**REPORT**

**Multistate Project NC1181:** **Optimizing land use for beef cattle production**

**Period Covered: 9/30/23-10/1/24**

**Date of This report:**

**Annual Meeting Date and Location: August 16-17, 2023 held via Zoom with Dr. Jaymelynn Farney hosting**

**Participants: Volesky, Jerry (**[**jvolesky@unl.com**](mailto:jvolesky@unl.com)**) - UNL; Guretzky, John (**[**johnguretzky@unl.com**](mailto:johnguretzky@unl.com)**) - UNL, Mitchell Stephenson, Blasi, Dale (**[**dblasi@ksu.edu**](mailto:dblasi@ksu.edu)**) - Kansas State University, Farney, Jaymelynn (**[**jkj@ksu.edu**](mailto:jkj@ksu.edu)**) - Kansas State University, Warner, Jason (**[**jwarner@ksu.edu**](mailto:jwarner@ksu.edu)**); Rusche, Warren (**[**warren.rusche@sdstate.edu**](mailto:warren.rusche@sdstate.edu)**) - South Dakota University; Harmoney, Keith (**[**kharmoney@ksu.e.du**](mailto:kharmoney@ksu.e.du)**); Caton, Joel (**[**joel.caton@ndsu.edu**](mailto:joel.caton@ndsu.edu)**) - North Dakota State University**

**Brief Summary of Annual Meeting:**

**Objectives**

* Enhance productivity and efficient use of pasture, rangeland, and other forage resources
* Create and evaluate opportunities to incorporate forage production within cropping systems
* Develop management strategies for cows/calf systems that use limited or no perennial pasture
* Assess economic performance, resiliency, and adaptability of the systems and management practices explored
* Improve stakeholder understanding of the systems and management practices evaluated

**Accomplishments**

*Short-term outcomes:*

* Objective 1: Enhance productivity and efficient use of pasture, rangeland, and other forage resources
  + - * + On short-grass native range average stocker cattle weights were similar when placed on pasture in May. At mid-July, treatments had similar animal gain, with supplemented pastures averaging 121 lb/hd gain and non-supplemented pastures averaging 131 lb/hd gain. During the last half of the season, non-supplemented pastures gained 94 lb/hd, while supplemented pastures gained 119 lb/hd. Supplemented pastures, whether supplement was placed in a bunk or on the ground, had similar animal gain during both the early and late grazing season.
        + In one year of data, cattle that were consuming mineral that contained an ionophore or an essential oil had the same gains. Additionally, there was no difference in available forage and mineral intakes were the same. Potentially, while on grass essential oils could be used as a non-antibiotic feed ingredient in result in similar gains as the standard feeding practice of ionophores.
        + In one year of measurements (second year is still on-going); cows that were supplemented with 1% of body weight of corn silage daily while on fescue showed increased body weight gains and were fatter than those not supplemented. Supplementally feeding corn silage did not off-set toxic fescue symptoms and did not substitute grass intake. As seen with other studies, the most beneficial way to reduce fescue toxicity symptoms is use of non-toxin producing varieties.
        + Fall-calving pregnant cows that were fed corn silage at 1% of body weight during the summer while on bermudagrass pastures did not show any body weight or fat accumulation differences that those that were not supplementally fed. However, supplementation did increase available forage by 33% in those pastures that were grazed by cows that were supplemented corn silage at 1% of body weight daily.
        + Hand-feeding a 60% corn:40% dried distillers grain blend at 0.25% of body weight three times a week results in the greatest cattle gains as compared to free-choice feeds. The ionophore increased average daily gain by 0.5 pounds in the self-fed supplement, but did not have an increase in gain when fed in the hand-fed supplement.
* Objective 2: Create and evaluate opportunities to incorporate forage production within cropping systems
  + Steers fed earlage at 6% of diet had less dry matter intake compared to steers fed earlage at 10 or 14% of hay at 10% of diet. Average daily gain tended to respond quadratically to increased earlage with earlage at 10% gaining 1.67 kg/d compared to 1.61, 1.63, and 1.59 kg/d for hay at 10% of diet, earlage at 14% of roughage, and earlage at 6% roughage, respectively. Gain to feed decreased linearly with greater inclusion of earlage. There were no appreciable differences in carcass outcomes based on dietary treatment. Results of this study showed that earlage can effectively replace ground hay in beef finishing diets. Feeding earlage to provide 10% roughage equivalent improved feed efficiency compared to a diet containing 10% ground hay on a dry matter basis. These results will allow cattle feeders who produce their own feedstuffs and roughage to better evaluate dietary ingredient choices to enhance system resiliency and profitability.
* Objective 3: Develop management strategies for cows/calf systems that use limited or no perennial pasture
  + During the period from 42 d prior to calving until 42 d post-calving, high-forage diets had greater enteric methane emissions than did high concentrate diets. Cows in the ad libitum forage group were heavier than those fed the limit-fed concentrate diets, likely because of differences in ruminal fill. These cows will be monitored throughout lactation to determine effects of winter cow management on subsequent weight gain, reproductive function, milk production and calf growth.
  + A bulkier TMR with more roughage inclusion resulted in more time at the bunk for cows and calves and cleaner hygiene scores for cows, but roughage inclusion did not affect manure scores in cow-calf operations that are housed in confinement.
* Objective 4: Assess economic performance, resiliency, and adaptability of the systems and management practices explored
  + Cereal rye terminated late sometimes led to increases in corn seedling disease although this did significantly increase biomass and potential forage.
* Objective 5: Improve stakeholder understanding of the systems and management practices evaluated
  + Information that can be incorporated into cattle and land managers have been shared through many outlets such as educational videos; media interviews for radio, TV, and podcasts; and popular press articles. Reach includes at least 12 states, but also podcasts have been downloaded from 5 countries outside of the United States.

