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water spouts

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Irrigation Workshops

- **Dec. 12, 2013 (Thursday)**
  Bismarck Ramkota Hotel

  This workshop is held in conjunction with the North Dakota Water Users Association's annual convention Dec. 11-12. The Missouri Slope Irrigation Development Association (MSIDA), NDSU Extension Service, North Dakota Irrigation Association and North Dakota Water Users Association are sponsors. The convention will include an irrigation exposition at which suppliers display their products and services.

- **Dec. 18 or 19, 2013**
  Ernie French Center,
  Williston Research Extension Center

  The specific date for this workshop has not been confirmed, but more information will be in the October issue of *Water Spouts*. The contact person is Chet Hill, (701) 774-4315, Chet.Hill@ndsu.edu.

NDSU EXTENSION SERVICE

County Commissions, NDSU and U.S. Department of Agriculture Cooperating. This publication will be made available in alternative formats for people with disabilities upon request, (701) 231-7881.

How to Estimate the Amount of Pumped Water

If you have an irrigation water permit, sometime this winter you will receive a notice from the North Dakota State Water Commission requesting a report of the amount of water you pumped for irrigation this past growing season. Here are three methods you can use to determine the volume of water pumped for irrigation, depending on your equipment.

1. **Do you have a working flow meter?**

   A working flow meter with a volume totalizer makes filling out the postcard easy to do. The volume totalizer is a counter similar to the odometer in a car. Some meters record the volume in hundreds or thousands of gallons.

   Determining which one usually is easy because the manufacturer will show zeros to the right of the counter. If the volume totalizer records hundreds of gallons; youwill see two extra zeros; if it records thousands of gallons, you will see three zeros.

   If you wrote down the numbers on the volume totalizer at the start of the season, then all you need do is read the meter again and subtract the numbers to obtain the volume pumped.

   You can report water use in gallons or acre-feet. Just remember, an acre-foot of water covers an acre 1 foot deep and is equal to 325,800 gallons. An acre-inch is equal to 27,150 gallons.

2. **Do you have an hour meter on a center pivot or pump?**

   For a center pivot system, you can calculate an estimate of the amount of water pumped using the hour meter in the pivot control panel. However, you need to have written down the hour-meter reading at the beginning of the growing season. Subtract the previous reading from the current reading to get the number of hours the pivot operated this year.

   You then need to know the approximate flow rate to your center pivot. This can be obtained from the center pivot sprinkler chart. Now that you know the flow rate, use the following formula to calculate the acre-feet of water that were pumped:

Volume pumped = (hours of operation) x (gallons per minute) / 5,430

For example, say your center pivot ran for 895 hours and the sprinkler flow rate is 800 gallons per minute. Then the volume pumped is approximately:

(895 x 800) / 5,430 = 131.9 acre-feet

You also can use this method if you have a diesel or gasoline engine with an hour meter or have an hour meter in the pump electrical control panel and know the average flow rate being pumped.

3. **No water or hour meter?**

   If this is the case, estimating the volume pumped will be difficult. However, for electrically driven water pumps, you can obtain an estimate of the number of hours of operation using the electric meter. Modern electric meters not only record the total energy use in kilowatt-hours (kwh) but also other parameters such as peak kwh and average kw use.

   You can estimate the total hours the pump was operated by dividing the total kwh used during the growing season by the average kw. The seasonal total and average electric draw for each meter can be obtained from your electrical supplier.

   For instance, say your pumping plant used a total of 43,937 kwh and the average pumping load was 43 kw. Dividing 43,937 kwh by 43 kw shows that the pump operated for 1,021.8 hours.

   Again, you need an estimate of the flow rate to calculate the total volume used. The calculated hours will be correct even if the electrical meter is recording the electricity used by the pump and a center pivot or if it is recording the electrical use of just the pump. The extra electrical load of the center pivot is recorded in the average draw and the total, so it doesn't affect the calculated hours of operation.

Estimating the volume of pumped water becomes very difficult when irrigation systems have one pump that supplies multiple pivots or multiple wells that supply a single pivot or multiple center pivots. If you have difficulty estimating pumped water volume, consider installing a flow meter, or if you have a center pivot, record the reading on the hour meter.

Other ways of estimating the volume of pumped water from electrical use are available, but they involve a few more calculations. Contact me if you have questions.

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Soybean Maturity, Moisture Variations May Pose Problems

Variations in soybean maturity and moisture in the field could create harvesting and storage challenges this year.

Field losses, splits and cracked seed coats increase as moisture content decreases. Shatter losses have been shown to increase significantly when seed moisture falls below 11 percent and when mature beans undergo multiple wetting and drying cycles.

Producers should try to harvest as much of their crop as possible before the moisture level falls below 11 percent. Producers will receive the best price for their soybeans when the moisture content is 13 percent. Prices will be discounted for beans at moisture contents exceeding about 13 percent, and beans are prone to storage problems at higher moisture contents.

Because harvest loss increases dramatically when the moisture content is below 11 percent, harvesting during high humidity or damp conditions may reduce shatter loss.

Unfortunately, little research has been conducted to examine if green soybeans will change color in storage. Limited studies indicate that green soybeans will tend to stay green in storage. They do not lose their internal green color, although the surface color may lighten or mottle somewhat after weeks or months in storage.

Field losses need to be balanced against the discounts for green seeds in determining when to harvest. Another possibility is harvesting some of the field and leaving the portion with the green soybeans unharvested.

