ANNUAL REPORT (2015 to 2016)

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

Period the Report Covers: October, 1 2015 to September 30, 2016 Date of Annual Meeting: August 11-12, 2016, Hays, KS

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

Short-term outcomes:

- Objective 1
 - Grazing pairs on cornstalks while supplemented DDGS appears to be a viable for later-calving cowherds and it is more profitable than the confining pairs and feeding a corn residue and distillers based diet. Partial budgets analysis suggests it will save \$137/cow in winter feeding cost.
 - Beef producers can graze corn residue without negatively impacting the soil physical properties or soil organic matter. Thus corn residue can be a low cost feed resource for cattle producers and a source of income for crop producers.
- 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. The additional infrastructure and human resource requirements of mob grazing compared to other grazing strategies does not appear to be justified.
 - After 6 years of grazing, the advantages of the additional infrastructure and human resource requirements of grazing strategies using short grazing periods (3day and 37-day vs 150-day) are only beginning to appear. Although we have not

yet reported our results in research and extension publications, ranchers are taking note of our research results presented at field days, open houses, the Nebraska Ranch Practicum, and the Nebraska Range Short Course.

- Modified intensive early stocking with cow/calf pairs on native rangeland appears to be viable option for producers and may allow producers to maintain or increase cow numbers on fewer perennial grassland acres. However, multiple years are needed to better evaluate effects.
- Objective 3
 - Quality of late summer planted oat and brassica mixes is very good and calf gains range from 1.5 to 2.2 lb/d. After two years of comparing performance of calves during the winter grazing period, use a late summer planted oat-brassica mix is slightly more costly than using corn residue and distillers in the midwest. However, it does result in slightly better marbling.
 - Summer annuals grasses (BMR Sorghum Sudangrass vs foxtail millet) were compared as monocultures or in a mix with one of two legumes (soybean vs cowpeas) in combination with collards. A monoculture of Sorghum Sudangrass was high yielding but had lower CP than the foxtail millet or the mixes. Adding legumes and collards increased CP and TDN but also increased cost without increasing yield. Adding a legume and collards to either grass increased TDN and CP of the forage. With a July planting in the panhandle of NE the millet monoculture was the most economical when evaluated on a cost/ton of DM, CP, or TDN produced.
 - In August 2014 and 2015, sixteen treatments were drill seeded at the Southeast Kansas Research Station near Columbus, Kansas. Each treatment consisted of a three-way mix representing cover crops from the plant families Brassicaceae, Poaceae, and Fabaceae. Eight species were planted, Forage radish (Raphanus sativus), Purple top turnip (Brassica rapa), Oat (Avena sativa), Rye (Secale cereale), Barley (Hordeum vulgare), Wheat (Triticum aestivium), Austrian winter pea (Pisum sativum subsp. arvense), and Berseem clover (Trifolium alexandrinum). Forage quality analyses indicate that all mixes were of excellent forage value; therefore, the economic analysis evaluated the biomass produced with respect to the cost of the seed. Oat, turnip, and winter pea mix was the least expensive to plant at \$21.44/acre and yielded the greatest biomass.
- Objective 4
 - Including feed beets in limit fed confinement diets resulted in similar BCS and BW as diets containing corn as the energy source. Beets harvested for feed beets had greater sugar content than rotting beets previously harvested for sugar. Beets in either production system were an acceptable energy source for maintaining production cows in confinement.
- Objective 5
 - Information presented on the use of cover crops for forage and the integration of cattle into cropping systems was valued at over 5.5 million dollars by participants in Nebraska.

• During the three day Husker Harvest Days 169 producers modified their plans related to planting and/or using cover crops for forage.

Outputs:

- 7 peer-reviewed journal articles
- 13 scientific abstracts
- 27 research reports or proceedings
- 3 popular press article
- 2 webinars