Activities

* Objective 1: Enhance productivity and efficient use of pasture, rangeland, and other forage resources
  + Began a multi-season monitoring experiment on supplementation strategies and best management practices of beef cows and heifers. The first experimental season occurred on late winter through early on spring dormant native forage.
  + A study was conducted on replicated pastures of shortgrass rangelands near Hays, KS. Continuous, season-long (CS) stocking of lightweight steers and heifers took place on shortgrass rangeland from May to October. Starting in mid-July, two protein supplement treatments (1.5 lb/hd/day of dry distillers grains fed in a bunk, or 1.5 lb/hd/day of dry distillers grains fed on grass vegetation on the ground) were compared to a non-supplemented control treatment. Supplements will be fed two days per week and will be proportioned accordingly to receive an equivalent of 1.5 lb/hd/day.
  + A study was conducted in Kansas on tallgrass native range to evaluate cattle performance when cattle were fed mineral that contained an ionophore or an essential oil blend. Steers (n = 281 head) grazed for 90 days during the summer. Steer gain, forage production, and mineral intake were recorded and analyzed.
  + A second year of data collection on both fescue and bermudagrass pastures was completed. On both types of grass, fall-bred pregnant cows were supplementally fed corn silage at 1% of body weight, daily. This was done to determine if supplementation can reduce toxicity concerns in toxic fescue varieties or could be used to extend the grazing season (ie drought management option).
  + Steers were supplemented on bromegrass with different commercially available products. The purpose was to determine steer gains, forage availability, and cost of production based on self-fed supplements, hand-fed supplements, and addition of feed additive, ionophore.
* Objective 2: Create and evaluate opportunities to incorporate forage production within cropping systems
  + Our team continued its work on diversified cropping systems that have potential to increase forage opportunities in typical annual crop rotations in Nebraska. This includes work primarily funded by four grants.
  + The first is the Kernza CAP, a multi-state, multi-institution effort to expand the use of the perennial grain crop Kernza. We harvested grain from the third year of two experiments at the Eastern Nebraska Research, Extension and Education Center near Mead, Nebraska. We also harvested fall biomass for the second time and are in the process of assessing forage quality for summer and fall samples. Preliminary analysis found that Nebraska produced the highest amount of fall biomass in the first year, compared to the five other sites in the experiment.
  + The second ongoing project is the Cover Crop Initiative, a collaborative project funded by NRCS Nebraska, where our team is managing multi-site cover crop variety trials. From 2023-2024, we planted three fall cover crop sites (second year – at Scottsbluff, North Platte and Haskell Ag Lab) and two summer cover crop sites (third year – at North Platte and Rogers Memorial Farm). Many of these treatments are being evaluated for forage quality.
  + The third project is led by the University of Missouri and includes co-PI Mary Drewnoski from NC1181. In this project the goal is to advance cover crop variety testing and science. I am leading the education efforts and in early October 2024, we planted the first variety trial at Eastern Nebraska Research, Extension and Education Center. This trial includes testing of five new varieties of cereal rye, winter canola, winter pea, hairy vetch and crimson clover.
