ANNUAL REPORT (2016 to 2017)

Multistate Project NC1181: Enhancing Resiliency of Beef Production Under Shifting Forage Resources

Period the Report Covers: October, 1 2016 to September 30, 2017
Date of Annual Meeting: August 15-16, 2017, Clay Center, NE

Objectives

List objective(s) worked on. The objectives listed in the project are:
1. Optimize the utilization of crop residues by grazing and harvesting and determine the effects on agroecosystems.
2. Evaluate strategies to increase efficient use and productivity of range and pasturelands through strategic timing and density of stocking and shifting species composition to more productive species.
3. Evaluate effects of integrating annual forage crops into year-round forage systems for beef production.
4. Develop innovative beef systems that match shifting forage resources.
5. Conduct multi-faceted education/extension program to disseminate research results, to include extension papers as well as regional conferences on the use of crop residues, annual forages, and range and pastureland by livestock.

Accomplishments

Multi-state collaborations:

- Objective 2
  - Five site locations have completed two years of replicated research in Kansas and Nebraska where summer annuals were interseeded into perennial cool season forages. All site locations followed the same protocol for treatments and data reporting. Individual locations have presented data in local publications; however, there is discussion to generate a multi-state, multi-location peer-review article.
  - Interseeding summer annuals in cool season perennials data and abstract were presented at National Agronomy meeting.

- Objective 3
  - Drs. Farney and Drewnoski have completed a survey about nitrate issues in cattle operations, with plans to submit a regional SARE grant about nitrates in cover crops (annual forages). Submissions close October 1, 2017.

- Objective 5
  - Planning began in August between Drs. Jenkins, Drewnoski, and Farney to host a 3-part meeting series at the borders of Kansas-Nebraska in 2017 with the over-reaching theme “Cattle management in limited perennial pastures”. Meetings are scheduled for December 12 in Marysville, KS; December 13 in Blue Hill, NE; and December 14 in Oberlin, KS.
Short-term outcomes:

- Objective 1
  - Grazing pairs on cornstalks while supplemented DDGS resulted in less ADG for calves and decreased BW for cows compared to pairs limit fed in total confinement. Body condition score was in excess of maintenance for the confined cows. The pairs on the cornstalk residue were more profitable than the confined cows.
  - Displacing distillers grains with corn does not maintain performance of steers grazing corn residue.
  - Providing supplemental urea or bambramycin does not improve the performance of steers grazing corn residue.

- Objective 2
  - After 6 years of treatment application on Sandhills meadow, there is no difference in botanical composition and aboveground plant production among grazing systems (mob grazing, simple rotation grazing, and continuous grazing); and trampling of standing live vegetation is the greatest and harvest efficiency and yearling weight gain are the lowest for mob grazing.
  - Shorter grazing periods improve grazing distribution and reduce utilization at preferred topographical positions. Shorter grazing periods appear to support higher stocking rates without negative impacts to pasture production and species composition.
  - Modified intensive early stocking with cow/calf pairs on native rangeland appears to be a viable option for producers and may allow producers to maintain or increase cow numbers on fewer perennial grassland acres. Cow performance appears, after two years of data, to be improved in an intensive early stocking system, where calf removal occurs at mid-season of grazing.
  - In the first year after establishment, legumes in tall fescue pasture for stocker steers did not impact their finishing performance or carcass characteristics
  - Stocker gain and gain per acre is reduced on high-endophyte fescue pastures versus reduced or modified endophyte fescue pastures. This continued through finishing where steers on high endophyte fescue had lower final weight, carcass weight, while having a lower backfat and numerical yield grade.
  - In the first year of establishment, regardless of whether legumes were interseeded in bermudagrass or not, and grazed by gestating beef cows, cow gains and forage availability were similar.
  - Summer annual interseeded into fescue may fill a “gap” in forage production for cattle operations. Corn and fields with fescue only had the lowest yield of forage, and a 1-cut system produced 33% more in fall than those that were cut twice.
  - The summer annuals, sudangrass and sorghum-sudangrass interseeded into Western wheat grass yielded the most while a one-cut system of harvesting also yielded the most grass. In Western Kansas rainfall during the summer plays a significant role in summer annual emergence and persistence. During 2015 all the warm-season plants desiccated under continued dry conditions prior to harvest thus mitigating any additional tonnage effects, however, in 2016 there was some warm-season annuals that were harvestable.
• Objective 3
  o Scanning images of blood and analyzing for red, green, and blue values shows potential as an inexpensive, chute-side test for methemoglobin as a diagnosis for nitrate toxicity. Nitrates are high in cover crops and have potential for toxicity issues in ruminant species.

