NC1182 2025 Annual Report

Basic Information

Project No. and Title:	NC1182 : Management and Environmental Factors Affecting Nitrogen Cycling and Use Efficiency in Forage-Based Livestock Production Systems
Period Covered:	06/01/2024 to 06/01/2025
Date of Report:	2/25/2026
Annual Meeting Dates:	12/17/2025 to 12/18/2025

Participants

1. Ohio, Barker, David barker.169@osu.edu; and Matcham, Emma matcham.3@osu.edu;
2. Michigan, Cassida, Kimberly cassida@msu.edu;
3. Arkansas, Coffey, Ken kcoffey@uark.edu; Popp, Mike, mpopp@uark.edu
4. Georgia, Franklin, Dorcas dfrankln@uga.edu;
5. Nebraska, Guretzky, John jguretzky2@unl.edu;
6. Kentucky, McCulley, Rebecca, rebecca.mcculley@uky.edu;
7. Utah, Miller, Rhonda, rhonda.miller@usu.edu
8. South Carolina, Severino da Silva, Liliane, lseveri@clemson.edu
9. Tennessee, Nave Oakes, Renata, rnave@utk.edu

Participants, but not present

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Summary of Minutes of Annual Meeting
Meeting Date: December 17 and 18 2025
Meeting was held via Zoom which was set up by David Barker.
Thanks were given to David for putting the meeting together.

The meeting began with Introductory comments By Dr. Scaglia and Dr. Amber Campbell

- Points and reminders would send them to David. Follow the guidelines and understand the needs

Needs given:

- Midterm review in early 2027.
- To be active in this project there must be an annual meeting.
- Be sure to plan for the 2026 meeting.
- Submit required reports. If there is a need for change in the documents, we will receive comments from him.
- The reports are reviewed by external reviewers and there must be proof of collaboration.
- Reports must show collaboration. Proposal needs to be ready before expiration of current (September 2029). We need to submit new proposal by fall 2028.
- Examples of collaboration are Renata and Kim working on crabgrass and David and Renata exploring paspalum which resulted in an inquiry visit and workshop in Australia.

Christina Hamilton chamilton@wisc.edu and our new NPL
Dr. Amber Campbell, National Program Leader, Division of Animal Systems NIFA (amber.campbell@usda.gov)
Important Highlights:

- AFRI deadlines pushed out animal proposals moved to tomorrow.
- Mark Morando AFRI science coordinator, has retired; working to find a replacement.
- Appropriations for agriculture we received a full year of appropriations additional shutdowns will not influence USDA.
- Report to NC1182 is end of year for 2025 Annual Meeting Report.

Annual meeting Activities:
Reports by states and collaborations between states were given by those attending the meeting. Each state reported highlights of research and outreach in each state on December 17 and 18 2025.

During the reports there was much discussion on:

- Progress and results of forages that were working and not working. Examples are crabgrass, foxtail, sunn hemp, several legumes including soybean.
- Emma, Renata, and Kim discussed progress on their collaboration on crabgrass.
- Pros and cons of foxtail.

Business Meeting was held Late afternoon Dec 17, 2025

Dring the business meeting several areas of potential collaboration were discussed:

- One area of great interest was crabgrass as there was much discussion of the potential uses of crabgrass as a summer forage by itself or in a mix. Many members of NC1182 were interested in collaborating on crabgrass success in different environments. The group agreed there was enough interest and willingness to participate to begin putting a proposal forward. Renata agreed to be the leader on proposal writing and facilitated the meeting. A meeting time was scheduled for January 20, 2026, to discuss funding, objectives, and proposal writing.

- Another area of collaboration that was discussed was the development of fact sheets and classroom and/or educational materials.

David Barker agreed to hold the 2026 NC1182 Annual Meeting to be in Ohio.
John Guretzky agreed to be the next Secretary for Year 2026.

Accomplishments

Accomplishments for this project included research, extension and teaching by PI's at 9 states, coordinated for three objectives.

