

# Cool-season Annual Grass, Grass-Forb, and Grass-Legume Forage Systems for Southeastern Beef Cattle Production

## Progress report for LS19-310

Project Type: Research and Education

Funds awarded in 2019: \$270,708.00

Projected End Date: 03/31/2022

Grant Recipient: North Carolina State University

Region: Southern

State: North Carolina

Principal Investigator:

[Deidre Harmon](#)

NC State University

## Project Information

### Abstract:

Although planting a cool-season annual forage for soil stability and mitigation of environmental change has been highly adopted, little has been done to investigate the relationship between cool-season annual forage systems and their use as a livestock feed resource, and resulting impacts on soil health. Moreover, with beef producers facing continuous increases in feed and fertilizer costs, and rising pressures from public interest groups to become more sustainable, a winter annual forage plan that targets environmental stewardship and efficient plant and animal production is necessary. The utilization of cool-season annual grass, grass-forb, and grass-legume mixtures in beef cattle production systems has the potential to increase forage availability, productivity, and promote an environmentally sustainable farm agroecosystem. This proposal investigates the use of cool-season annual forages and forage mixtures at the plant, animal and environmental interfaces. The project team, consisting of both a forage and a livestock specialist, will establish field plots and a live animal experiment to determine soil health parameters, forage agronomic characteristics, harvesting techniques, and digestibility attributes of cool-season annual grass, grass-forb, and grass-legume mixtures. Collectively, these experiments will provide Southeastern beef cattle producers with science-based information and recommendations on utilizing cool-season annual forage systems profitably and sustainably.

### Project Objectives:

- Evaluate cool-season annual grass, grass-forb, and grass-legume forage systems for yield, forage distribution, and nutritive quality.
- Determine the effects of a bacterial silage inoculant on forage nutritive value of ensiled cool-season annual forage and forage mixtures.

- Determine in situ fiber digestibility from cool-season annual forage systems.
- Quantify changes in soil health and nutrient management in cool-season annual forage systems.
- Develop a comprehensive educational program for beef producers on the use of cool-season annual forages for grazing and ensiling.

## Cooperators

- [Steve Sorrells](#) - Producer  
[coldmtnnsy@bellsouth.net](mailto:coldmtnnsy@bellsouth.net)  
Farmer
- [Josh Sorrells](#) - Producer  
[coldmtnnsy@bellsouth.net](mailto:coldmtnnsy@bellsouth.net)  
Farmer
- [Chris Link](#) - Producer (Educator)  
[chris@appalachian.org](mailto:chris@appalachian.org)  
Manager of Farmer Incubator Program  
Southern Appalachian Highlands Conservancy

## Research

### Materials and methods:

1. Mikey Henry was originally identified as a farmer cooperator for this project. Owning a custom baler operation, Mike's role in this project was to advise forage growers on best management practices to ensure that quality is preserved before, during and after the ensiling process. At field days, Mike was going to demonstrate harvesting equipment and how diversifying cool-season annual forage species can impact the final ensiled forage product. Mike, with his custom baling operation, would work with Alabama extension personnel to collect balaege samples in order to asses cool-season annual balaege quality in Alabama. We are so sad to report that Mr. Henry has passed away unexpectedly this past year. He was a key person in this grant, from both a research and extension standpoint. We are working with Area and County livestock extension agents in both North Carolina and Alabama to try and fill the void that Mr. Henry has left. We are working with the agents to collect the much needed baleage samples so that we can assess forage quality of winter-annuals throughout the southeast.
2. As with most activities this past year, COVID-19 has caused major set backs, limitations, and reduced operations for many. We are actively working to try

and get back on schedule for this project, although there are still university and state restrictions when it comes to research and extension activities.

