The challenge with doing applied research is you cannot answer all of the questions that you may have in a single study without confounding the results. Often, after you begin a study, you realize there are things you should have done differently or that what you thought would be a result winds up being something totally different. Such is the case with the summer cover crop/winter pasture grazing study we wrapped up this year.

This study created a very large data set that we are currently working to get fully analyzed. When the results of the study are finalized, I will share them with you in Noble News and Views. For now, the following is a discussion based on our observations from the study that may lead to future work or provide food for thought for folks currently using cover crops or thinking about incorporating them in the future.

**SUMMER COVER CROPS AND TILLAGE STUDY**

The main objective of the study was to evaluate how the addition of a summer cover crop affects the subsequent winter pasture production in either a tillage or no-tillage system.

Let’s begin our discussion with the cover crop. We started with a diverse mixture of three types of millet, grazing corn, soybean, cowpea, buckwheat and sunn hemp. Out of this mixture only the pearl millet, cowpea and sunn hemp persisted and contributed to yield and grazing. After two years, we simplified the mixture to include pearl millet, cowpea and okra. Sunn hemp was performing well and providing a lot of biomass but was not contributing much to grazing, so it was replaced with okra. The okra has performed well, providing some grazing and a deep tap root.

Animal performance has been good on both mixtures, with cattle gaining close to 2 pounds per day.

Story continues on next page
KNOW YOUR ENVIRONMENT AND GOALS
It is important when choosing a summer cover crop to consider what crop will work in your environment, what the cost is and what you want the cover crop to do.

DEALING WITH WEEDS
Looking back, if we did not control volunteer plant growth with either tillage or herbicide, we would have had good volunteer ground cover during the summer. The problem is that volunteer ground cover may not always be desirable. In no-till, our volunteer cover crop was summer annual grasses that were grazeable. However, in the tillage system, our volunteer cover crop was pigweed. Though pigweed generally isn't desirable, it might raise an opportunity for multi-species grazing by adding goats to suppress the pigweed.

EVALUATING VERTICAL TILLAGE
Soil movement was a big issue in our tillage treatments. Our primary tillage tool was a heavy offset disk used two to three times behind the cover crop to get the ground ready for winter pasture or used several times in fallow areas during the summer in an attempt to keep pigweeds controlled. A way to describe an offset disk is a “big soil fluff-upper” that leaves the soil loose, fluffy and vulnerable to movement from wind and water. Several new tillage tools are now available that can create a seedbed without the extreme disturbance created by a disk. One such tool is the vertical tillage tool. While I am a strong advocate of no-till, it would be interesting to evaluate a vertical tillage instrument in future work.

ROLLER CRIMPER POSSIBILITIES
Another tool that has gotten a lot of interest in the world of cover crops is the roller crimper. The idea being that it can be used to terminate cover crops in no-till without using herbicides. A lot of the application for the roller crimper has been to terminate cool-season crops, such as annual rye. Evaluating roller crimper use for termination of summer annual crops and weed control in a system is on my research to-do list.

ROTATING COVER CROPS
Crop rotation is an often overlooked but valuable practice that we need additional data on in stocker cattle systems. In our study, we used wheat or triticale as our winter pasture and multispecies cover crops during the summer. In future work, evaluation of summer cover crop rotations and adding diversity to our winter pasture crop should be evaluated. Can short-lived perennials be incorporated into these systems in a cost effective manner? What kind of outside-the-box thinking should we be evaluating in traditional production systems?

GRAZING BETTER ON COVERS
This was a grazing study where we were using cattle to harvest the winter pasture and summer cover crops. In the winter pasture part of the system, cattle grazing went well with cattle going on in the fall and coming off in the spring. Summer cover crop grazing was challenging. The window of time is short in order to get a crop in and have it develop to the point that it can be grazed prior to planting the next winter pasture crop. This limited our grazing time to about 40 days on average. When we put the study together, we looked at a set of calves that would graze winter pasture before being sold then another set of calves that would graze the cover crops. Because of the limited grazing days on the cover crops, the calves did not have enough grazing time to pay for the cost of the cover crop. However, there are many more options of grazing that need to be evaluated. Instead of looking at the cover crop and winter pasture as two separate grazing systems, future work needs to focus on them as being one system. For example, millet and cowpea can produce a lot of forage from September to frost. Are there opportunities to receive cattle on a summer cover crop and graze until winter pasture becomes available? The same is true in the spring. Are there opportunities to finish cattle on summer cover crops or to continue growing stocker cattle past winter pasture graze-out?

We gained a tremendous amount of knowledge during the course of this study, but there is still a lot of work to be done and questions to be answered. Crop rotation, crop species, economics, grazing options and soil health all are just a few of the ongoing work here at Noble Research Institute.