

A long-term, mixed grazing project was designed to determine the performance of goats grazing with cattle. In a 2x2 factorial, 40 Spanish goats and 14 Brangus cows were randomly assigned to continuous or rotational grazing systems, and two grazing schemes. Approximately 20 ha of Bermuda grass were divided into four pastures, two 8 ha for mixed species grazing and two 2 ha for grazing goats alone. The rotational pastures were subdivided into 4 equal sized paddocks, in which each paddock was grazed for 7 d and rested for 21 d. Goat weights, body condition scores and FAMACHA scores were collected every 28 d. Records of 1437 weights were analyzed using SAS MIXED procedure where grazing schemes, grazing systems, months of grazing and interactions were included as fixed and animals as random effects in the model. Body condition and FAMACHA scores were analyzed using Chi-square. Weights of goats grazing with cattle (36.9 ± 0.6 kg) were heavier ($P < 0.01$) than goats grazed alone (34.6 ± 0.6 kg). A similar effect was noted using grazing system ($P < 0.001$), where goats continuously grazing averaged 37.7 ± 0.6 kg, as compared to 33.8 ± 0.6 kg for those rotationally grazed. Significant weight differences ($P < 0.01$) were observed in the interaction of grazing scheme and system with goats grazed with cattle continuously weighing more (39.9 ± 0.8 kg) as compared to the other three interactions. The majority of goats, regardless of grazing scheme or system, tended to have a body condition score between 2 and 3 on a 5 point scale. A shift in the scores was observed starting in the spring and moving toward fall, where there was an increase in those scoring 3 or better. Similar trends were observed with FAMACHA scores, with the majority of goats scoring a 2 or 3. A shift in FAMACHA scores was observed starting in the spring through the fall, with a decrease in those scoring 4 and an increase in those scoring 3. Preliminary results suggest that goats could graze together with cattle to efficiently utilize available forage resources.

Key Words: FAMACHA, Goats, Mixed Grazing

601 The effect of mixed species grazing systems on soil compaction and permeability. Y. Ghebreyessus*, V. Bachireddy, S. Gebrelul, R. Payne, M. Berhane, and Z. Augustine, *Southern University, Baton Rouge, LA.*

A study to evaluate the effect of mixed species grazing systems on soil physical properties particularly soil compaction and permeability was conducted. Animals were grazed on Bermuda grass pastures during the summer and ryegrass during the winter. In a 2x2 factorial, 40 Spanish goats and 14 Brangus cows were randomly assigned to continuous or rotational grazing systems, and two grazing schemes (goats alone and goats mixed with cattle). A land area of approximately 20 ha on Bermuda grass was divided into four pastures, two-8 ha each for mixed-species grazing and two-2 ha each for goats-alone grazing. The rotational pastures were further divided, using electric fences, into four paddocks each to facilitate controlled grazing. Each paddock was grazed for 7 days and allowed to rest for approximately 21 days. Soil physical properties that determine soil compaction and permeability were collected in Fall and Spring seasons. The parameters were penetrometer reading, bulk density, soil water content and soil infiltration rate. Based on one year data significant difference in penetrometer readings was found between seasons, grazing systems, among species and grazing by specie interactions. Soils with rotational cattle grazing were more compact compared with the other treatments. Mean penetrometer readings were 4.4 ± 0.1 and 4.19 ± 0.2 revolutions for the rotational and continuous grazing, respectively. Soil compaction by goats was the lowest ($3.4 \pm .2$ revolutions). Bulk density, which is a measure for soil compaction, was significant among species with cattle grazing 1.48 and goats 1.34 Mg/m³. Soil water content was higher (25.6 vs. 19.7, $P < 0.05$) in spring than fall, indicating more compaction in spring months. Soil permeability was significantly higher (0.45 vs. 0.13 cm/hr, $P < 0.05$) with goat grazing as compared with cattle grazing.

Key Words: Goats, Mixed Grazing, Soil Compaction

Joint National Extension Workshop: Changing the Future of Food Animal Production

602 Introduction to the symposium: The lengthening chain of change. R. E. Stup*, *The Pennsylvania State University, University Park.*

Extension has a rich history of helping farmers to adopt new technology and improved management practices. Throughout most of Extension's history change could be initiated by exposing farmers to information that demonstrated the benefits of the new technology or practice. Extension educators used on-farm demonstration, farmer meetings, newsletters, factsheets and many other methods to present research-based information to farmers. The farmer evaluated the concept he was presented with and made a decision about whether, when, and how to apply the change in his own farm. This method of change could be viewed as a short chain of change extending from education to implementation (i.e. extension educator presents concept to farmer who decides and implements the change). This chain of change was successful throughout much of the twentieth century and in many cases it is still successful today. In recent decades, however, farmers have expanded operations and thus increased the number of people

employed. As farms grew larger, the farm owner was less likely to personally perform production operations, because other employees did that. The chain of change from education to implementation grew longer as employees were added to farms (i.e. extension educator presents concept to farmer, farmer decides whether and when to implement change, farmer trains and directs employees, employees implement change). In addition, the implementation end of the chain sometimes looks more like a web because multiple employees are involved in implementation. Obviously, this chain is much longer and more prone to breaks. The longer and more complex chain of change that we deal with today requires Extension to understand organizational change processes, not just individual education processes. This is a significant challenge and opportunity for Extension. It is a challenge because change management involves learning a new set of skills. It is an opportunity because there are few other entities in the agricultural sector that focus on organizational change. This session will introduce you to change processes and share how some Extension educators have dealt with rapidly changing industries.

