Bianca Birkenstock

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Personal Information:
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CAREER INTEREST:

Passionate about educating and mentoring the next generation of agricultural professionals while advancing sustainable livestock systems through applied research. With a strong foundation in cattle nutrition, forage management, and environmental sustainability, I aim to bridge classroom instruction with real-world challenges. My goal is to foster critical thinking, scientific curiosity, and practical problem-solving in students while contributing to solutions that reduce greenhouse gas emissions and promote resilient food systems

EDUCATION:

PhD Candidate, January 2025, expected graduation date August 2026 (defense date June 10th 2026)
New Mexico State University, Las Cruces, NM.
Major: Animal Science, Ruminant Nutrition *Advisor:* Clint A Loest and Glenn C Duff

Master of Science, August 2021.
New Mexico State University, Las Cruces, NM.
Major: Animal Science , Ruminant Nutrition *Advisor:* Clint A Loest

Bachelor of Science, August 2019.
Alcorn State University, Fayette, MS, US.
Major: Animal Science (Agriculture).

RESEARCH EXPERIENCE

Visiting Assistant Professor / Undergraduate Research Mentor
Warren Wilson College — Asheville, NC
Aug 2024 – Present
Research:

- Advise undergraduate research projects evaluating methane-mitigating feed ingredients (e.g., grape pomace) using the ANKOM RF gas production system.
- Lead pasture-based research comparing perennial versus annual grazing systems and forage productivity.
- Support applied sustainability research in grazing livestock systems.

Graduate Research Assistant
New Mexico State University
August 2019 – August 2025
New Mexico State University
Department of Animal and Range Sciences
Campus: Las Cruces, NM
Research Center: Clayton Livestock Research Center, Clayton, NM
Research:

- Primary research is focused on evaluating sustainable forage and nutritional strategies to reduce greenhouse gas emissions in beef production systems. Emphasis is placed on methane mitigation through dietary supplementation and optimizing cattle nutrition to enhance environmental outcomes.
- Assisted with daily operations at the feedlot and pasture research facility and contributed to collaborative, industry-funded research efforts.

Involvement with other research projects (PhD, Master and Undergraduate students):

- Transport stress responses in newly received cattle, including behavioral, metabolic, and immunological parameters (2021)
- Effects of direct-fed microbials on carcass characteristics in finishing cattle (2024)
- Evaluation of intravenously administered glucose dosing on glucose tolerance parameters and urinary glucose excretion in beef × dairy steers (2024)
- Ruminal degradation of red chile byproducts evaluated in vitro (2025)
- Effects of pecan-derived phenolic compounds on immune responses during endotoxin challenge in receiving cattle (2025)
- Assessment of respiratory disease incidence and treatment outcomes in feedlot cattle using DART scoring methodology (2025)
- Conducted pasture-based research comparing improved perennial and annual grazing systems, assessing forage productivity, nutritive value, and cattle performance (2025)
- Effects of ground pecan shell supplementation on in vitro gas production kinetics and in situ ruminal fermentation (2026)

TEACHING EXPERIENCE

Warren Wilson College — Visiting Assistant Professor of Animal Science
Aug 2024 – Present

• Teach General (Principles of) Chemistry and Animal Science courses, emphasizing foundational chemical concepts including atomic structure, bonding, stoichiometry, thermochemistry, solutions, and chemical reactions through biological and agricultural applications.
• Deliver lecture and laboratory instruction using active-learning and discussion-based approaches that strengthen quantitative reasoning and scientific literacy among undergraduate students.
• Design and supervise General Chemistry laboratory experiences focused on solution preparation, spectrophotometry, redox chemistry, and analytical techniques, including antioxidant capacity assays and compositional analysis of biological and feed samples.
• Train students in laboratory safety, experimental design, data analysis, and scientific communication using spreadsheet-based and quantitative analytical methods.
• Integrate chemistry concepts with real-world systems such as animal nutrition, metabolism, and environmental sustainability to enhance student engagement and conceptual understanding.
• Collaborate with local farms and community partners to connect classroom chemistry and animal science with applied agricultural practice and experiential learning.
• Contribute to curriculum development and program growth through course design, sequencing, and interdisciplinary laboratory integration.