Objective 1: To quantify biophysical effects of grassland-based management strategies and climate change on N-use efficiency by ruminant animals, N cycling in herbage and soils, aquatic N losses, and GHG and other pollutant emissions from grassland agroecosystems.

Sub-Objective: 1.1 Use of new and novel plant materials for improved N-functionality in pasture (KY, OH, TN)

Two states collaborated on preliminary work to evaluate the extent to which plantain is capable of producing biological nitrification inhibition (BNI). In Kentucky, five cultivars of plantain were grown in the greenhouse, including material bred for BNI activity (Tonic, Agritonic, Boston, Tuatara, Libor). Working with USDA-ARS-FAPRU collaborators, they established a protocol to measure the natural products plantain produces that are thought to lead to BNI – aucubin, catalpol, and verbascoside. They confirmed these compounds are being produced in the cultivars being screened. Related to this project, researchers from TN, KY and OH collaborated in research and teaching exchange with Dr Mike Dodd, AgResearch New Zealand, who has an active project on plantain production. Dr Nave received funding to travel to New Zealand in 2025. Dr Dodd travelled to USA during October 2025 to visit with other NC1182 participants (Dr Nave, Univ Tennessee and Dr McCulley, Univ Kentucky) who are collaborating on a new project related to nitrogen use efficiency using narrow-leaf plantain. Dr Dodd also visited OH and presented detail about the current state of research with this species to an undergraduate class.

In a separate study, research in Tennessee focused on the evaluation of plant growth-promoting bacteria (PGPB) in bermudagrass forage systems, under both greenhouse and field conditions. The research included testing Azospirillum Ab-V5 and Ab-V6, Bacillus subtilis, Paenibacillus riograndensis, and Methylobacterium symbioticum, with and without nitrogen fertilization at different rates. Early results indicated that PGPB can improve bermudagrass productivity, particularly under reduced nitrogen inputs, reinforcing their potential as sustainable tools in forage-based livestock systems. Field trials were conducted in Crossville, TN, using randomized complete block designs. Treatments included bacterial inoculants with and without nitrogen, applied to 'Coastal' bermudagrass. Greenhouse trials were used to isolate effects under controlled conditions.

In a separate study, the legume species *Trifolium stoloniferum* plants had been established at field locations throughout Ohio, in sites representative of their natural habitat. Measurements were conducted annually to quantify persistence and performance of this germplasm. Plant populations were measured at 4 of the 12 planted sites in Spring 2025,

according to ODNR Permit #RP2025-29. The total number of plants (crowns) was 3628. This was a 40% increase from the total known population of approximately 9000 plants at the natural sites in Ohio. Within the Morgans Camp site, one sub-site (#14) continued a strong population from prior years, but 2 sites had a decreased population due to silt deposition from flooding by the adjacent river, and an exceptionally dry summer in 2024. Within the Lake Katherine site, two sub-sites (Salt Creek and Pine Ridge) both showed an increase in the plant populations from prior years due to spread of stolons beyond the original planted area. Within the Bosch Hollow site, one sub-site showed an increase in plant population from 2024 due to spread of stolons beyond the original planted area, but two sub-sites showed a loss of plants, likely due to the especially dry summer in 2024. At the Bosch Hollow site, one sub-site had high vegetative cover that precluded plant counts, but had 1600 flowers, making this among the most prolific sties in Ohio. A second sub-site showed an increased plant population from 2024, while a third sub-site site had lost plants, perhaps due to deer herbivory.

Sub-Objective: 1.2 Quantification of N-cycling as affected by grazing and pasture type (AR, GA, NE, MI)

Two researchers in two states worked on projects that quantified N-cycling as affected by grazing, pasture type, crop system or N-inputs.

One project in Michigan measured nitrogen Cycling in Biodiverse Perennial Forage. Their objectives were to 1) evaluate how long-term mixtures of perennial legume and grass influence biological nitrogen fixation and soil N pools, and 2) assess differences in soil N fractions and health among long-term genotype monocultures within perennial forage species. Measurements included forage yield, biological nitrogen fixation, soil health and canopy recovery after cutting. Laboratory analyses FY2025 were completed on forage nutritive composition and tissue 15N for the natural abundance method. Statistical analyses are ongoing with an MS student targeted to finish in May 2026.

