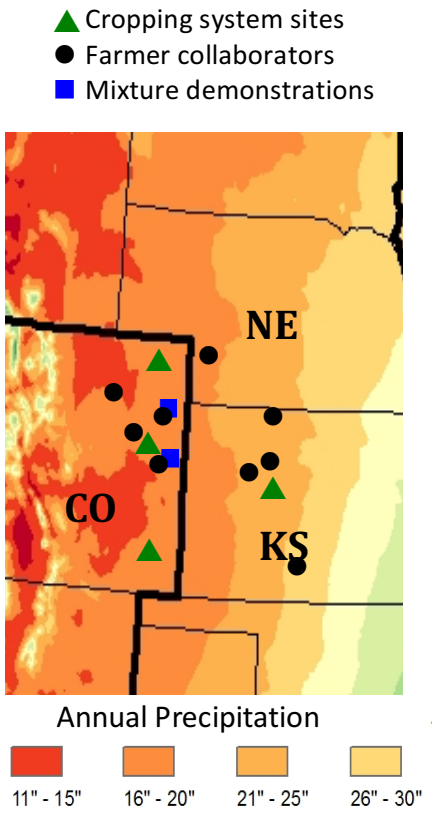
Evaluating Cover Crop and Forage Mixtures for Dryland Systems

Our long-term goal is to support producers in the High Plains to adopt management strategies that are profitable and build soil and ecosystem health.

Geographic location
We are focused on adaptation of conservation practices for the High Plains region that includes a 3-state area of eastern Colorado, western Nebraska, and western Kansas.



Spring planted mixtures
In March and April 2016 and 2017, collaborating producers planted a minimum of 40 acres with the same cover crop mixture. The mixtures were grazed, terminated, and then planted to winter wheat in the fall.

2016 spring mix
Total: 45 lbs/acre, est. cost ~$18/acre
5# spring peas
15# oats
15# forage barley
5# hay millet
2# rapeseed
1# flax
1# safflower
1# sunflower

2017 spring mix
Total: 41 lbs/acre, est. cost ~$18/acre
5# spring peas
10# oats
10# forage barley
10# triticale
2# rapeseed
1# flax
1# safflower
1# sunflower
1# purple top turnip

Within each field, we established 4 replicated blocks in each field. Within each grazing block, an ungrazed exclosure and a small 'fallow' area were fenced off (Figure 1). Fields were strip-grazed primarily in June and July. Stocking rates varied by field. Animals were weighed individually before and after grazing. Forage biomass was sampled at the end of grazing. Soils were sampled at cover crop termination after grazing and at fall wheat planting for moisture to 6 feet and bulk density in the top 2 inches. Soils will also be analyzed for active carbon and other biological soil health indicators.

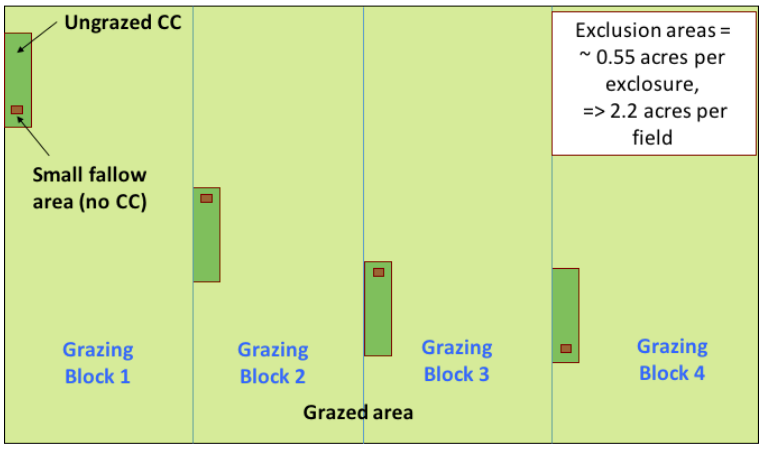


Figure 1. Example field layout with 4 grazing blocks, grazing exclosures, and areas with no cover crops.

Preliminary results from Year 1

From the first year of the study, the earlier planted and grazed fields generally had higher forage biomass, less weed pressure, and higher animal weight gains than later planted and grazed fields.

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Forage production

The planted mixtures contained eight species, however, not all species contributed equally to biomass production. The forage mixtures were primarily oat and barley, though the mixtures became more diverse with later planting and grazing dates. On average, the cover crops produced more than 2 tons/acre of dry matter (Figure 2). Due to regrowth and low stocking densities in some fields, forage biomass at the end of grazing was similar between grazed and ungrazed areas (Figure 2).