## **Participation Summary**

### Educational & Outreach Activities

- 12** Consultations
- 4** Curricula, factsheets or educational tools
- 2** On-farm demonstrations
- 9** Published press articles, newsletters
- 25** Webinars / talks / presentations
- 1** Workshop field days

## **PARTICIPATION SUMMARY:**

Education/outreach description:

### Conference Proceedings:

1. Dillard, S.L., R.C. Carrell, M.K. Mullenix, A.V. Gamble, R.B. Muntifering, K.B. Mason, M.L. Marks, J.J. Tucker, C.G. Nichols, J. Yeagar, D.S. Miller, S.J. Thompson, A. Jacobson, M.L. Cole, and D.W. Held. 2020. Grazing and Forage Systems for Beef Cattle Production in Alabama: A Review of Current Research and Demonstration Activities in the Department of Animal Sciences at Auburn University. Auburn University Beef Cattle Conference. Auburn, AL.
2. Shoup, S.L.\*, M.K. Mullenix, R. B. Muntifering, and L. Dillard. 2020. Fermentation characteristics of cool-season annual mixtures with or without silage inoculant. American forage and Grazinglands Conference. Greenville, SC.
3. Shoup, S.L.\*, R.B. Muntifering, M.K. Mullenix, and L. Dillard. 2019. Fermentation characteristics of cool-season annual baleage. American Forage and Grazinglands Conference. St. Louis, MO.
4. Shoup, S.L.\*, M.K. Mullenix, R.B. Muntifering, and L. Dillard. 2018. Nutritive value of cool-season annuals for baleage production. Auburn University Beef Cattle Conference. Auburn, AL.

### Scientific Abstracts:

1. Henderson, E.G., D. Harmon, M.H. Poore, A.D. Shaeffer, J.R. Rogers and A. Franzluebbbers. 2020. Utilizing cool-season annual grass and grass-legume mixtures for grazing and silage in Appalachia. Proceedings of the 2020 American Forage and Grasslands Council Annual Meeting.
2. Nolasco, C.V., J.L. Cox-O'Neill, A.J. Franzluebbbers, D. Harmon, M.H. Poore, J.H.

- Eisemann, and C.L. Pickworth. 2020. Nutritive value of cereal rye monoculture and a cereal rye and turnip mix forage as part of an integrated crop and livestock system. Proceedings of the 2020 American Forage and Grasslands Council Annual Meeting.
3. Cox-O'Neill, J.L., C.V. Nolasco, D. Harmon, M.H. Poore, A.J. Franzluebbbers, J.H. Eisemann, and C.L. Pickworth. 2020. Subsequent corn yield and soil structure following grazing of annual forages in an integrated crop-livestock system. Proceedings of the 2020 American Forage and Grasslands Council Annual Meeting.
  4. Shoup, S.L.,\* M.K. Mullenix, L. Dillard, and R.B. Muntifering. 2020. Fermentation kinetics of different cool-season annual mixtures with or without silage inoculant. Southern Section American Society of Animal Scientist Meeting. Chattanooga, TN.
  5. Shoup, S.L.\*, R.B. Muntifering, M.K. Mullenix, and L. Dillard. 2019. Agronomic and nutritive value of cool-season annual mixtures for baleage production. University of West Alabama Research Symposium, Livingston, AL.
  6. Shoup, S.L.,\* R.B. Muntifering, M.K. Mullenix, and L. Dillard. 2019. Nutritive value and fermentation characteristics of cool-season annual baleage. Southern Section American Society of Animal Scientist Meeting. Oklahoma City, OK.
  7. Shoup, S.L.\*, L. Dillard, R.B. Muntifering, and M.K. Mullenix. 2018. Forage yield and quality of cool-season annual mixtures for baleage production in Alabama. Auburn University College of Agriculture Graduate Student Symposium and Competition.

#### Peer-reviewed Extension Publications

1. Dillard, L., K. Mullenix, J. Gladney, and S. Shoup\*. 2018. Producing and Feeding Baleage in Alabama. Alabama Cooperative Extension ANR-2511. *Alabama NACAA Communications Award Winner.*

#### Timely Information Extension Publications:

1. Dillard, S.L., J. Elmore, and M. Griffin\*. 2019. 2019-2020 Forage Small Grains Variety Recommendations.
2. Dillard, S.L. 2020-2021 Small Grains Variety Recommendations.
3. Dillard, S.L., J. Elmore, and M. Griffin\*. 2019. 2019-2020 Forage Small Grains Variety Recommendations.