Model development in Arkansas used multi-state data on nitrogen yield response in soybean to determine profit-maximizing fertilizer application rates. Tested were alternative soybean maturity group and N fertilizer application timing under both irrigated and non-irrigated conditions. Also tracked were meal/oil yield and protein concentration and whether paying producers on the basis of quality traits rather than a soybean price would impact whether and how much N fertilizer to use when soybean price and fertilizer cost impact that decision.

Sub-Objective 1.3. Quantifying Ecosystem Services as measures of Sustainability in Soil Smart Grazing Systems

Research in Georgia measured spatial production of forage within large-scale replicated grazing study. Worked completed included analysis of soil samples for background concentrations on nitrogen and carbon to 90 cm, biodiversity, and incidence of filth flies on pastures that were historically fertilized with either broiler litter or mineral fertilizer and with differing drainage classes. We found that there were distinct differences in carbon and nitrogen retention is pastures historically fertilized with broiler litter and much of that nitrogen was in the form of nitrate. Well-drained soils historically fertilized broiler litter retained more nitrate at almost every depth. Measurements continued on treatments initialized early summer 2023 to measure soil nitrogen and carbon near the surface and GHG losses up the catena within each pasture seasonally.

Sub Objective 1.4 N-leaching and N-dynamics to improve Soil Health. (UT, SC, MI)

Researchers in two states worked on cover crops inter-seeded into silage corn to improve N-availability and reduce N-leaching. In a Utah study, inter-seeding early in the season when the corn was at the V3-V5 stage is needed due to the short growing-season, and the lack of rainfall and irrigation water later in the season. Preliminary results showed that nitrate leaching was reduced by more than 50% when cover crops were inter-seeded compared to no cover crop. The preliminary results show that cover crops not only help improve soil health but also reduce nitrogen leaching thereby helping maintain those nutrients for future crop growth. In a related study in Michigan, alfalfa and falcata-alfalfa were established as cover crops into which corn was planted to determine the N-credits that resulted from the cover crops. The hypotheses were: i) that alfalfa can act as a living mulch for corn, ii) that falcata-alfalfa might be better than alfalfa, and iii) that these cover crops might be more important on sandy than heavy soils. The final corn harvest was recorded in October 2024 and an extra alfalfa harvest was recorded in May 2025. Soil samples were collected in spring 2025 and are pending commercial analyses for soil health attributes following the methodological recommendations of the Soil Health Institute for gravimetric soil moisture, aggregate stability, total C and N, carbon mineralization, and labile C. Forage quality laboratory analyses are complete. The MS student who conducted the research defaulted to a non-thesis MS in Aug. 2025, delaying project completion. A post-doc was hired in Dec. 2025 to complete the statistical analyses and write the papers.

In a separate 2-year study in South Carolina, bermudagrass was overseeded with cool-season forages to determine forage production and nutritive value, litter dynamics and soil health responses. Data collection for this study was finalized in December 2024. The results of this study will greatly benefit South Carolina (SC) producers, as many livestock operations rely on cool-season forages to extend their production and grazing seasons through the fall and winter months. A second 2-year cool-season grazing trial was initiated in Oct 2024 as part of an M.S. student program. This study focuses on exploring diverse

plant functional groups to optimize forage production, nutritive value and distribution, and soil health indicators.

Objective 2. Determine the role of plant secondary metabolites in ensuring improved pasture sustainability, enhancing animal health and performance, and decreasing the animal environmental footprint.