  + Finally, in 2023-2024, our team concluded its work with the Precision Sustainable Agriculture project funded by USDA-NIFA’s Sustainable Agriculture Systems program. We published our first paper from the field research in Nebraska evaluating the effect of planting corn into “green” cover crops on corn seedling disease. Cereal rye terminated late sometimes led to increases in corn seedling disease although this did significantly increase biomass and potential forage. We are working on several more collaborative papers with the project and multi-site trials.
    - * + Northern plains cattle feeding is competitive with other regions because of abundant supplies of grain and grain co-products and outstanding quality of feeder cattle. Climate conditions in Iowa can pose challenges for row crop production (frost late in the spring and early in the fall) resulting in fewer growing degree-days and consequently reduced yields for corn. One solution to this dilemma is to harvest ear corn after physiological maturity but before the grain has fully dried in the field. Harvesting as high-moisture ear corn (HMEC) eliminates the need for crop dry-down and reduces risk from a shorter than ideal growing season. HMEC is composed of corn grain, cob, husk, and some shank. 192 Charolais cross steers with an initial weight of 449 kg. Steers were allocated into twenty-four pens (eight steers per pen) with six pens allocated to four different treatments. The treatments were a control finishing diet that included 10% ground hay on a dry matter basis **(Hay10)**, plus three diets containing either 34, 53, or 71% earlage on a DM basis to provide 6, 10, or 14% roughage equivalent, respectively (**Ear6**, **Ear10**, and **Ear14**). Steers were fed for 146 d with dry matter intake, average daily gain, and feed efficiency calculated from pen data as well as individual carcass data.
* Objective 3: Develop management strategies for cows/calf systems that use limited or no perennial pasture
  + Winter feed costs typically represent the largest portion of a cow/calf operation’s expenses. In time of limited hay supply and increased hay price, it can be economically advantageous to use corn rather than hay to meet the energy and protein requirements of pregnant cows. Forty-six pregnant Angus and Simmental-Angus cows (body weight = 630 kg) were used in this study and assigned to one of two treatments: 1. Ad libitum feeding of a forage-based diet; or 2. A concentrate corn-based diet limit-fed at 1.2% of BW. Individual feed intake was measured using an Insentec feeder and enteric methane emissions were monitored using a GreenFeed trailer system.
  + In Illinois, a study evaluating roughage inclusion in limit-fed rations in confinement, drylot housed beef cows was conducted. On day prior to new bedding, more cows on high roughage inclusion were at the bunk at h 2, 3, 4, and 5 post-feeding. On day after new bedding, there was more cows on moderate roughage inclusion that were at the bunk before feeding; however, more cows on high roughage were at bunk at h 2 and 3 post-feeding. On both evaluation days there was a treatment × time interaction calves at bunk. More calves on high roughage inclusion were at the bunk at h 1 and 2 post-feeding. Cows fed the moderate roughage inclusion ration had dirtier lower leg (1.5 vs 1.2) and upper leg/flank (1.4 vs 1.1) hygiene scores on d 40 than cows fed the high roughage inclusion; however, there were no treatment differences on d 75. There were no treatment differences for manure scores on d 40 or d 75.
* Objective 4: Assess economic performance, resiliency, and adaptability of the systems and management practices explored
* Objective 5: Improve stakeholder understanding of the systems and management practices evaluated
  + Two multi-state events, Dakota Alternative Beef Cow Symposium and the KOMA Cattle Conference, were held during this reporting period. Both events had presentations recorded and are hosting sites online.

