of Animal Science – Western Section member 2017 – 2022

Service at the College

- Minnesota West Community & Technical College – Health and Wellness Committee, member (September 2023 – June 2026)
- Minnesota West Community & Technical College – Vice President of Finance and Facilities Search Committee, member (September – November 2023)
- Minnesota West Community & Technical College Telework Advisory Committee, member (May 2023 – May 2025)

Service at the Regional or National Level

- Ad hoc reviewer *Animals* (2025 – present)
- Ad hoc reviewer *Journal of Animal Science* (2024 – present)
- Ad hoc reviewer *The Microbe* (2024 – present)
- Ad hoc reviewer Minnesota Department of Agriculture (2023 – present)
- Ad hoc reviewer *Scientific Reports* (2022 – present)

Leadership Positions

- College of Agriculture and Natural Resources Ambassador, University of Wyoming, May 2021 – August 2022
- Graduate Student Representative, University of Wyoming Department of Animal Science Graduate Student Admissions Committee, Jan. 2021 – August 2022

- President, Animal Science Graduate Student Association, University of Wyoming, Sept. 2019 – Sept. 2021
- Student Representative, Bair Ranch Foundation Seminar Series Board, June 2018 – Aug. 2019
- Wool Lab Technician, Montana Wool Lab, Montana State University, June 2017 – Aug. 2019
- President, Graduate Student Organization, Montana State University, Aug. 2017 – Aug. 2019
- Chaplain and Judicial Board Head, Alpha Gamma Rho-Beta Gamma Chapter, University of Wisconsin-Platteville, Dec. 2016 - May 2017
- Member, Collegiate FFA, University of Wisconsin-Platteville, Sept.2014 - May 2017
- Member, Collegiate Farm Bureau, University of Wisconsin-Platteville, Sept. 2014 - May 2017
- Youth Leader, Sauk County Sheep Project, Sept. 2014 – May 2017

Skills

- Animal Husbandry Skills (Cattle and Sheep)
    - Processing livestock (tagging, weighing, castrating, weaning, vaccinating, etc.)
    - Basic animal health (wound care, hoof care, drenching, etc.)
    - Low stress animal handling
    - Sample collection (blood, fecal, milk, oral lavage for rumen fluid)
- Laboratory and Research Skills
    - Feed intake systems
        - Vytelle Sense feeding systems
        - C-Lock Smart Feed systems
            - SmartFeed, SmartFeed Pro, and Super Smart Feed
    - Forage sampling
    - Dry matter determination
    - Proximate analysis of feeds
    - Blood components separation
        - Plasm, sera, buffy coat
    - DNA, RNA, protein extraction
        - Qiagen extraction protocols include QIAcube usage and numerous extraction kits
        - Host DNA modified salting out method
    - Next-generation sequencing library preparation and quality control
    - Light microscopy (parasitology, histology)
    - Parasite identification methods
        - Fecal flotation methods
        - Fecal sedimentation methods
    - Experimental design

- Sterile culturing technique
- Bacterial culture identification and staining
- Dilution schemes
- Gel electrophoresis
- Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry
- Media preparation
- Polymerase chain reaction
- Antimicrobial resistance
  - Sensititre antimicrobial susceptibility testing protocol
- Milk components
  - LactiCyte-HD Somatic Cell Counter (Page & Pedersen International, Ltd.; Hopkinton, MA)
- Wool quality
  - Optical Fiber Diameter Analyser 2000 (OFDA 2000; BSC Electronics Pty. Ltd., Attadale, Western Australia)
  - NextGen Laserscan (AWTA, Ltd.; Kensington, VIC, Australia)
  - ASI Certified Level I Wool Classer

- Computer Skills
  - Operating systems
    - Windows
    - Mac
    - Linux
  - Statistical analysis programs
    - R
    - SAS
  - Microsoft Office products
    - Word
    - PowerPoint
    - Excel
  - Graphical Representation Programs
    - R/ggplot
    - Inkscape
  - Bioinformatics
    - QIIME2
    - R
    - BLAST