Activities

- Objective 1
 - Two studies evaluating supplementation of calves grazing corn residue were conducted
 - Three studies evaluating method of harvesting corn residue on feeding value were conducted
 - Soil samples were taken from a long term (16 year) experiment evaluating the impacts of grazing of corn residue
 - The second 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 was completed.
 - Digestibility estimates from corn residue bales with varying composition of plant parts were collected.
 - Impacts of ammoniating corn residue on total tract digestibility was determined.
- Objective 2
 - The sixth year of data on the long-term impacts of grazing strategy on vegetation productivity and utilization, harvest efficiency, and rangeland health on meadow and upland range at the Barta Brothers Ranch was collected.
 - The first year of data was collected evaluating intensive early stocking of native mixed-grass rangelands with cow/calf pairs in Kansas at two sites.
 - The second year of no-till interseeding of annual warm-season grasses into perennial cool-season grass pastures (smooth bromegrass and tall fescue) and annual cool-season grasses into warm-season grass pastures (native rangeland and bermudagrass) was conducted in Nebraska and Kansas.
 - Experiments evaluating perennial legumes in tall fescue pastures and annual and perennial legumes in bermudagrass pastures was initiated in Kansas.
- Objective 3
 - The second year evaluating the effects of using an oat brassica mix for background calves and its subsequent effect on finishing performance was completed.
 - The first 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.

- The second year of data has been collected evaluating the forage quality and biomass production of multispecies annual forages planted in August in Parsons, KS.
- The first year of data evaluating the forage quality and biomass production of monocultures of summer annuals and multispecies mixes planted in the Nebraska Panhandle.
- An on-farm research experiment evaluating the profitability of grazing rye with growing calves within an integrated production system was initiated.
- Objective 4
 - Effects of wintering system on cow-calf performance and reproduction in a summer-calving intensively managed cowherd were evaluated at two locations for the second year.
- Objective 5
 - 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 500,000 views in 2015. The BeefWatch electronic newsletter which had 45,000 views in 2015.
 - Research results from the grazing strategy studies in objective 2 were presented at the 2016 Gudmundsen Sandhills Laboratory Open House, the Nebraska Ranch Practicum and multiple producer workshops.
 - Research results from the cover crop and annual forage studies in objective 3 were presented at 24 events, educating 1,687 cattle and/or crop producers.
 - A survey of farmers in NE was conducted to gauge current use, management and perception of cover crops and their use for forage was conducted thereby allowing more targeted and informed educational programming

Milestones:

- Objective 1
 - The results of the soil ecosystem services analysis of the long term effects of corn residue grazing were submitted for publication in the Soil Science Society of America Journal.
 - 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 continued.
- Objective 2
 - The multi-year experiments evaluating grazing strategies and their effects on native rangeland and meadows were continued in NE.
 - A new multi-year experiments to evaluate the impacts of early intensive stocking was initiated in KS.
 - The multi-year experiment evaluating interseeding of annual into perennial pastures at multiple locations in KS and NE was continued
- Objective 3

- Experiments evaluating forage quality, biomass production, calf gains and economics of annual forages and cover crops planted in KS and NE were conducted.
- Objective 4
 - Results of the first series of experiments evaluating cow/calf systems using complete confinement were published in the Prof. Anim. Sci
 - The multiyear experiment comparing a complete confinement systems to one utilizing corn residue grazing in the winter for summer calving cows was continued.
- Objective 5
 - Received a \$10,000 extension innovation grant from UNL extension to develop an online corn residue exchange to connect cattle producers seeking grazing and crop producers with corn residue available for grazing.

Impacts

- A survey of NE farmers showed that for those not allowing grazing of corn residue impacts of cattle on the soil was a major concern. Thus research showing that cattle grazing corn residue does not cause significant amounts of compaction may increase opportunity for beef producers to winter cattle on this feed resource.
- 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.

Abstracts/Posters/Professional Presentations

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Extension Reports/Publications

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- Warner, J.M., C..J. Bittner, R. G. Bondurant, K.H. Jenkins, R.J. Rasby, M.K. Luebbe, G.E. Erickson, and T.J. Klopfenstein. 2016. Effects of Wintering System on Cow and Calf Performance in a Summer-Calving Intensive Production System. 2016 Nebraska Beef Report. MP103:5-7.
- 5. Jenkins, K.H., A. Berger, G. Hergert. 2016. Annual Forages Following Irrigated Wheat. 2016 Nebraska Beef Report. MP103:68-70.
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- 3. Redfearn, D.D. 2016. Small grains as forage: Harvest soon, not late. Progressive Forage, January 29, 2016. Online: http://www.progressiveforage.com/forageproduction/management/small-grains-as-forage-harvest-or-graze-soon-not-late#

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Nebraska

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Student theses and/or dissertations

None

Funding (include grants and contracts)

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

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