**Impacts**

**Outputs**

***Abstracts/Posters/Professional Presentations (Bold = authors from multiple states)***

1. Holman, J., N. Detter, A. Obour, L. Haag, and K. Roozeboom. 2024. Summer annual legumes: yield potential and water use. Ogallala Aquifer Program. Liberal, KS.
2. Dhanda, S., V. Kumar, A. Dille, A. Obour, E. Yeager, and J. Holman. 2024. Replacing fallow with cover crops for weed suppression in semiarid Central Great Plains. WSSA. San Antonio, TX.
3. Dhanda, S., V. Kumar, A. Dille, A. Obour, E. Yeager, and J. Holman. 2024. Impact of growing cover crops on weed suppression, crop yields, and profitability in semiarid Great Plains. WSSA. San Antonio, TX.
4. Holman, J., N. Detter, A. Obour, L. Haag, and K. Roozeboom. 2024. Summer annual legumes: yield potential and water use. Great Plains Soil Fertility Conference. Lubbock, TX.
5. Holman, J., N. Detter, A. Obour, and Perpetual Tamea. 2024. Effect of Seeding Rate on Annual Warm Season Forage Yield and Plant Structure. Great Plains Soil Fertility Conference. Lubbock, TX.
6. Simon, L. A. Obour, J. Holman, S. Johnson, and K. Roozeboom. 2024. Dual-purpose cover crop and occasional tillage effects on crop yields and soil properties in a no-tillage wheat-sorghum-fallow rotation. Great Plains Soil Fertility Conference. Lubbock, TX.
7. Cason, Z., A. Obour, J. Holman, and K. Roozeboom. 2024. Crop production and soil property impacts of integrating annual forages and ruminant livestock into wheat-based cropping systems. Great Plains Soil Fertility Conference. Lubbock, TX.
8. Obour, A., J. Holman, L. Simon, and Y. Assefa. 2024. Soil properties and winter wheat nutrient uptake as affected by long-term tillage and nitrogen fertilization. Great Plains Soil Fertility Conference. Lubbock, TX.
9. Winter-feeding high concentrate diets reduces enteric methane emissions pre-calving in beef cows. 2024. Megan A. Wehrbein, Elias Velasquez Moreno, Hector M. Menendez, Warren C. Rusche, Zachary K. Smith, and Ana Clara B. Menezes. J. Anim. Sci. 102:Suppl\_3:679-680. doi.org/10.1093/jas/skae234.768.
10. Fowler, M., B. Freeman, K. P. Ewing, W. T. Meteer, W. P. Chapple, J. C. McCann, and D. W. Shike. 2023. Effect of roughage inclusion in limit-fed cow rations on behavior, cow hygiene, and manure scores. Midwest Section of Animal Science Meetings. Madison, WI. J. Anim. Sci.
11. Shike, D. W. January 26, 2024. Effects of creep feed duration in a drylot system on cow and calf performance. Presented at Driftless Region Beef Conference in Dubuque, IA.
12. Shike, D. W. Feb 6 and 7, 2024. Creep-feeding calves in confinement systems. Presented at Dakota Alternative Beef Cow Systems Symposium in Huron, South Dakota and Jamestown, North Dakota.
13. Furlan, R., Coelho, R. M., Yasuoka, J. I., Farney, J., & Pedreira, B. C. (2023) Estimating Forage Mass Using Ultrasonic Sensor on Tall Fescue Pastures [Abstract]. ASA, CSSA, SSSA International Annual Meeting, St. Louis, MO. <https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149054>
14. Yasuoka, J. I., Coelho, R. M., Farney, J., & Pedreira, B. C. (2023) Estimating Forage Mass Using Remotely Piloted Aircraft Systems on Tall Fescue Pastures [Abstract]. ASA, CSSA, SSSA International Annual Meeting, St. Louis, MO. <https://scisoc.confex.com/scisoc/2023am/meetingapp.cgi/Paper/149050>
15. Banks, J., J. Warner, K. E. Fike, and J. K. Farney. 2024. Effects of supplementing corn silage to fall-calving heifers and cows grazing bermudagrass on cow and calf performance and physiology. J. Anim. Sci. 102 (Suppl. 1):61. [doi:10.1093/jas/skae019.072](https://doi.org/10.1093/jas/skae019.072).
16. Farney, J.K., J. Warner, J. Banks, J. Yasuoka, and B. Pedreira. 2024. Does supplementation of beef cattle impact the agronomy performance of tall fescue and bermudagrass pastures? J. Anim. Sci. 102 (Suppl. 1):47-48. doi:10.1093/jas/skae019.056.
17. Banks, J., J. Warner, K. E. Fike, and J. K. Farney. 2024. Effects of supplementing corn silage to fall-calving heifers and cows grazing tall fescue on cow and calf performance and physiology. J. Anim. Sci. 102 (Suppl. 1):60-61. [doi:10.1093/jas/skae019.071](https://doi.org/10.1093/jas/skae019.072).