Key Words: Change Management, Extension, Industry Changes

603 Adapting extension to rapidly changing industries: A pork industry experience. M. T. See*, *North Carolina State University, Raleigh.*

Extension programs have been delivered to the pork industry by NC State University since 1918. Over much of this period the NC pork industry experienced steady growth. However, since 1990 the NC pig crop increased four-fold from 5.1 million head to 20.1 million pigs in 2006. Today NC is recognized internationally for its large, modern and vertically integrated industry. Rapid growth was accompanied by increases in vertical integration, changing regulation, expanding workforces, and rapid technology adoption. These trends continue along with industry consolidation, internationalization, and changes in language and culture of workers. With changes of this magnitude occurring among our clientele, changes in programming offered and delivery methods were required. Local delivery of extension programs to the pork producers centers on manure management allowing county agents to specialize in an area where every producer and contract grower needs assistance. In addition, NC has state legislation requiring manure management plans and continuing education of producers. Traditional programs in nutrition, health, reproduction, genetics and management occur predominantly among peer groups including extension specialists, industry scientists and managers. Understanding the management and decision making structure of producers is required to design appropriate technology transfer methods. Our swine extension programs have a large component of production research, addressing industry needs and technology adoption. As financial resources for extension have declined our programs have grown through increased partnership with producer associations, production companies, and allied industry. We jointly offer educational programs with NC Pork Council, National Pork Board, and specific production companies on a cost-recovery basis. Electronic information transfer has become common place and allows us to reach a broad audience. Changing our extension programs as the NC pork industry has changed has allowed us to continue to provide relevant, research based information to pork producers helping them to efficiently and responsibly produce a quality product for consumers.

Key Words: Extension, Pigs, Pork

604 Adapting extension to the rapidly changing dairy industry. E. R. Jordan*, *The Texas A&M University System, Dallas.*

Over the last 50 years, the dairy industry has undergone dramatic changes. The number of milking cows has been cut from 21 million head on 2.9 million farms in 1955 to just over 9 million on less than 80,000 farms in 2005; thus herd size has grown from 7 cows per herd to over 110 cows. At the same time production has tripled, from less than 2700 kg of milk per cow to 8900 kg per cow. Numerous technological advances from artificial insemination to total mixed rations have

been adopted by the industry to enhance productivity of the modern dairy cow. Extension educators have facilitated the transfer of these technological advances by using on-farm demonstrations, conducting producer educational meetings, and generating fact sheets and newsletters to disseminate information. Through these techniques producers progressed through the five stages of adoption for new technologies—awareness, interest, evaluation, trial and adoption. With the advent of computer technology and internet distribution of information, innovative producers are accessing information through alternative sources and implementing practices without waiting for unbiased scientific results on the benefits of a product. Extension will continue to have a role in differentiating beneficial products or practices for innovators and early adopters; however the timeline for evaluation will be accelerated. This accelerated pace of evaluation will result in the Extension professional functioning as a researcher and educator simultaneously. An increasing workforce at the non-managerial level provides another audience for Extension educators. The focus of these educational programs will be on proper techniques and explaining the importance of given procedures. To effectively reach this audience, educational programs will frequently be in a second language and written materials will be translated or an alternative medium (video or podcast) may be required for those with limited formal education. Although many techniques traditionally used to promote change can be adapted to today's clientele, it is imperative for Extension to remain relevant and that modern delivery methods be adopted.

Key Words: Extension, Delivery Methods, Technology Transfer

605 Extension's responsibility in responding to emergency and controversial issues. J. F. Ort*, *North Carolina State University, Raleigh.*

Extension's programs vary from state to state, but the system is united by a shared mission of helping people put research-based knowledge to work. Amid debate surrounding contentious issues such as land and water use, animal rights, and genetically modified organisms, Extension best fulfills this mission by serving as the go-to source for unbiased expertise, and by convening and facilitating informed communication among various stakeholders. Likewise, Extension has an important role to play in delivering information that helps industry and society prepare for, respond to and recover from emergencies, such as those brought about by natural disasters and disease outbreaks. Three regional conferences to be held in 2007 are designed to help government, industry and other stakeholders fully understand the capacity to which Extension can serve in animal agrosecurity, and the reasons why serving in regulatory and advocacy roles can undermine Extension's ability to achieve its important educational mission.

Key Words: Extension, Emergency Issues, Controversial Issues