

Livestock Research Protocols

Improving Cool-Season Pastures with Interseeding Annuals and Grazing, Spring – Summer 2015

Objective: To experiment with seeding multi-species forages into existing pastures and monitor performance of livestock, forage and the soil.

Farmer-cooperator, Bruce Carney will:

- *Interseed warm and cool season seed mixtures into pastures; keep track of mixes, planting dates, acreage seeded and costs.*
- *Record plant diversity using transects; before seeding annuals and before grazing annuals.*
- *Take forage biomass samples prior to grazing pastures.*
- *Send in forage biomass for quality analysis.*
- *Record all pasture move dates and paddock sizes to estimate forage yield.*
- *Collect soil samples at least once every three years. Collect soil penetrometer resistance yearly.*
- *Submit all data on the data sheets provided.*

Measurements:

Transect setup

- Two permanent transects will be established in the pastures of interest. Transects are 100 ft long and the ends should be marked with permanent posts, stakes, or flags, so that observations can be taken from the same spot in subsequent seasons. Transects should be placed in areas that are representative of the pasture they lie in. If some pastures are being seeded with new forage species or are receiving different treatments, at least two transects should be set up and sampled in each pasture.

Plant diversity

- Plant diversity will be measured with the bead-and-string method. A long string or tape measure with beads or marks at every 6 inches is stretched across the transect. At each bead or point, note whether the bead is over bare ground, or a forage species (and note the species). Keep a tally of how many beads are on which species types.
- Plant diversity counts should be taken at least once each year at each transect, around the same time each year. Record all species observed, the relative proportions of each species in the total sward (either individual species, or % grass, legume, and weed), and the height and growth stage of each species.
- Photos of each quadrant or at least each transect help to track changes over time. Try and take photos from the same angle every time.

Biomass sampling and treatment cost

- Biomass samples should be taken before animals graze pastures, particularly the specially-treated or seeded ones. A forage square should be tossed randomly in a representative section of a field, shortly before animals graze. All forage inside the square should be clipped to one inch above the ground. Three or four samples should be taken from each field. Combine the three or four samples within a field, and allow to air-dry for four to five days. Weigh dry forage. Report the size of the square, the number of samples taken, and the dry forage weight.
- Note the expenses incurred in each treatment, as well as seeding application method for forages. Estimate the time and/or expense of the seeding as well as the cost of the seed itself.
- Biomass samples should be sent in for forage quality analysis prior to grazing. If interested, take forage samples of pasture before and after seeding annuals.

Pasture rotations and forage yield

- Forage yield of pastures will be estimated by recording paddock sizes, date of pasture moves, and number of animals on each paddock. By also monitoring animal weights (see below), we can interpolate the animal weights for that particular date and use that to calculate stock density. We will then use the assumed dry matter intake rate of 3% of body weight per day and a removal rate of 50%.
- If hay is harvested from any of the paddocks, the area harvested and number of bales will be recorded. Several representative bales should also be weighed to calculate an average bale weight.

Soil

- Take soil samples every three years. Soil cores are to be taken to at least a six-inch depth, but ideally to 36 inches deep, segmented as 0-6, 6-12, 12-24, and 24-36 inches. Soil can be sampled either intensively in a small area around the plant diversity transects, or extensively to represent the whole of each paddock. Sampling should be done at the same time of year each time; ideally in the fall when soil nutrients are fairly stable.
- Samples will be analyzed for concentration of organic matter, available phosphorus, exchangeable potassium, magnesium, calcium and hydrogen, soil pH, buffer index, cation exchange capacity, percent base saturation of cation elements, and several microminerals.
- Soil penetration resistance (compaction) may be evaluated with a penetrometer provided by PFI. Take readings at the same sites baseline testing was done previously. Record resistance every three inches to a depth of 24 inches. Take note of areas where a Yeoman's plow was used.

Practical Farmers of Iowa will:

- *Monitor progress of project and provide support when needed.*
- *Analyze the data, compile with past data and write an updated report.*
- *Publish results in a PFI research report, on PFI website and potentially other outlets.*
- *Pay the Farmer Cooperator a fee of \$550 at the conclusion of the project in 2015.*