Soybean moisture variation also may lead to storage and marketing losses. Operating an aeration fan will help move moisture from wet beans to drier beans. Air going past wet beans picks up moisture, and that moisture will transfer to drier beans as the air goes past them.

Moisture movement will be minimal without aeration airflow past the beans. Run the fan longer than is required to cool the grain to even out the moisture content. The moisture will not equalize, but it will become more uniform.

For more information, do an Internet search for NDSU soybean drying.

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Corn Harvest, Drying and Storage Could be a Challenge

Variability in moisture content and maturity will create corn drying and storage challenges this year.

Moisture availability can cause variations within regions and even within fields. Many fields have areas that are totally brown but also have areas that are still green and growing. In those green spots, test weights and moisture contents will be high, while in the brown spots, test weight will be lighter and moisture contents much lower.

Drought conditions stress the corn crop, leading to weak stalks and shanks. Weak stalks contribute to "downed" corn due to wind or other forces, and weak shanks contribute to "ear drop" and large field losses. Check the condition of the corn in the field and possibly harvest early to minimize losses even though areas of the field may be at higher moisture contents.

Drought conditions also lead to larger than normal in-field corn moisture content variations. Moisture content may range from 15 to 25 percent in the same field due to soil variations or other contributing factors.

Kernel moisture content, size and density or test weight likely will vary on an individual cob as well. Drought stress leads to small kernels on part of the cob and large kernels on other parts of the cob. Even the larger kernels may have a lower test weight due to the plant stress.

Corn moisture variation in a field means that adjusting the combine for conditions will be difficult, and that may contribute to more fines in the corn. Also, more fines are produced when corn is wet because more aggressive shelling is required, which causes more kernel cracking and breaking.

In addition, immature corn contains more small and shriveled kernels. Fines cause storage problems because they spoil faster than whole kernels, have high airflow resistance and accumulate in high concentrations under the fill hole unless a spreader or distributor is used. Preferably, the corn should be cleaned before binning to remove fine material, cob pieces and broken kernels.

Corn reaching maturity about Oct. 1 may be slow to dry due to cooler temperatures. Standing corn in the field may dry about 1.5 to 3 percentage points per week during October and 1 to 1.5 or less per week during November, assuming normal North Dakota weather conditions.

If corn has a moisture content of 35 percent on Oct. 1, it probably will dry to only about 25 percent moisture on Nov. 1, assuming normal North Dakota climatic conditions. Field drying normally is more economical until mid-October, and mechanical high-temperature drying normally is more economical after that.

If the moisture content varies in corn going into a high-temperature dryer, it also will vary coming out of the dryer. For example, if the moisture ranges from 15 to 25 percent going into the dryer, it may range from 11 to 19 percent coming out. More mixing in the dryer will help reduce the moisture variation coming from the dryer. This moisture variation will greatly affect storability and storage management.

Operating an aeration fan will help move moisture from wet to drier kernels. Air going past wet kernels picks up moisture, and that moisture will transfer to drier kernels as the air goes past them. Moisture movement will be minimal without aeration airflow past the kernels. Run the fan longer than is required to cool the grain to even out the moisture content. The moisture may not equalize, but it will become more uniform. For example, the moisture content still may range from 14 to more than 16 percent.

Corn above 21 percent moisture should not be dried using natural-air and low- temperature drying. Because the drying capacity is extremely poor at temperatures below 35 to 40 degrees, little drying may be possible during the fall using a natural-air system if the harvest is later in the fall.

Adding heat does not permit drying wetter corn and only slightly increases drying speed. The primary effect of adding heat is to reduce the corn moisture content. Turn fans off during extended rain, fog or snow to minimize the amount of moisture moved into the bin by the fan.

Using the maximum drying temperature that will not damage the corn increases the dryer capacity and reduces energy consumption of a high-temperature dryer. Be aware that excessively high drying temperatures may

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result in a lower final test weight and increased breakage susceptibility. In addition, as the drying temperature and time increase, high-moisture corn becomes more susceptible to browning.

Grain segregates based on size and density as it flows into a bin or container. Generally, the smaller and denser material will accumulate in the center and the larger material flows to the perimeter of the bin. Therefore, areas of wet corn and variations in test weight are possible in a bin. Using a distributor or "coring" the bin may reduce the accumulation of smaller material in the center of the bin.

The storage life of stressed, low-test-weight and immature corn is expected to be shorter than normal, so farmers need to be more diligent with drying and storage management. Also, corn with damage to the seed coat has a shorter storage life than mature, good-quality corn.

Dry low-test-weight and stressed corn a percentage point lower in moisture content than normal because of greater variations of moisture content in the grain mass and increased kernel damage and foreign material, which could magnify storage mold problems.

Therefore, cooling the grain in storage to about 20 to 25 degrees for winter storage in northern corn-growing regions and near freezing in warmer regions is more important than for mature, sound corn. Also check the stored grain more frequently and do not put immature or damaged corn in long-term storage.

Storage in a poly bag is a good temporary storage option, but it does not prevent mold growth or insect infestations. At moisture contents exceeding about 25 percent, ensiling may occur at temperatures above freezing and prevent the corn from being dried and sold in the general market.

Select an elevated, well-drained location for the storage bags, and run the bags north and south so solar heating is similar on both sides of the bags. Wildlife can puncture the bags, creating an entrance for moisture and releasing the grain smell, which attracts more wildlife. Monitor the grain temperature at several locations in the bags.

For more information, do an Internet search for NDSU corn drying.

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