Development of forage curriculum for Extension educators in the Southeast USA

Silva, L.S.[*]; Dillard, L. [†], Mullenix, K.[†]; Wallau, M.[‡], Tucker, J.J.[¶], Vasco, C. [†]
* Clemson University Cooperative System; [†]Auburn University/Alabama Cooperative Extension System; [‡] University of Florida; [¶]University of Georgia

Keywords: agriculture; education; forages; livestock production; management

Abstract
In the Southeast USA, livestock production is one of the largest agricultural activities, and forages are the primary feed source. Most livestock systems are highly dependent on off-farm inputs to support forage production and animal performance, which elevates production costs and the activity's carbon footprint. There is a strong need to develop forage educational resources to enhance productivity, environmental sustainability, resilience, and profitability of agricultural systems in the region. This multi-disciplinary initiative was a collaboration among several land-grant Universities across the region. The objective was to develop decision tools and provide in-classroom training associated with hands-on demonstrations to Extension agents and agricultural educators in the Southeast. A textbook was developed for the two-day training, and the in-person program was held in Columbiana, AL, through a collaboration among 20 Specialists from several land-grant Universities. The book included basic concepts and management strategies for forages, livestock (e.g., beef, horse, small ruminants), soil, economics, nutrient management, animal genetics, and marketing strategies for forage-based systems. There were 62 participants from Alabama, Florida, Georgia, Louisiana, North Carolina, South Carolina, and Tennessee. The majority of the participants were Extension agents or educators, and close to half of them had been in the job position for less than five years (n= 28 participants). A significant emphasis was set on newer agents` participation aiming to allow them to address gaps in knowledge. The training sessions supported critical thinking and deepening of knowledge and network. Post-training surveys were applied to gather change in knowledge and feedback from participants and identify potential barriers to be used in structuring future curriculum development and trainings. Regional joint efforts can be a tool to address multi-disciplinary training while incentivizing collaboration across regions for Specialists and agents through their programming activities.

Introduction
In the Southeast USA, livestock production systems are based on forages due to favorable climate conditions, a wide range of adapted species, and access to local resources (e.g., poultry litter). Ruminants play an important role in the human diet and can convert non-edible products into high-quality protein (Wilkinson, 2011; Broderick, 2018). Most forage systems in the region are based on perennial grasses, which require nitrogen fertilizer input to support forage production and animal performance. The fluctuation in prices of off-farm inputs associated with low-profit margins and the need to increase the sustainability and resilience of forage-based systems enhance the need to improve management strategies and incorporate new technologies. A proper understanding of concepts and forage management strategies is essential to increase forage production and quality and help support ecosystem service delivery (Sollenberger et al., 2019). In this context, agricultural educators have a crucial role in bridging the knowledge gap among farmers and helping implement sustainable intensification practices of forage production systems.
Well-managed forage production systems require a holistic understanding of the ecosystem to address recommendations for forage and animal needs, soil fertility, and conservation practices. In order to design a proper forage system plan, it is essential to understand edaphoclimatic conditions properly, adapted forage species, goals, and budget of the enterprise. In this context, improved access to science-based resources and trainings for Extension agents and educators can improve long-term productivity, profitability, and adoption of sustainable practices in forage and livestock operations in the region. There is also a need to provide trainings for educators on "hot topics" such as animal welfare and climate change and their role in agricultural production. Educators need to have a toolbox to address a variety of topics and to interact with a changing clientele, including an increasing number of beginning farmers. In recent years, there has been an increased demand for educational programs for beginners, and the COVID-19 pandemic elevated this need due to the expansion of locally produced and sourced food, including livestock products.
Over the past decades, Extension programs have successfully diversified their research-based information management to expand to e-publication, websites, and other web-based platforms, including video recordings (Parish, 2011; Rusche and Renelt, 2014). The development of resources with research-based recommendations

serves as an easy-to-access toolbox for educators and farmers to find information needed daily and to contact them closely with the Extension personnel for further questions. The long-term goal of this multi-disciplinary collaboration is to increase productivity and incorporate environmental and economic practices in forages and livestock systems in the region. Proper training and hands-on experience are needed to achieve this goal, and developing a revised forage curriculum supports programming activities and related topics.