Researchers in two states (AR, KY) worked on projects determining the potential for biochanin A (a metabolite produced by red clover) to improve livestock production, and reduce greenhouse gas emissions from soil

In Arkansas, forty (40) Dorper lambs were offered one of the following treatments: novel endophyte infected tall fescue hay (NE+) with no red clover (RC0), or 5 (RC5), 10 (RC10), or 15 (RC15) % ground (5 mm) red clover. Total feces and urine were collected for 5 days after an initial 14-day adaptation, and blood samples were collected prior to feeding and 2 and 6 hours after feeding on day 20 of each of the 2 periods. Red clover (RC) contains biochanin A (BA), a flavonoid compound that exhibits estrogenic activity. This study aimed to investigate the effects of different levels of red clover (3351 μg/g BA) on nutrient intake and digestibility in lambs offered non-toxic, novel endophyte-infected tall fescue. Dry matter and OM digestibility were greater ($P < 0.05$) in lambs offered RC0 and RC5 compared with those offered RC10, but RC15 was not different ($P > 0.05$) from the other treatments. Lambs offered RC0, and RC5 diets had greater ($P < 0.05$) ADF digestibility than those offered RC15, but RC10 was not different ($P > 0.05$) from other treatments. The apparent N absorption was greater from RC0 and RC5 compared with RC10 and RC15. Dry matter and organic matter intake, neutral detergent fiber digestion, and blood urea nitrogen were not different ($P \geq 0.07$) among treatments.. In conclusion, feeding various levels of ground red clover did not impact DM, OM, and fiber intake and did not improve DM, OM, and ADF digestibility and nitrogen apparent absorption in lambs offered tall fescue hay. Therefore, more research is needed to better understand how to take advantage of the benefits of isoflavinoids in red clover without having negative impacts on parameters that impact animal performance.

Related research in Kentucky, has shown that biochanin A appears to interact with urease (a microbial produced enzyme that breaks down urea to ammonium) such that urease enzyme activity is lowered and ammonium pools remain low in soils receiving biochanin A-spiked urine. These conditions result in significant reductions in ammonia volatilization for 1-5 days after urine application and may also reduce subsequent nitrous oxide production. By providing a mode of action and additional data confirming that biochanin A in excreta can reduce pollutants associated with animal production, our research is building a case that plant natural products can replace problematic chemically manufactured inhibitors to improve nitrogen use efficiency and animal production system sustainability.

IMPACTS

The Tennessee research found integration of PGPB into forage systems such as bermudagrass may offer a promising alternative to synthetic nitrogen fertilization, potentially reducing input costs and environmental impacts. Early findings show that certain bacterial strains enhance bermudagrass growth even at reduced N rates, suggesting their role in improving nutrient efficiency. These biological tools align with climate-smart agriculture goals and could improve long-term sustainability and productivity of livestock-forage systems in the southeastern U.S. Adoption of PGPB-based management strategies has the potential to reduce nitrate leaching and greenhouse gas emissions, while maintaining or improving forage yield and quality.

Application of a N-response model in Arkansas, suggested that early application at R1 is preferred to later R5 application. Also, adapted soybean varieties responded to N better than non-adapted (shorter or longer growing season) varieties. N response under irrigated conditions was more economically justifiable than in non-irrigated conditions. Finally, N use impacted meal/oil yield and protein concentration but paying producers for these quality attributes with a protein premium and on the basis of crush value (meal/oil yield) in comparison to a soybean price did not alter N fertilizer recommendations.

The research results generated under the research projects conducted in South Carolia are relevant and applicable to the Southeast region. There has been growing interest and adoption of management strategies by producers from other states in the treatments being used in the ongoing trials. There has been participation from out-of-state producers and stakeholders in previous locally organized events, in addition to the interaction and dissemination of results at regional and national events. These interactions have enabled discussion and networking that have guided the adoption of technologies and recommendations over time.

Reducing the environmental impact of grazing animal production systems will improve nitrogen use efficiency and reduce pollution, thereby improving environmental quality for adjacent and downstream communities while simultaneously helping to meet societal demands for animal products, like meat, cheese, and milk, and sustaining grazing operations and the families whose livelihood depends on them.

