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Impacts of 40 Years of the Gudmundsen Sandhills Laboratory on Beef Cattle and Range Systems

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The University of Nebraska (UNL) Gudmundsen Sandhills Laboratory (GSL) is a 12,800-acre research ranch in the Nebraska Sandhills. In 1978, Elmer “Pete” and Abbie Gudmundsen gifted the former Rafter C Ranch to the University of Nebraska Foundation. Thus, 2018 was the 40th year of UNL oversight of GSL. To the credit of UNL Administration, GSL development for range livestock research was delegated to a team of Research and Extension Specialists chaired by Dr. Don Clanton. Other members of that original team were Jim Nichols, Range Science; Gene Deutscher, Reproductive Physiologist; Dick Clark, Agricultural Economist; and Ivan Rush, Beef Extension Specialist. This team configured the ranch to investigate production and management questions pertinent to the region.

Our objective of this paper is to briefly describe impact on beef and range management systems resulting from visionary development of a working research ranch in the Nebraska Sandhills by the University of Nebraska.

One of the most significant accomplishments at GSL has been the development and implementation over the years of a systems approach to research. An example is that early work was primarily conducted on components of production. As time progressed, it became clear that a systems approach from pre-breeding to harvest better identifies and describes the overall

impact on a ranch. A systems approach often changes the interpretation of results obtained from research dealing solely with segments of production systems.

Examples of the importance of considering the system, rather than individual components separately are the fetal programming work, calving date and weaning date systems, heifer development and grazing vs feeding harvested hay systems. The Nebraska Ranch Practicum is the education component to the systems work at GSL.

Some of the conclusions at the time of the research have changed as economics and deeper understanding of biological principles have evolved with time and further systems-based investigations. For example, market value of Sandhills pasture has increased at a greater rate than cost of feeding hay in the Sandhills. Therefore, this has changed the relationship between grazing and hay feeding in some situations.

Major evolution of impacts on beef and range systems from GSL are:

1. Development and implementation of a systems approach to research while training students in systems thinking.
2. Protein, rather than high levels of starch, is most always the preferred winter supplement for Sandhills forages.
3. Production systems using self-harvesting by grazing are typically most economical in Sandhills cow-calf systems.
4. June versus March calving for the Nebraska Sandhills beef systems best matches rangeland quality and quantity.
5. Validation of the NRC models for Nutrient Requirements of Beef Cattle in Sandhills systems.
6. Use of distiller's grains as supplements are used effectively to extend range capacity and provide a beneficial nutrient profile for gestating cows and yearlings when grazing cool-season meadow and upland range.
7. Time and type of supplementation affect prenatal fetal programming to impact changes in BCS, weight, carcass traits and cow productivity through epigenetic mechanisms.
8. Nebraska Ranch Practicum at GSL provides valuable, science-based, systems approach education to clientele in multiple states.
9. Heifer development systems are a key component of sustainable beef systems in the Nebraska Sandhills.
10. Proper sub-irrigated meadow management offers a key component to profitable forage management systems.

Summary and Implications

Gudmundsen Sandhills Laboratory has been, and will continue to be, a prized resource for training students, informing producers and exploring beef and range production systems. An example of this are the 105 articles that report research at GSL in Nebraska Beef Reports through 2018. We conclude that GSL provides an important resource for solving ranching problems in beef systems.