Participants are asked to have at least three replications per trial and experimental design can be alternated between the treatment and the control across the field, or randomized. We need three replications to have enough data generated at each location for a robust data set where conclusions can be made in the shortest time possible. The coordinator will be there when the inputs are being applied and will mark the edges on a GPS and add flags for a physical marker of each plot in the field.

At harvest, there will be someone available to help with running a weigh wagon to get the weights from each plot. They will also collect a grain sample to test for quality including, protein, test weight and moisture. The flags are moved after the headland is harvested. Some of the trials planned for the 2017 season may not require a grain sample. Therefore, they can be weighed with a grain cart and a scale if the grower has one available.

Once harvest is complete, the data will be analyzed as quickly as possible and will be made available to the participants first. If the trial was replicated at least three times, the participant will get a check for $1500 as a reimbursement for their time and for the costs associated with any extra inputs.

The Network strives to develop applied research based on designs that fit within real-world constraints and acknowledges grower's demands and capabilities.

ANTICIPATED OUTCOMES
1.) Minnesota wheat growers will report finding significant financial value in the research reports produced because of on-farm research.
2.) The On-Farm Research Network will become a database of trusted local research for Northwest Minnesota.
3.) The research will facilitate changes for better stewardship.
4.) Growers who participate in Network activities will report gaining knowledge on how to conduct appropriate research on their own farm.

BACKGROUND
Seven years ago, wheat growers increased the wheat check-off in order to expand applied production wheat research in Minnesota. Over the past five years, research has been conducted by the Minnesota On-Farm Research Network.

Breakdown is as follows:
2012 - 15 growers participated in 23 trial locations focusing on ESN or coated slow-release urea and its effect on wheat yield and quality.

2013 - Only two growers participated in the ESN research because of the adverse spring planting conditions and no in-season trials.

2014 - A broader range of research projects was implemented. There were 15 growers involved with 18 different projects on both wheat and soybeans.

2015 - 21 growers worked on 11 different trials in both wheat and soybeans.

2016 - We narrowed up the projects in an effort to get more locations and more data to enable coming to a conclusion quicker. There were 20 growers with 27 trials, three of the trials were on ESN or N-serve, but the other 24 were divided into three main priority areas all with wheat.

NEED
- Because of the increasing diversity of agricultural products and practices, producers have difficulty knowing which ones consistently work best in their environments and yield the best financial paybacks over time.
- In many years, low protein wheat causes large economic losses for Minnesota wheat producers. Finding practical ways to increase wheat protein and/or quality, yet maintaining or increasing yields through nitrogen use efficiency is critical to increasing profitability.
- The Network has experienced tremendous growth and interest recently because it is hard to find unbiased, large-plot, local research. The growers are willing to do the work to get the answers as long as they have enough time. We try very hard to make the research run smoothly and efficiently for the ease of the participants.
- It can be discouraging for a grower to do their own research and know at the end of the day that they have to take their results cautiously because it is only one location. A network of growers and research experts " needs to exist to facilitate this process and build confidence in the research.
- Few if any, grower and research or extension partner ships exist that involves on-farm research and learning opportunities in Northwest Minnesota.

BENEFICIARIES
The intended direct beneficiaries are participants in the Network and wheat growers in Minnesota.

2017 RESEARCH PRIORITY AREAS
1.) **Topdressing with a Stabilized Application of 28% UAN at the Boot Growth Stage**
This will be the second year for this trial. Without reducing or providing excessive preplant nitrogen, there is no way for the majority of wheat producers to know if their wheat crop is short of nitrogen. Some growers use in-season soil and tissue sampling but this can be time consuming and expensive so growers have to make the decision whether or not to add more nitrogen with limited information.

Every year brings diverse growing conditions for producers to make the most of. This trial should be conducted for

as many years as warranted to understand when and in what environments, a supplemental application of nitrogen can produce positive economic results.

There is one new component to this procedure for 2017. We plan to add a nitrogen rich strip to as many of the locations as we can and have a drone with the appropriate sensor(s) fly the field to help the participant determine whether they will get a return on their fertilizer investment.

The use of drones could make the decision of adding nitrogen to a wheat crop a much easier one, once the research gives growers a clearer understanding of how this is accomplished.

Data that the coordinator will collect:
- Stand counts at the one to two leaf stage
- Rain data at the site
- Growth stage of the topdress application
    o The ideal timing is the boot stage with the head near the top of the plant but not out. Once there is a rain event in the forecast and your crop is jointing (you can feel nodes along the main stem) then you can stream on the fertilizer.
- Yield and grain quality data

To minimize burning on the leaves from the fertilizer we require everyone to use streaming nozzles. Last year, we were fortunate to get nozzles and nozzle bodies donated from TeeJet. Applying the nitrogen in the evening when conditions are cooler and when the wind is weak will also help to minimize leaf burn. Minimal nitrogen can be taken in through the leaves so timing the application close to a rain event gives a chance for the fertilizer to be moved into the soil and taken up by the roots. We also were fortunate to get a urease inhibitor donated so

that everyone can protect the urea portion of the 28% for about 12 days. The participant needs to make sure that the sprayer tank is clean and calibrated. The rate for the 28% UAN is 10 gallons per acre. The urease inhibitor rate may change with the brand being used. In 2016, the rate of the product we used was 1.5 quarts per 2000 pounds of 28% UAN.

2.) Seeding Rate Study
When a grower is trying a new variety on their farm, they have to trust whatever information they can find about how to manage the variety. The wheat breeders have told us they often get questions from growers on optimum seeding rate for various varieties. This is why we are focusing on seeding rate, both for recently released varieties and whichever ones are most popular in Northwest Minnesota at that time.

This will be the second year for this trial. The grower participants need to know the number of seeds per pound for the lot of seed they plan to use for the trial because it requires three seeding rates of 1, 1.5 and 2 million live seeds per acre. They need to be planted in wide enough strips in the field to fit the combine header down comfortably and for at least three replications. It is not required to randomize the rates but if the field has any topography, randomizing is important to try to control some variability.

Data that the plot coordinator will collect:
- Stand counts at the one to two leaf stage at least three times in each of the plots
- Head or spike counts
- Lodging, overall and the degree, taken just prior to harvest
    o Each treatment will be given a score between 1 and 9, 9 being completely flat.
- Yield and grain quality data