Methods

For this multi-disciplinary collaboration, 20 Specialists from land-grant Universities from the Southeast developed written, in-person, and online forage-based resources and trainings. The following institutions were involved in this effort: Auburn University/Alabama Cooperative Extension System, Alabama A&M University, Clemson University, North Carolina State University, University of Florida, University of Georgia, and the University of Tennessee. First, a guide providing concepts and research-based information on animals, forages, soils, pests, and economics was developed for the Southeast USA entitled "Concepts and Research-Based Guidelines for Forage-Livestock Systems in the Southeast Region" (Available for free download at Guide). Then, a two-day in-person training was held in Columbiana, AL, in April 2022. The audience (n=62) consisted of Extension agents, educators, and professionals associated with agricultural institutions from Alabama, Florida, Georgia, Louisiana, North Carolina, South Carolina, and Tennessee. The first training day was designed to be inside the classroom with a keynote presentation by Dr. Don Ball, Auburn University Emeritus Professor, then several talks on topics addressed in the printed guide. We had a roundtable of more experienced agents that shared their experiences with the audience on various topics selected by the moderators, including program development, accessing clientele, and measuring impact. This activity aimed to provide ideas for newer agents and promote an open environment for them to ask questions and get ideas to implement and develop in their programs. On the second day, the focus was on hands-on demonstrations on the field and providing tools to educators to replicate content in their programs. There was also an emphasis on thinking outside the box to explain complex concepts and deepen their knowledge. Surveys were applied to gather feedback on educational material and training from participants. An online two-day training session will be held in February 2023. Six speakers will address topics on professional development opportunities for Extension agents and best management practices in forage systems in each session, respectively. Additionally, online recordings will be shared with agents to provide additional training resources and information gathering. Web metrics will be reported regarding views and downloads of the textbook.

Results and Discussion

Most participants (n=53) are requested to have a specific number of professional development activity credits logged annually. This was a unique opportunity for professionals from all levels of their careers since we could cover basics to advanced aspects and provide them with coursework, curriculum, and additional publications to support their program and personal development. Only 25 participants had seven or more years of experience among those in attendance. Over 90% of participants use written publications within or out-of-state and considered the textbook and training useful to their job.

Most respondents appreciated the opportunity to participate in an event designed especially for them when they learned how to teach the content to their clientele. Over 90% of participants use demonstrations in their programs because they believe it helps with explaining complex concepts. When asked how likely the participants are to integrate the coursework into their programming activities, 94% of participants responded they are likely or very likely to do so.

Networking was a particular component of this training since we had several specialists from land-grant Universities and Extension professionals from other systems and institutions coming together throughout the Southeast region. Thus, most participants requested that this event has continuity and alternate locations in the coming years so they can learn about the specificities of forage systems in different locations and be exposed to new concepts. The continuity of this regional effort depends on the approval of additional resources. The group of collaborators is seeking opportunities to expand this effort and continue addressing forages and livestock-related topics through training events for agricultural educators.

Figure 1. First day of training during Dr. Don Ball's keynote presentation (left) and second day at weed demonstration site (right) at the 4-H Center in Columbiana, AL.

Conclusions and/or Implications

The attendance and feedback from participants in this event emphasized the need for additional opportunities focusing on forages to provide tools for educators to transfer knowledge to their clientele. Regional joint efforts to offer trainings can be a tool to address multi-disciplinary topics while incentivizing collaboration across regions for Specialists and agents through their programming activities. The major challenge is obtaining funding that can be applied to support the majority of agents' expenses within and out of state so they can attend. Still, this group of collaborators continues to actively work in acquiring funding.

Acknowledgment

The authors would like to thank the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Southern Sustainable Agriculture Research and Education program under award number SPDP21-04. The authors also thank the support of additional collaborators from multiple land-grant Universities across the Southeast and sponsors for the in-person training event, Barenbrug USA and Corteva AgriScience.

References

Broderick, G.A. 2018. Optimizing ruminant conversion of feed protein to a human food protein. *Animal*, 12: 1722–1734.

Parish, J. A. 2011. Website usage information for evaluating beef cattle extension programming. *Journal of Extension*, 49:5.

Rusche, W.C. and T. E. Renelt. 2014. Mobile and web-based applications to determine the most economical feedstuffs for livestock. *Journal of Extension*, 52:2.

Sollenberger, L. E., Kohmann, M. M., Dubeux, J. C. B., Silveira, M. L. 2019. Grassland management affects delivery of regulating and supporting ecosystem services. *Crop Science*, 59:441-459.

Wilkinson, J.M. 2011. Re-defining efficiency of feed use by livestock. *Animal*, 5: 1014–1022.