Grants, Contracts & Other Resources Obtained

Dr McCulley submitted a SEED proposal and a pre-proposal on the plantain work to NIFA-AFRI and Southern SARE, respectively. Once the greenhouse cultivars have reached maturity, they will harvest the plant material and soils and conduct a variety of lab analyses to assess whether BNI is occurring.

A group of researchers from 4 states (GA, TN, KY, AR) identified similar interests for the potential of crabgrass within low-input (low-N) grazing systems. These researchers will

meet separately during 2026, to consider collaborative projects, and possible funding options.

PUBLICATIONS

Nave, R.L.G., O.G. Almeida *, J.J. Tucker, and Xiong, Y.V*. 2024. Restoring ecosystems in the Southeastern U.S. by interseeding alfalfa in existing cool-season grass pastures. Grassland Science. doi.org/10.1111/grs.12434.

Corbin, M.D.*, R.L.G. Nave, H. Naumann, G. E. Bates, C. Boyer, and O.G. Almeida*. 2024. Inclusion of cool and warm-season species to tall fescue swards for increased productivity. Agronomy Journal. doi.org/10.1002/agj2.21690

Corbin, M.D.*, R.L.G. Nave, H. Naumann, G. E. Bates, C. Boyer, and O.G. Almeida*. 2024. Does adding legumes to tall fescue pastures before stockpiling improve productivity and animal performance? Agronomy Journal. doi.org/10.1002/agj2.21676

Berry, M., P. Keyser, H. Naumann, K. Coffey, A. Griffith, J. Klotz, E. Herring, S. L. Davies-Jenkins, H. Ji. 2025. A big bluestem and indiangrass complement enhances cattle productivity in tall fescue forage systems. Applied Animal Science. (In press).

Johnson, M.L.,C. E. Gruber, K. R. Vierck, S. Gadberry, K. Coffey, C. T. Shelton, R. C. Jones, G. Gourley, and J. Daniel Rivera. 2025. Effects of byproduct-based diets or grain-based diets on performance and carcass quality of beef steers finished on pasture. Applied Animal Science 41:465-472. https://doi.org/10.15232/aas.2025-02684.

Garcia, C. (postdoctoral fellow), Vieira-Filho, L., Sanchez, D., Zagato, L., Silva, L. Agronomic responses and botanical composition of warm-season annual forages managed under contrasting harvest strategies. Crop, Turf and Grass Management (accepted for publication)

Silva, L. 2025. Enhancing climate resilience of forage ecosystems through sustainable intensification and educational knowledge transfer in the Southeast USA. Crops. https://doi.org/10.3390/crops5040042 .

Miller, R. 2025. Less Leaching with Covers. Journal of Nutrient Management 6(3): 12-15. https://jofnm.com/article-398-Less-leaching-with-covers.html

Proceedings and Scientific Abstracts

Furlan Junior, R., T. C. Mueller, L. E. Steckel, R.L.G. Nave, and B. Pedreira. 2024. Evaluating alfalfa establishment when controlling glyphosate-resistant Palmer Amaranth with soil fertility and herbicide application. Beef and Forage Center Annual Research Report.

Furlan Junior, R., T. C. Mueller, L. E. Steckel, R.L.G. Nave, and B. Pedreira. 2024. Bringing alfalfa back to Tennessee: Importance of fall weed control on spring forage accumulation. Beef and Forage Center Annual Research Report.

Almeida, O.G., R.L.G. Nave, M.D. Corbin, M.A.S. Malheiros, F. Nassar, V. Martinez, Y. Roberts, and R. C. Silva. 2024. Agronomic Responses in Tall Fescue Swards Mixed with Legume Species. International Annual Meetings ASA-CSSA-SSSA – San Antonio, TX.