New Mexico State University — *Aug 2019 – 2025*

- Served as instructor and teaching assistant across undergraduate Animal Science and Chemistry curricula.
- Led laboratory and recitation sections, developed instructional materials, and mentored students in experimental design and data analysis.

Department of Animal and Range Sciences Las Cruces, NM

Teaching Assistant:

- Senior Teaching Assistant | Fall 2019 – 2025
- Animal Nutrition (ANSC 422) | Fall (2020, 2022, 2024)
- Feeds and Feeding (ANSC 304) | Fall (2019, to 2021, 2023), Spring (2019, to, 2025)
- Beef Production Feedlot Management, (ANSC 429) | (Fall 2024, 2025)
- Dairy Production, (ANSC 427) | (Fall 2024, 2025)
- Provided instructional support through evaluation of coursework, curriculum creation, facilitation of academic discussions, and supervision of laboratory sessions to ensure effectiveness and readiness
- Contributed to undergraduate instruction by delivering lectures, guiding student learning, and providing academic mentorship

Undergraduate Research, 2018 – 2019.

Alcorn State University, Lorman, MS.

Research:

- Assisted on a swine research team during sophomore and junior years, contributing to data collection, analysis, and management of swine breeding and nutrition studies.
- Conducted research on a goat acceleration breeding project in senior year, focusing on optimizing breeding cycles to enhance reproductive efficiency.

SKILLS:

Laboratory:

- Detergent Fiber and Digestibility Chemical Preparation
- DNA extraction and ELISA assays (salivary cortisol, plasma cortisol, TNF-a)
- Blood analysis. (serum, plasma, and CBCs)
- In Vitro and In Situ Experiments. (Digestibility. trials)
- Sample Collection in Pasture, Feedlot, and Metabolism Barn (Feed, Feces, Urine, Digesta, Rumen fluid, Blood and Gas collections)
- ANKOM RF gas production modules and software for in vitro fermentation analysis

Computer:

- Proficient in Microsoft Word, Excel, and PowerPoint
- Statistical Analysis using SAS (Statistical Analysis System)
- R program and Coding for Greenfeed data and ANKOM RF systems
- Moodle and Canvas

Presentations

- Leucine supplementation alters immune responses and blood metabolites in endotoxin-challenged lambs (2019)
- Effects of pre-transport feeding strategies on intake, body weight shrink, rumen fermentation, and physiological responses in receiving feedlot cattle (2022)
- Delivered GreenFeed, Gasmet, and Eosense chamber training to Clayton Livestock Research Center feedlot faculty and commercial producers (2023–2024)
- Presented extension seminars at Clayton Livestock Research Center Feedlot Open Days (2023–2024)
- Presented pasture-systems research and outreach talks at Clayton Livestock Research Center Open Days (2023–2024)

CERTIFICATIONS:

- Greenfeed User Certification
- CITI Institutional Animal Care and Use Committee – Agricultural Research Settings, Animal Biosafety.

ACADEMIC SERVICE:

- Social Officer, Graduate Student Association (2019, 2020, 2022)
- Demonstration of Gasmet and Esosense chambers. Update on improved perennial pasture versus annual pastures. (2023, 2024)
- CAP grant synthesis of results from breed comparison breakout group to stakeholders at annual research meeting. (2022)
- Field days demonstration of GreenFeed equipment (2023, 2024)
- Animal and Ranges Sciences Academic Quadrathlon, 2019-2023
    - Volunteer with competition set up and organization
- NMSU Animal and Range Sciences Farm Tours, 2021-2023
    - Daycares
    - Preschool, elementary, and high schools
    - 4-H groups
- NMSU Animal and Range Sciences school educational tours/talks/demonstrations, 2022-2024
    - Elementary and high schools
    - 4-H and FFA events

ASSOCIATIONS:

- American Society of Animal Science Graduate Member (2021-present)
- Animal Science Graduate Student Association, New Mexico State University (2019-2024)
- National Cattlemen Beef Association (2022-present)

FELLOWSHIPS, HONORS & AWARDS:

- Dr. Dennis "Doc" and Marilyn Hallford Endowed Fund (*2021*)
- Southwest Sustainability CAP Grant Graduate Student Fellowship (*2019–2024)*

PUBLICATIONS

DISSERTATION AND THESIS

Birkenstock, B. 2025. Sustainability-driven strategies to improve greenhouse gas emissions, nutrient efficiency, and cattle performance in feedlot and pasture systems. Ph.D. Dissertation. New Mexico State University, Las Cruces. (ABD)

Birkenstock, B. 2021. Effects of pre-transportation feeding program on intake, body weight loss, rumen fermentation, and physiological responses of receiving feedlot cattle. M.S. Thesis. New Mexico State University, Las Cruces.