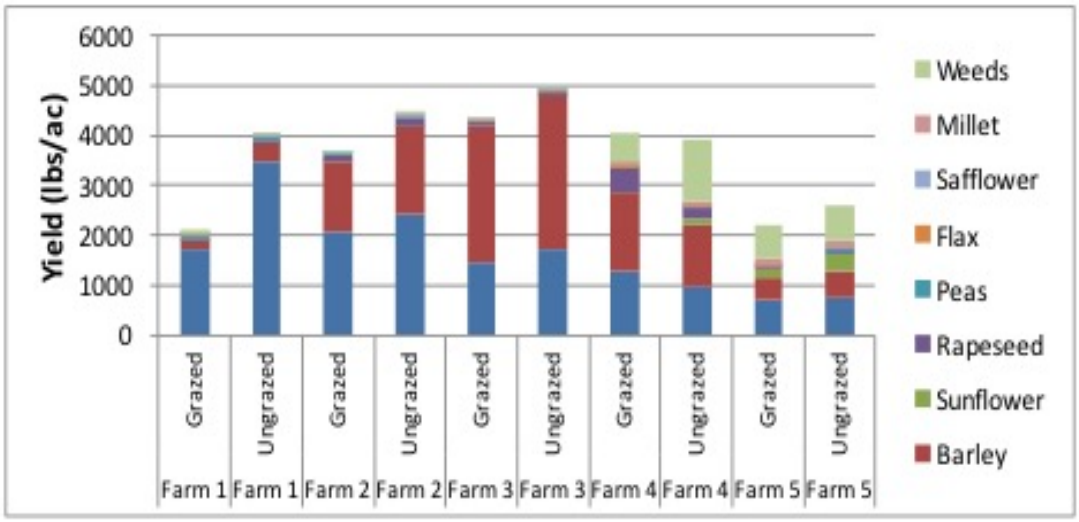

Figure 2. Forage and weed biomass of the grazed and ungrazed cover crops at the end of grazing for each field.

Animal performance

Stocking densities varied by field and ranged from 196 lbs/acre for the cow-calf pairs to 683 lbs/acre for steers (Figure 3). Animal weight gains averaged about 2 lbs/day (Figure 3), though there was high variability in conditions and stocking rates. Samples are still being processed to evaluate forage quality.

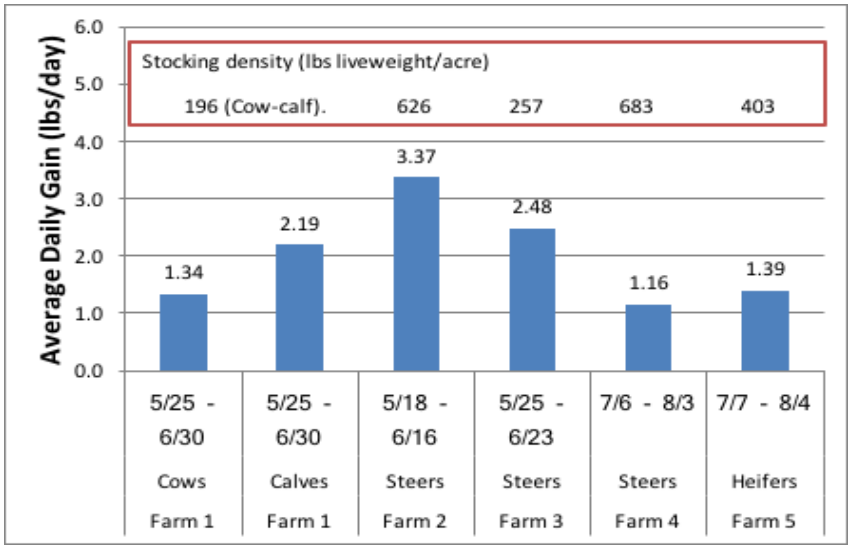

Figure 3. Average daily weight gain of cattle, stocking density, type of cattle, and grazing start and end dates for each farm field.

Soil moisture and bulk density

At fall wheat planting, soil moisture in grazed cover crop areas did not differ from fallow areas in the top 24 inches while fallow had higher soil moisture below 2 feet. We also measured bulk density as an indicator of soil compaction in the top 2 inches of the grazed, ungrazed and fallow areas. Grazed cover crop and fallowed areas had the same bulk density. Ungrazed cover crop areas had slightly lower bulk density.

Next steps: Post-wheat planted mixtures

A second planting window following wheat harvest will be evaluated in 2017-2018. In July and August 2017, collaborating producers are planting a cover crop mixture following wheat harvest. Cover crops will be grazed in late fall and/or early spring and then fields will be planted to a summer crop in 2018.

2017 post-wheat mix

1# radish, 0.5# rapeseed, 4# cowpea, 6# Austrian winterpea, 4# sorghum sudangrass, 2# millet, 3# sunflower, 20# triticale, and 0.2# Phacelia. Total: 41 lbs/ac, ~$23/acre.

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