***Journal Articles (Bold = authors from multiple states)***

1. Kumar, V., S. Dhanda, P. Geier, R. Currie, J.A. Dille, A. Obour, E. Yeager, J. Holman. 2024. Synergistic effect of pyridate-based herbicide mixtures for controlling multiple herbicide-resistant kochia. Weed Technology
2. Obour, A., J. Holman, P.V. Prasad, Y. Assefa. 2024. Winter wheat yield stability as affected by fertilizer-N, tillage and yield environment. Agronomy Journal. <http://doi.org/10.1002/agj2.21656>
3. Simon, L., A. Obour, J. Holman, S. Johnson, K. Roozeboom. 2024. Cover crop grazing effects on soil properties in no-tillage dryland cropping systems in the central Great Plains. Agriculture, Ecosystems and Environment. Agriculture, Ecosystems & Environment 374, 109140.  <https://doi.org/10.1016/j.agee.2024.109140>.
4. Holman, J., P. Mauler, A. Obour, K. Roozeboom, and Y. Assefa. 2024. Soil, forage, and weed attributes following tillage in grazed no-tillage triticale pasture. Soil Science Society of American Journal. <http://doi.org/10.1002/saj2.20736>
5. Dhanda, S., V. Kumar, J. A. Dille, A. Obour, E. Yeager, and J. Holman. 2024. Influence of cover crop residue and residual herbicide on emergence dynamics of glyphosate-resistant Palmer amaranth (*Amaranthus palmeri*) in grain sorghum. Weed Science
6. Holman, J., A. Obour, D. O’Brien, and Y. Assefa. 2024. Historic corn yield, production, and economic value trends in Kansas. AJ. (AJ-2023-09-0736-OA.R1).
7. Holman, J., D. Ruiz-Diaz, A. Obour, and Y. Assefa. 2024. N Fertilizer source, rate, placement, and application timing effect on sorghum (grain and forage) and corn grain yields. Agrosystems, Geosciences & Environment. <http://doi.org/10.1002/agg2.20469>
8. Holman, J., A. Obour, D. O’Brien, and Y. Assefa. 2024. Historic winter wheat yield, production, and economic value trends in Kansas, the “Wheat State”. Crop Sci. Crop Science, 1–17. https://doi.org/10.1002/csc2.21171
9. **Almeida, T.F., Robinson, E., Matthiesen‐Anderson, R., Robertson, A.E. and Basche, A., 2024. Effect of cover crop species and termination timing on corn growth and seedling disease. Agronomy Journal. https://doi.org/10.1002/agj2.21601**
10. **Huddell, A.M., Thapa, R., Marcillo, G.S., Abendroth, L.J., Ackroyd, V.J., Armstrong, S.D., Asmita, G., Bagavathiannan, M.V., Balkcom, K.S., Basche, A. and Beam, S., et al. 2024. US cereal rye winter cover crop growth database. Scientific Data, 11(1), p.200.**
11. Bai, G., Koehler-Cole, K., Scoby, D., Thapa, V.R., Basche, A. and Ge, Y., 2024. Enhancing estimation of cover crop biomass using field-based high-throughput phenotyping and machine learning models. Frontiers in Plant Science, 14, p.1277672.