#### Popular Press Articles:

1. Harmon, D.D. The ultimate guide to current forage research in North Carolina. The Carolina Cattle Connection. 34(2): 8-9. February 2020.
2. L. Dillard and D.D. Harmon. 2020. Using brassicas during the fall grazing season. The Carolina Cattle Connection. 34(10):14-15.
3. Dillard, L. 2019. When is it too late to seed cover crops?. Agfuse.com. Interview.
4. Dillard, L. and K. Mullenix. 2018. Cool-season mixtures for limiting grazing cow-calf pairs. Progressive Forage. Apr.
5. Shoup, S.L.\* and L. Dillard. 2020. When should I consider making baleage?

Carolina Cattleman Connection Magazine. Feb.

6. Dillard, S.L. Is baleage right for me? Alabama Dairy Newsletter. April.
7. Dillard, L. 2019. When should I consider making baleage? Alabama Cattleman's Association Magazine.
8. Dillard, L. Benefits to cool-season annuals. Alabama Cattleman's Association.
9. Dillard, S.L. 2018. Late planting cool-season annuals. Alabama Cattleman's Association Magazine. Dec.

Extension Presentations:

1. Harmon, D.D. Forage research update for new NC Cooperative Extension agents. N = 11.
2. Harmon, D.D. Forage Research Update. WNC Livestock Agent Meeting. N = 14.
3. Harmon, D.D. How to utilize winter-annual forages in your beef herd. Have You Herd Webinar Series. September 15, 2020. N = 19.
4. NC forage and beef cattle research update. Shelby Area Beef Conference. N = 43.
5. Harmon, D.D. NC forage and beef cattle research update. NC Forage and Grassland Council's Winter Conference Series. N = 165.
6. Harmon, D.D. 2020NC forage research update. Statesville Area Beef Conference. N = 89.
7. Harmon, D.D. 2019. WNC research update. Beef Commission Steak Supper. N = 49.
8. Harmon, D.D. Harvested and stored forages. Biltmore grazing school. N = 10.
9. Harmon, D.D. New specialist program development update. NC Cooperative Extension Animal Agriculture Agent Training Conference. N = 68.
10. Harmon, D.D. Update on winter annual small plot study. OVT Whistle Stop Tour Field Day. N = 18.
11. Harmon, D.D. Annual forages. NC Cattlemen's Association Annual Meeting. N = 58.
12. Harmon, D.D. Amazing Grazing research and extension update. NC Forage and Grasslands Council Winter Conference Series. N = 49.
13. Harmon, D.D. Amazing Grazing research and extension update. NC Forage and Grasslands Council Winter Conference Series. N = 54.
14. Harmon, D.D. Amazing Grazing research and extension update. NC Forage and Grasslands Council Winter Conference Series. N = 75.
15. Harmon, D.D. Amazing Grazing research and extension update. NC Forage and Grasslands Council Winter Conference Series. N = 60.
16. Harmon, D.D. Livestock research update. Western District Ag Agents Training. N = 42.
17. Harmon, D.D. Utilizing summer and winter annuals in your forage program. Burke County Cattlemen's Meeting. N = 83.
18. Harmon, D.D. Filling in the gaps with annual forages. Davie and Yadkin County Cattlemen's Meeting. N = 52.
19. Harmon, D.D. Baleage tips and tricks for success. Surry County Cattlemen's

- Meeting. N = 63.
20. Harmon, D.D. Filling in forage gaps with cool and warm season annuals. Catawba County Cattlemen's Meeting. N = 73.
  21. Dillard, S.L. 2018. Baleage production tips and tricks. North Carolina State AREA Beef Conference. Waynesville, NC. N = 76
  22. Dillard, S.L. Overseeding cool-season annuals into bermudagrass hay fields. Bermudagrass Hay Summit. Virtual. n = 102.
  23. Dillard, S.L. and R.C. Carrell. 2020. 2020 Wiregrass Beef and Forage Field Day. Virtual. n = 443.
  24. Dillard, S.L. Making it through the winter: stockpiling forages and grazing cool-season annuals. Lawrence County Cattlemen's Meeting. Moulton, AL. n = 46
  25. Dillard, S.L. and M.K. Mullenix. 2018. Baleage and silage for dairies: agronomic considerations, animal performance, and costs. Alabama Farmers Federation Dairy commodity meeting. Montgomery, AL. n = 34

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