SOUTH DAKOTA– Integrating Livestock in Annual Cropping Systems

Christopher Graham, South Dakota State University

Reintegration of livestock into annual cropping systems poses possibilities and new challenges. Where do livestock fit in an annual cropping system? What annual forages are profitable? How should forages be managed? And what are grazing effects on subsequent grain crops and soil health? Research at the SDSU West River Research Farm (Sturgis, SD) attempts to answer these questions with full-season annual cover crop mixes and grazing cattle through swath or standing biomass. This research compares grazing effects against a usual hay operation (sorghum x sudangrass) and an ungrazed cover crop. In the following season, spring wheat is sown across all treatments to examine potential knock-on effects livestock have on crop yield and soil function. Research is finishing its 2nd year of livestock integration. Figure 1 shows the measured biomass comparison between sorghum x sudangrass and a cover crop mix (sorghum x sudangrass, oats, field peas, radish, turnip). Both crops were planted mid-June and grazed early September. Cover crop mix yields were ~45% higher in 2020 when soil moisture was adequate. In 2021, drought was persistent, significantly reducing yields. RFV was similar across years averaging 120 for cover crop mix and 113 for sorghum x sudangrass. Protein content averaged 10.6% and 9.8% for cover crop and sorghum x sudangrass, respectively. Further, we are monitoring soil health indicators (e.g., soil carbon, respiration, soil enzymes, soil protein, microbial community) as well as major nutrients like N and P fluctuations between grazed and ungrazed plots. Wheat grown the year following grazing does not receive fertility, allowing us to make some estimate of the potential nutrient supply received from the grazing. This project will continue through 2023 for a total of 3 grazing cycles and 3 cropping seasons.

Figure 1. Dry weight forage yield for cover crop and sorghum x sudangrass in lbs/ac. Both crops were planted mid-June and biomass yield was sampled early September.