***Extension Research Reports/Publications***

* Banks, J. Wyatt L.; Farney, Jaymelynn K.; Fike, Karol E.; and Warner, Jason M. (2024) "Effects of Supplementing Corn Silage to Fall-Calving Heifers and Cows Grazing Tall Fescue on Cow Performance," Kansas Agricultural Experiment Station Research Reports: Vol. 10: Iss. 2. <https://doi.org/10.4148/2378-5977.8570>
* Banks, J. Wyatt L.; Farney, Jaymelynn K.; Fike, Karol E.; and Warner, Jason M. (2024) "Effects of Supplementing Corn Silage to Fall-Calving Heifers and Cows Grazing Bermudagrass and Calf Performance and Physiology," Kansas Agricultural Experiment Station Research Reports: Vol. 10: Iss. 2. <https://doi.org/10.4148/2378-5977.8571>
* Farney, Jaymelynn K.; Rash, Kloey; Collins, Noelle; Black, Emily; and Gillespie, Hailey (2024) "Evaluation of Grazing Options During Summer for Growing Heifers – Year 3," Kansas Agricultural Experiment Station Research Reports: Vol. 10: Iss. 2. <https://doi.org/10.4148/2378-5977.8572>
* Farney, Jaymelynn K.; Rash, Kloey; Collins, Noelle; Black, Emily; and Gillespie, Hailey (2024) "Effect of Corn Type and Form of Supplement on Grazing Steers – Year 3," Kansas Agricultural Experiment Station Research Reports: Vol. 10: Iss. 2. <https://doi.org/10.4148/2378-5977.8573>
* Farney, Jaymelynn K.; Rash, Kloey; Gillespie, Hailey; Black, Emily; and Collins, Noelle (2024) "Stocker Steer Gains and Fly Numbers as Impacted by Burn Date and Type of Mineral on Tallgrass Native Range – Year 5," Kansas Agricultural Experiment Station Research Reports: Vol. 10: Iss. 2. <https://doi.org/10.4148/2378-5977.8574>

***Extension publications (peer-reviewed)***

***Workshops***

Andrea Basche presented the Kernza research by leading tours of the experiment at Eastern Nebraska Research, Extension and Education Center near Mead, Nebraska in June 2024 and July 2024. The June visitors included ~20 high school students from the STEM Odyssey Camp, led by Nebraska Extension. The July visitors included ~60 guests from NRCS-Nebraska Extension’s soil health training.

For the Cover Crop Initiative: Hosted field days in Lincoln/Rogers Memorial Farm (Sept 2024), and North Platte (August 2024). We also launched a workshop series in early October 2024 for NRCS field staff about common cover crop questions in Nebraska. Our first webinar was attended by approximately 100 participants, mostly Nebraska NRCS field staff but also a few participants from Nebraska extension.

