FOUR-STATE RUMINANT CONSORTIUM
Integrating Crop and Livestock Production with Annual Forages
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Introduction/Rationale
Agricultural (arable and grazable) land dominates the landscape in the targeted region of southeastern Montana, southwestern North Dakota, northwestern South Dakota and northeastern Wyoming. Appropriate integration of crop and livestock systems within this landscape can be a valuable tool in increasing rural economic development. Inclusion of feed and forage production in cropping rotations would provide flexibility in developing cropping systems to help enhance the general sustainability of the underlying ecosystem. Coupling this feed and forage production with resident and value-added ruminant livestock production offers a tremendous spring board for capturing the real value of agricultural production and stimulating additional economic development in the region in an environmentally friendly fashion. This project has eight separate efforts designed to address 4 separate objectives. The combination of traditional agronomic research coupled with nontraditional animal interfaces should provide the information necessary to successfully develop and implement truly integrate crop/livestock systems that are adaptable to the target region.

Research Objectives/Approach/Interim Results
Evaluate various annual systems of forage production (e.g. winter annuals, cool-season and warm-season). Basic experimental design is a randomized complete block. A split-plot arrangement of treatments was superimposed upon this basic design to accommodate a sampling date treatment in the winter and warm-season annual studies. Winter annual forage evaluations were not successful in either ND or WY in 2004. In MT, seeding legumes with either winter wheat or winter triticale did not improve forage yield over a sole cereal crop. The cool- and warm-season annual forage evaluations fared somewhat better. Cool-season trials were established in three locations (MT, ND and WY) with usable data being generated at the first two sites. Preliminary data from ND supports previous work in ND where oat tends to produce slightly more forage and have a lower crude protein concentration compared to barley. Nitrate concentration was also elevated in oat compared to barley forage. Preliminary cool-season data from MT suggests barley produces more forage than oat at that location. This supports previous work in MT, but contradicts ND results. Warm-season trials were established in two locations (ND and WY) with usable data being generated at the former site. Preliminary data suggests substantial differences in warm-season annual forage production. Granting the dry conditions, millet and safflower tended to be relatively productive particularly at a later sampling date.

Evaluate various nontraditional mechanisms of using this forage production in beef cow/calf operations. Two basic experiments are proposed. The first is to evaluate the effect of time after swathing on dry matter yield and forage quality of a swathed annual forage. The second was to evaluate swathed or baled annual forage (e.g. oat) and unharvested corn for maintaining beef cows during fall and winter. The swathed annual forage evaluations were not successful at either location (ND or WY). The swath and corn grazing evaluation was conducted in ND and, despite reduced forage production, cattle were

successfully managed on either swathed oat, standing corn or in drylot for approximately 8 weeks (mid October to mid December) in southwestern ND.

Characterize the economics of these systems/mechanisms. This research evaluates the economic impact of utilizing annual forages within a beef production system to extend the grazing season to January 1. Enterprise types evaluated were a livestock enterprise (LS) that converted perennial forage to annuals and a livestock enterprise with a separate crop enterprise (LC) that converted cropland to annual forage for livestock use. Four options were applied to each enterprise type, (1) the base system – i.e., no use of annual forages, (2) spring annuals for fall swath grazing, (3) standing corn for fall grazing, and (4) spring annuals for mechanically harvested forage. A dynamic, bio-economic computer model of range cow-calf production systems was used to simulate production systems (e.g., management, cattle performance, profitability) under average conditions. The range-based cow-calf enterprises were modeled to represent systems located in the generalized area of southwestern Montana, eastern North and South Dakota, and northeastern Wyoming characterized by historical cattle management data. Grazing management for both enterprise types incorporated crested wheatgrass pasture in spring, a rotational grazing strategy on native range in summer, and altai wildrye pasture in fall. In systems using annual forages, these forages were grazed or fed after fall grazing. Budgets were developed to track costs of implementing and maintaining the use of annual forages for each option in each enterprise type. Economic inputs were developed from 2004 prices. Currently, the collection of cattle and forage (quantity and quality) data from several projects is ongoing and will be completed after the 2005 growing season. Once the data is incorporated into the budgets, the different options will be analyzed.

Provide a platform from which to extend current and new knowledge regarding the effective use of annual forages produced in the region directly to producers and allied industries. Two producer demonstrations were conducted in ND both focusing on using swathed corn for late season grazing with beef cows. No forage field days were scheduled in 2004. The year was not the best for annual forage production and this probably related to a reduced interest in forage production-related field days.

Measurable Impacts and Potential Future Impacts The first year of the project was not very forgiving from an environmental standpoint. Widespread droughty conditions over most of the region made forage production tenuous at best at most locations. A lack of soil moisture, poor stand establishment and/or reduced forage production was ubiquitous across the region and was listed as the primary cause(s) of individual evaluation failure. Nonetheless, all participants are (eternally) optimistic that these problems will be avoided and a full complement of evaluations will be conducted in 2005.

Interest in annual forages appears to be increasing across the region and results from these studies are intended to help both livestock and crop producers observe and appreciate the potential for annual forages to provide the basis for increasing the economic and environmental sustainability of agriculture across the region.