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Planning Grain Drying, Handling, and Storage Facilities

Here are some things to think about as you plan new or renovated grain handling facilities. Consider both your immediate needs and your long-term needs. Keep in mind that life expectancy is probably 5 to 10 years for fans and some types of conveyors, 10 to 20 years for dryers, and 15 to 30 years for storage bins.

Do you really need your own facility?

- Do you have a grain marketing plan and do you need a grain drying, handling, and storage facility to make that plan work?
- How far are you from the nearest commercial facility?
- Do you think you can dry and store grain at a lower cost than the commercial facility would charge?
- Are you a good storage manager and are you willing to bear the risk of possible quality loss in storage?
- Do you raise livestock? Are you planning to add or to drop livestock in the future? (Livestock production and the type of livestock raised can have a big impact on grain facility planning.)
- If you are a livestock feeder, is it important to use the grain that you produced on your farm? Would you get your own grain back from a commercial storage facility?
- If you're a livestock feeder, could you be using more forages, silage, or high-moisture grain and less dry grain?
- Would your marketing options be too limited if you used a commercial storage facility?
- How long would you have wait in line to unload grain at a commercial facility during the busy harvest season?
- Could you share drying and storage facilities with a neighbor or partner?
- How close are you to retirement? Would your investment in these facilities be valuable to the next generation that operates the farm?

Where should the drying, handling, and storage facility be located?

- Do you have a good, well-drained, accessible site that is somewhat protected from wind and snow? (High water tables can limit use of belowground pits.)
- Is there room for large vehicles to move through the facility without having to back up? (Semi-trailers need about a 55-ft turning radius.)
- Is there room for future expansion?
- Does it make sense to improve upon existing facilities, or would you be better off starting with a bare site? (Don't forget that existing bins can be moved and that concrete foundations are relatively cheap compared to the cost of ending up with a poorly laid out facility.)
- How close is the facility to your house or a neighbor's house? Would vehicle traffic, noise, dust, and chaff be a problem?

If the site you currently have in mind has some serious limitations (not enough space, drainage problems, too close to residences, too far from a good road, poor utility service), you might be better off starting over at a new site.

What total storage capacity and what size bins do you need?

- How many bushels per year are you storing now and how many are you likely to be storing in the future? Consider possible increases in both acreage and yield per acre.
- How many different crops or different varieties of crops that need to be separated are you growing now or will you be growing in the future? Consider the possibility that some day you might be growing varieties that have special characteristics (for example, high-oil, organically produced, or non-genetically modified) and need to be handled separately with their identity preserved.
- Are you willing to consider storing grain for neighbors, partners, or landlords?

Note that you have more marketing and storage flexibility, and probably lower risk of spoilage if you have a number of medium-sized bins rather than a few large ones.

What drying and grain receiving capacity do you need?

- How many total bushels of each crop will you be harvesting per year?
- What is your harvest capacity in bushels per hour and bushels per day now, and what is it likely to be in the future? (Many farmers have traded combines several times since they last upgraded their grain handling facilities and now their harvest capacity greatly exceeds their drying and handling capacity.)
- How many field working days can you count on for harvest? Consider precipitation, combine availability, days off, time needed for other farm operations.
- What size and how many vehicles do you use for hauling grain from the field?
- Are you willing to run the dryer more hours per day and more days per week than you run the combine? (If you install a large wet-holding bin, your dryer doesn't need to keep up with your

combine. If you choose in-storage drying, you can combine as fast as you want without worrying about the dryer keeping up.)

- What is your typical harvest moisture and how many points of moisture do you generally remove?
- For high-temperature drying systems, are you willing to consider unloading grain hot and cooling it in storage or in a cooling bin? (This can boost dryer capacity, improve grain quality, and save energy.)
- Are you interested in doing some custom drying for neighbors, partners, or landlords?

What type of dryer do you prefer?

- Is grain quality (for example, low stress cracks or high test weight) important to you or your buyer? (Natural-air drying provides much better grain quality than does high-temperature drying.)
- How expensive is electricity relative to gas on your farm? (Low electricity cost and high gas cost make natural-air drying more attractive, and high electricity cost and low gas cost make high-temperature drying more attractive.)
- Would electrical service to your farm need to be upgraded if you installed a number of large electric motors? (Work with your electric power supplier to see what it would cost to get three-phase power and larger transformers - if you need them.)
- Is it important to have all of your grain dry before winter? (With some in-storage drying systems, you might need to finish drying in spring.)
- Do you need to add drying and storage capacity, or just drying capacity? (In-storage drying is more feasible if you need to increase both drying and storage capacity.)

How much automation would you like to install?

- How much labor is available during harvest? What about five years from now?
- Do you have plenty of labor, or would you be better off spending more money on extra equipment and automatic controls to reduce labor requirements?
- Would you like to have your drying and handling system operate around the clock?

What kind of grain conveying equipment makes the most sense for your operation?

- Bucket elevators are convenient, handle grain gently, and provide high capacity with relatively low power requirements, but they can be quite expensive, they require careful bin layout, grain can be damaged from long drops, they require either a tower or guy wire support system, and once installed, they're hard to move.
- Pneumatic conveying systems have limited capacity and relatively high power requirements, and they can damage grain if they are not laid out and operated properly, but they are quite flexible and can be easily adapted to fit into existing systems.
- Augers can be hazardous and can cause grain damage if not operated carefully, but they are more flexible and less expensive than other types of conveyors. Newer, large-diameter augers have fairly high capacity.

- Large grain receiving pits are very convenient and allow for rapid grain unloading, but they can be expensive and difficult to install where water tables are high.
- Will you be producing a crop that must be handled separately and kept free of contamination from other crops (for example, non-genetically modified crops)? If so, it will be important to use pits, conveyors, and hopper bins that are self-cleaning or that can be easily cleaned when you switch crops.
- Will grain be hauled from the farm by semis or other large vehicles? If so, it might be important to design for high-speed load out to minimize the amount of time that it takes to fill vehicles.

Safety is an important consideration in planning grain, drying, and storage facilities.

- Consider installing stairs, rather than ladders on bins that are frequently climbed.
- Make sure vehicles can load and unload without having to back into position.
- Install plenty of lighting for night work.
- Try to avoid using equipment that has exposed, rotating power shafts.
- Bury powerlines, if possible.

Install equipment for monitoring and aerating stored grain.

- Install aeration equipment on all storage and wet-holding bins.
- Consider installing automatic controls on grain aeration equipment, but carefully evaluate the reliability and cost per bushel of controllers.
- Consider installing temperature cables that can be used to monitor grain temperature in storage bins.
- Provide a shed or trailer at the facility for moisture meters, grain probes, grain moisture and temperature records, and for workers to rest and escape the noise, dirt, and weather.

Before ordering equipment:

- Study references like Grain Drying, Handling, and Storage Handbook, MWPS-13.
- Visit several other systems and ask operators what they like about their facility and what they would do differently next time.
- Estimate cost per bushel to own and operate a grain drying, handling, and storage system and compare that cost with alternatives.