• Objective 4
  o Field peas were evaluated relative to distillers grains as a protein supplement for grazing cattle. Two levels (0.4 and 0.8% BW) of field peas or dried distillers grains were fed to assist in the establishment of price structure for cull peas when they are unacceptable for human consumption or the pet food market is saturated. Preliminary results indicate supplementing field peas does not result in as much daily gain as feeding distillers grains.
  o Horn fly control and growth implants are effective strategies for heifers grazing Flint Hills pasture.

• Objective 5
  o Producer publications have been written, approximately two consultations with producers per week regarding feeding and managing confinement cows have been conducted, 6 conference or extension meeting presentations have been conducted.

Outputs:
  • 7 peer-reviewed journal articles
  • 16 scientific abstracts
  • 29 research reports or proceedings
  • 32 popular press article
  • 16 audio recordings
  • 4 theses

Activities
• Objective 1
  o Master’s student reported on year 1 data at the Nebraska and National Society for range management meetings and at the UNL Barta Brothers Ranch Field Day.
  o Two studies evaluating the effects of ammoniation of corn residue on feeding value were conducted.
  o Third year of on-farm research in Nebraska at 6 sites evaluating the impacts of grazing and baling of corn residue on crop yields and soil ecosystem services were completed.
  o An experiment evaluating supplementation of urea to calves grazing corn residue supplemented with distillers grains was conducted.

• Objective 2
  o The 2nd year of data was collected evaluating intensive early stocking of native mixed-grass rangelands with cow/calf pairs in Kansas at two sites.
o The second year of no-till interseeding of annual warm-season grasses into perennial cool-season grass pastures (smooth bromegrass, tall fescue, and Western wheatgrass) and annual cool-season grasses into warm-season grass pastures (native rangeland and bermudagrass) was conducted in Nebraska and Kansas.

o Experiments evaluating perennial legumes in tall fescue pastures and annual and perennial legumes in bermudagrass pastures was continued in Kansas.

o Interseeding warm-season annuals into cool-season perennials were continued for the second year at five locations in Kansas and Nebraska.

• Objective 3
  o An on-farm research experiment evaluating the profitability of grazing rye with growing calves within an integrated production system was initiated.
  o Completed a summer scholars event with undergraduate student to determine the feasibility of using blood and color via images to determine methemoglobin concentrations as a measure of nitrate toxicity.
  o Collected one year data from producer ranches and began research evaluating a cool-season annual forage within a wheat rotation. A Master’s student was recruited.
  o The second year of data evaluating the use of oats planted after corn silage or high moisture corn for background calves and the subsequent impact on summer cash crop productivity was conducted.
  o An on-farm research experiment evaluating the profitability of grazing rye with growing calves within an integrated production system was conducted.
  o The second year of data evaluating the use of oats planted after corn silage or high moisture corn for background calves and the subsequent impact on summer cash crop productivity was conducted.

• Objective 4
  o Complete sugar beets will be evaluated for growing and finishing cattle as an energy source replacing some corn.
  o Field peas will be evaluated for relative value to more traditional supplementation
  o An experiment evaluating a traditional cow-calf production system to one utilizing confinement, crop residue, and annual forages was initiated.

• Objective 5
  o Producer publications will continue to be written, one on one consults for feeding and managing confinement cows will be conducted, extension meetings are being planned, specifically a series of joint extension meetings with the members from Kansas are being planned to address results from objectives 1,3,4, and 5.
  o Over 375 participants in 7 extension presentations received information about horn fly control for pasture animals.
  o At KSU Beef Stocker Field Day and Cattlemen’s Day, were nearly 1,250 participants were exposed to information about grazing cover crops, pasture management, and animal management for improvement production.
  o Delivered 15 extension presentations to approximately 750 participants on
objectives 1 and 2.
  o Co-hosted 4 extension outreach events including the Barta Brother Open House and cover crop field days that were attended by nearly 200 participants.
  o Developed online Crop Residue Exchange (http://cropresidueexchange.unl.edu) for crop producers to list cropland available for grazing using an interactive map and entering information about the type of residue, fencing situation, water availability, and dates available. Also, livestock producers can search the database for cropland available for grazing.

**Milestones:**

**Objective 1**
  o A journal article describing the effect of corn residue harvest methods was submitted to the Journal of Animal Science for publication.
  o The multi-year experiment evaluating the effect of grazing or baling of corn residue on crop yields and soil ecosystems services at multiple site in NE was completed.