Lima, C.E., Nassar, F.F., D. McIntosh, Reis, R.A., R.L.G. Nave, and B. Pedreira. 2024. Evaluating Azospirillum brasilense inoculation and nitrogen management on crabgrass. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Malheiros, M.A.S.*, R.L.G. Nave, Nassar, F., and Dillard, S.L. 2024. Effects of the Application of Plant Growth Promoting Rhizobacteria in the Production of Bermudagrass (Cynodon Dactylon) in Tennessee, United States. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Martinez, V., R.L.G. Nave, Almeida, O.G., V. R. Sykes, B. Pedreira, and C. Boyer. 2024. Optimizing organic corn production under different living mulch systems. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Nassar, F.F., R.L.G. Nave, Dillard, S.L., B. Pedreira, Silva R.C., Malheiros, M.A.S., Martinez, V., Roberts, Y., and Almeida, O.G. 2024. Use of plant growing-promoting bacteria as an alternative fertilizer for bermudagrass. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Roberts, Y.*, R.L.G. Nave, V. R. Sykes, K. J. Walters, A. P. Griffith, and Almeida, O.G. 2024. Management and Productivity of Corn and Alfalfa Intercropping Systems in the Southern U.S. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Silva R.C., R.L.G. Nave, Dillard, S.L., B. Pedreira, Nassar, F.F., Malheiros, M.A.S., Martinez, V., Roberts, Y., and Almeida, O.G. 2024. Qualitative and productive effects of plant growth-promoting bacteria (PGPB) in tall fescue. International Annual Meetings ASA-CSSA-SSSA – San Antonio/TX.

Hewitt, K., R. Miller, and B. Miller. 2025. Cover crops and water quality: effects on nutrient leaching. International Annual Meetings ASA-CSSA-SSSA – Salt Lake City, UT.

Cheek, R. A., E. B. Kegley, K. P. Coffey, J. G. Powell, S. Gadberry, C. O. Lemley, N. Moss, C. Bright, J. L. Reynolds, A. Harness, C. R. Hopkins, B. P. Littlejohn. 2025. The effect of melatonin supplementation during mid-late gestation in dams grazing toxic, endophyte-infected tall fescue on stocker phase growth performance and feed efficiency of offspring. J. Anim. Sci. 103(Suppl. 3):302-303.DOI: 10.1093/jas/skaf300.353.

Stinfil, R., C. Nieman, and K. P. Coffey. 2025. Impacts of ground red clover on nutrient intake and digestibility in lambs fed with novel endophyte-infected fescue. J. Anim. Sci. 103(Supplement_3):620-621. DOI: 10.1093/jas/skaf300.702

Miller, R., K. Hewitt, and B. Miller. 2025. Impact of Cover Crops on Nutrient Leaching. Waste-to-Worth 2025 Proceedings: Advancing Sustainability in Animal Agriculture. April 7-11, 2025. Boise, ID. Livestock, Poultry, and Environmental Learning Community (LPELC). Available at: https://lpelc.org/the-effect-of-cover-crops-on-nutrient-leaching/

Cheek, R. A., E. B. Kegley, K. P. Coffey, J. G. Powell, S. Gadberry, C. O. Lemley, N. Moss, C. Bright, J. L. Reynolds, A. Harness, C. R. Hopkins, B. P. Littlejohn. 2025. The effect of melatonin supplementation during mid-late gestation in dams grazing toxic, endophyte-infected tall fescue on stocker phase growth performance and feed efficiency of offspring. J. Anim. Sci. 103(Suppl. 3):302-303.DOI: 10.1093/jas/skaf300.353.

Stinfil, R., C. Nieman, and K. P. Coffey. 2025. Impacts of ground red clover on nutrient intake and digestibility in lambs fed with novel endophyte-infected fescue. J. Anim. Sci. 103(Supplement_3):620-621. DOI: 10.1093/jas/skaf300.702