***Multi-State Outreach Presentations***

1. . Dakota Alternative Beef Cow Symposium

This program was offered in two locations: 1. Huron, SD on February 6, 2024, with eight individuals attending, and 2. Jamestown, ND on February 7, 2024, with eighteen attending in person and twenty-three attending virtually. Presenters included **Zac Carlson**, formerly with NDSU, **Dan Shike** with University of Illinois, Kaylee Wheeler with SDSU Extension, and **Warren Rusche**, SDSU. Topics included feeding strategies to reduce forage use in cow-calf production systems, creep-feeding calves in confinement systems, alternative grazing strategies that increase adaptability, and trade-offs of alternative cow-calf systems compared to perennial pasture-based systems. Objectives address: 2 and 3.

1. KOMA Cattle Conference

Kansas, Oklahoma, Missouri, and Arkansas hosted a meeting series. The meeting was held in Oklahoma and Missouri in 2024 and will be hosted in Kansas and Arkansas in 2025. The format for the event included 15-minute presentations about research projects that were completed by faculty and their students at the 4 universities. Seven of the 15 presentations at the event were studies conducted as part of this multi-state group and covered topics in Objectives 1 and 2. One hundred and ninety people were in attendance. Videos of the presentations and proceedings reports are posted online.

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

1. https://agext-northdakotastate-ndus.nbsstore.net/dakotas-alternative-beef-cow-systems-symposium
2. https://www.komacattleconference.com/

**Funding (include grants and contracts)**

1. USDA Natural Resources Conservation Service. “Cover Crop Initiative: A collaborative project to advance knowledge and utilization of cover crops for conservation measures in Nebraska.” $1,049,500. Lead PI Andrea Basche. 2021-2025.
2. USDA National Institute of Food and Agriculture. "Developing and deploying a perennial grain crop enterprise to improve environmental quality and rural prosperity.” $10,000,000 total project funding; $246,000 to the University of Nebraska-Lincoln. Project Director: Jake Jungers, lead institution University of Minnesota. 2020-2025.
3. USDA National Institute of Food and Agriculture. “Catalyzing Cover Crop Advancement as a Climate-Smart Practice through a National Variety Improvement and Seed Production Program.” $10,000,000 total project funding; $512,000 to University of Nebraska-Lincoln. Project Director: Rob Myers, lead institution University of Missouri. 2023-2028.
4. USDA National Institute of Food and Agriculture. “A cover crop network for enhancing the sustainability of US cropping systems.” $10,000,000 total project funding; $370,607 to University of Nebraska-Lincoln. Project Director: Chris Reberg Horton and Steven Mirsky (USDA-ARS), lead institution NC State University. 2019-2024.
5. Iowa Beef Industry Council. Evaluation of high-moisture ear corn as a roughage source in finishing diets fed to beef steers. $93,431. Zach Smith, Warren Rusche, Ana Menezes. 2024-2025.
6. Iowa Beef Industry Council. Winter-feeding high forage vs. corn-based diets for pregnant beef cows: Impacts on offspring performance, milk production, and greenhouse gas emissions. $79,431. Ana Menezes, Hector Menendez III, Warren Rusche, Zach Smith. 2024-2025
7. Shike, D. W. and W.T. Meteer. 2023-2024. Evaluation of moderate and high roughage rations in a confinement cow-calf system. Illinois Beef Association $29,727.
8. Shike, D. W., A. Margenot, and W. T. Meteer. 2023-2025. Evaluation of grazing or harvesting cereal rye in corn-soybean rotation: understanding impacts in an integrated crop-beef cattle operation. $89,904.
9. Shike, D. W. and W. T. Meteer. 2024-2025. Evaluation of moderate and high roughage inclusion in a confinement cow-calf system (yr 2). Illinois Beef Association $25,899.