**Objective 2**
  o The multi-year experiments evaluating grazing strategies and their effects on native rangeland and meadows were continued in NE.
  o A new multi-year experiments to evaluate the impacts of early intensive stocking was continued in KS.
  o The multi-year experiment evaluating interseeding of annual into perennial pastures at multiple locations in KS and NE was continued
  o A multi-year experiment evaluating interseeding legumes into cool season perennials in KS was continued.
  o Serseia lespedeza control and pasture restoration in heavily infested areas has completed year one of two data collection and working on analysis.
  o A multi-year study evaluating continuous and rotational grazing in cool season grasses was completed.

**Objective 3**
  o Experiments evaluating forage quality, biomass production, calf gains and economics of annual forages and cover crops planted in KS and NE were conducted.
  o First test to determine if a chute-side test for methemoglobin as a measure of nitrate toxicity was completed and data presented at BCI Summer Scholars meeting.

**Objective 5**
  o Information related to the outcomes of objectives 1 through 4 were disseminated through UNL Beef online through the beef.unl.edu website which had 5,000 repeat visitors and 650,000 views in 2016. The BeefWatch electronic newsletter which had 46,000 views in 2016.
  o Research results studies in objective 1, 3 and 4 were presented at 16 events, educating 1,130 cattle and/or crop producers.
A survey of cattle producers was conducted to gauge current management and perceptions regarding nitrates in annual forages to allowing more targeted and informed educational programming.

A presentation was made at the Nebraska Cattlemen’s Convention and four workshops were held at four locations in Nebraska focused on risk management tools for forage and livestock producers educating 54 producers on using annual forage and pasture insurance tools. A recorded webinar presentation titled Annual Forage Insurance Plan for Precipitation was posted online at http://beef.unl.edu/annual-forage-insurance-plan-precipitation.

Impacts
- Using management practices that mimic modified early intensive stocking to increase beef cattle stocking density for breeding herds may allow producers to maintain or increase cow numbers for beef production on fewer perennial grassland resources.
- Tall fescue is grown on at least 37 million acres in the U.S., supporting roughly 20% of the beef cattle in the so-called transition zone. Most of its production occurs in spring, and less in fall, leaving a summer “gap” in forage availability and quality. Annual warm-season grasses could supply some much-needed forage during that period. If they could be successfully interseeded prior to fescue’s summer dormancy, some high-quality forage would be produced with no increase in pasture area.
- Annual forage usage in the Nebraska Panhandle was estimated to be a management practice that will be implemented, based on evaluation responses.
- Feeding lactating cows with calves in confinement when perennial pastures are unavailable in 2017 could result in a feed cost of $2.22/pair/d when using alfalfa hay of the quality and quantity needed to provide 15 lb TDN per day to maintain performance. Substituting ground cornstalk residue, sugar beets, and wet distillers at the same nutrient content, could result in a feed cost of $0.94/pair/d. This is a $1.28 savings/pair/d which is substantial for a cattle producer.
- Reaching an audience with research based information is critical for effecting change. The BeefWatch newsletter in 2016 had 970 subscribers. The 80 podcasts were created from these articles in 2016. The beef.unl.edu website had 82,000 repeat visitors in 2016.
- Distillers grains appears to be the best nutritional option for growing calves grazing corn residue. The addition of feed additives or urea does not appear beneficial. Corn supplementation does not provide the same animal performance as distillers grains.

Abstracts/Posters/Professional Presentations
Journal Articles


Extension Reports/Publications


Articles in the Popular Press (non-peer reviewed)
13. Jenkins, K. Spring Planted Forage Cocktails for Beef Cattle – BeefWatch – March 2017
15. Jenkins, K. Storing and Utilizing Sugar Beets Rejected for Human Consumption– BeefWatch March 2017
16. Jenkins, K. Using CRP Hay during a Drought – BeefWatch – August 2017


**Webinars/Videos and URL for online access**

None

**Student theses and/or dissertations**


**Funding (include grants and contracts)**

*Source, amount, start/end dates, title of project, Project Director, Co-Project Director(s)*

2. Nebraska Grazing Lands Coalition, $50,000, 1/1/2017 – 6/1/2019, Grazing cover crops and annual forages, Mitch Stephenson, Karla Jenkins, Cody Creech
7. Evaluating nitrate toxicity potential in grazed cover crops. Lenz, M.E. and M. E. Drewoski. 9/1/17 – 8/31/18. $11,948