Peer-Reviewed Journal Articles

da Silva, Aghata E.M., A. Macias Franco, J.K.Q. Solomon, L.B. da Freiria, F.H. de Moura, P.H.S. Mazza, **B. Birkenstock,** L.R. Bezerra, T. Shenkoru, M.A. Fonseca. 2025. Cactus (Opuntia ficus-indica) diets reduce voluntary water intake, water footprint and enteric methane production improving ruminal fermentation in steers. Journal of Arid Environments. 10.1016/j.jaridenv.2024.105311

Duff, G.C., **B. Birkenstock,** M.M. Smithyman. 2023. 12 Tools for Climate-Smart Decision Making for the Stocker/Feedlot Sector. Journal of Animal Science. 10.1093/jas/skad281.387

ABSTRACTS

Mota, L., C. D. Ashworth, G. C. Duff, M. Smithyman, C. Sowers, **B. Birkenstock,** C. Smithyman, M. E. Branine, M. Socha, D. Kleinschmit, C. A. Löest, and M. A. Fonseca. 2024. Evaluation of intravenously administered glucose dose on glucose tolerance parameters and urinary glucose excretion in beef × dairy steers. Journal of Animal Science. (Abstract; details pending publication volume/issue).

Rivera, K. L., M. Humphery, M. M. Smithyman, C. L. Smithyman, N. Lara, D. D. Dominguez, S. M. Strong, **B. Birkenstock**, and C. A. Löest. Effects of a pecan shell-containing diet on inflammatory responses of endotoxin-challenged beef calves. Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM.

Dominguez, D. D**., B. Birkenstock,** L. K. Cruz, L. G. Mota, and C. A. Löest. Effects of ground pecan shell supplementation on in vitro gas production kinetics and ruminal fermentation. Department of Animal and Range Sciences, New Mexico State University, Las Cruces, NM.

Birkenstock, B., J. J. Figueroa-Zamudio, S. A. Soto-Navarro, G. C. Duff, V. N. Gouvea, E. Marks-Nelson, D. T. Yates, A. Akter, B. G. Smythe, K. E. Smith, and C. A. Löest. 2022. Effects of pre-transit diets and road transportation on plasma, salivary cortisol, and rumen environment of beef heifers. Journal of Animal Science. 10.1093/jas/skac313.029.

Birkenstock, B., M. Catey, S. McIntosh, F. Lopez, L. Klump, R. Ashley, E. J. Scholljegerdes, and C. A. Löest. 2020. Leucine supplementation alters immune responses and blood metabolites of lambs exposed to endotoxin. Journal of Animal Science. 98(Suppl. S4):424 (Abstr.).

CONFERENCE PRESENTATIONS

Birkenstock, B. 2021. Effects of pre-transportation feeding program on intake, body weight loss, rumen fermentation, and physiological responses of receiving feedlot cattle.

Figueroa-Zamudio, J.J., B. Birkenstock, U.A. Sanchez-Sandoval, B.G. Smythe, V.N. Gouvêa, C.A. Löest, S.A. Soto-Navarro. 2022. Effect of pre-transportation feeding program on intake, body weight loss, rumen fermentation, and physiological responses of receiving feedlot cattle. Journal of Animal Science. 10.1093/jas/skac313.017

REFERENCE

DR. CLINT LOEST

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DR. GLENN DUFF

Professor of Animal Science – Ruminant Nutrition Clayton Livestock Research Center
New Mexico State University
15 NMSU Ln, Clayton, 88415

Contact Information: Email: glennd@nmsu.edu, Office phone: 575-374-2566

DR. MCKENZIE SMITHYMANN

Dalhart, Texas, United States, Five Rivers Cattle Feeding

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