Extension Outputs

1. Beem, G., B. Scott, J. Paling, and K. Cassida. 2025. Active soil carbon comparison among perennial forage species. UURAF. April 11, 2025, East Lansing, MI. Poster.
2. Cassida, K. 2024. MSU Forage Connection. www.forage.msu.edu/ (Website)
3. Cassida, KA. Optimizing Forage Quality in Hay and Haylage. MSU Extension Virtual Breakfast, Online May 1, 2025, URL https://www.canr.msu.edu/videos/optimizing-forage-quality-in-hay-haylage/ (WEBINAR/PODCAST)
4. Kaatz, P., and K. Cassida. 2025. Optimizing Forage Quality is Topic for May 1 Virtual Breakfast Series. MSU Ag News. 4/23/25 (press release)
5. Mar. 19, 2025. Maximizing Hay Forage Quality. Knutson Equipment Forage Harvester Conference, East Lansing, MI. (INVITED, 38 participants).
6. Mar. 6, 2025. MSU Forage Research Update. Great Lakes Forage & Grazing Conference, St. Johns, MI. (89 participants)
7. Mar. 5, 2025. Beem and Cassida. Soil Health Demonstration. PSM FFA Open House. East Lansing, MI. (30 participants)
8. Feb. 7, 2025. MSU Extension Crop & Pest Management Update. Saginaw, MI. (~80 Participants)
9. Jan. 10, 2025. MSU Alfalfa Research Update. MSU Extension Crop & Pest Management Update. Bad Axe, MI. (85 participants)
10. Miller, R., K. Hewitt, and B. Miller. 2025. Mitigating leaching with inter-seeded cover crops. Northern Utah Soil Health Conference. Utah Conservation Districts. Logan, UT. Oct. 29-30, 2025. (INVITED Conference Presentation)

Abstracts

1. Rodriguez, D. (graduate student), J. Adkison, K. Seavey, S. Giri, C. Garcia, M. Aguerre, L. Dillard, L. Silva. Agronomic and nutritive value responses of cool-season forage mixtures under rotational stocking.2025 Clemson University-CAT Agricultural Technology Spotlight Event. September 23, 2025. Clemson, SC.
2. Garcia, C. (postdoc), Adkison, J., Zagato, L., Giri, S., Rodriguez, D., Silva, L. Nitrogen fertilization strategies responses on forage mass, nutritive value, and soil gas emissions of cool-season forage system. 2025 Clemson University-CAT Agricultural Technology Spotlight Event. September 23, 2025. Clemson, SC.
3. Garcia, C. (postdoc), Silva, L., Vieira-Filho, L., Adkison, J., Agudelo, P. Impact of climate-smart practices on greenhouse gas emissions in South Carolina livestock operations. 2025 Southern Pasture & Forage Crop Improvement Conference. Corpus Christi, Texas. April, 2025.

Invited talks

1. Silva, L.S. Clemson University forage-livestock systems research and Extension program update. 2025 South Carolina Forage and Grazing Lands Coalitions Annual Meeting. September 9th. Columbia, SC.
2. Silva, L.S. Title: Understanding the alternatives and consequences of taking versus not taking action. Symposium "Building a resilient forage program for climate extremes". 2025 American Dairy Science Association. June 22-25. Louisville, KY.
3. Silva, L.S. Online in-service training: 2025 Building Resilience in Forage and Livestock Systems – Virtual Series – collaboration with the USDA Southern Climate Hub (Collaborators: Michael Gavazzi, Renai Nez, Ylexia Padilla). Link: https://www.eventbrite.com/e/building-resilience-in-forage-and-livestock-systems-virtual-series-tickets-1397042635129?aff=oddtdtcreator .

Book chapters

1. Silva, L.S., Aguerre, Fischer, M., Marshall, M., Greene, J., Kirk, K., Scharko, P., Smith, N. 2025. Forage-related sections. Silva, L.S., (ed.). In: South Carolina Forages: Research-based concepts for forage management. August 2025. Partially funded by the South Carolina Sustainable Agriculture Research and Education (SARE).
2. D. Barker, M. Chiavegato, B. Campbell and K. Verhoff, (2026) Advances in sustainable sheep pasture and grazing management, Ch 10 in "Advances in sheep production" Pp 237-254. Eds. Lesley Stubbings and Kate Phillips, BDS Publishing.
3. David J. Barker, Marilia Chiavegato, and Michael Collins 2025. Forage Fertilization and Nutrient Management Chapter 13, in "Forages, Volume 1: An Introduction to Grassland Agriculture" Wiley