The NEBLINE®

University of Nebraska Cooperative Extension in Lancaster County

"Helping Nebraskans enhance their lives through research-based education."

March 2005
Vol. XIX, No. 3

441-7180 • Web site: lancaster.unl.edu

In This Issue

SPECIAL INSERT: WEED AWARENESS

Prepared by the Lancaster County Weed Control Authority

Non-Profit Organization
U.S. Postage Paid
Permit No. 537
Lincoln, Nebraska

CHANGE SERVICE REQUESTED

Lancaster County 4-H Council
University of Nebraska
Cooperative Extension in Lancaster County
444 Cherrycreek Road • Suite A
Lincoln, Nebraska 68528-1507

Rising Energy Prices Cause Some Irrigators to Consider Changing Energy Source

Tom Dorn
Extension Educator

UNL Institute of Agriculture and Natural Resources

Extended drought across much of Nebraska in recent years, complicated by rapidly increasing energy prices, has put Nebraska's farmers in an economic squeeze. Some irrigators are exploring the economic feasibility of switching energy sources. A thorough economic comparison calculates fuel, operating and ownership costs.

Estimating Irrigation Fuel Cost Differences

The University of Nebraska Biological Systems Engineering Department has analyzed hundreds of pumping plant test results and developed the Nebraska Pumping Plant Performance Criteria (NPC) (see Table 1, page 11). This criteria indicates the useful work one should expect per unit for each of the energy sources used in irrigation.

Using the NPC, irrigators can estimate expected energy consumption for each alternative energy source whenever the lift, system pressure and pumping rate are known. Multiplying the estimated energy consumption by the fuel price provides an estimate of energy cost for each fuel source, thereby giving an indirect comparison of prices for alternative energy sources.

One can compute price factors using the NPC to compare each energy source to the others. For example, the expected work output per gallon of liquid propane (LP) is 6.89 while the work output of diesel is 12.5. For the energy cost to be equal between these two fuel sources, LP should be priced at 6.89/12.5 = 55.1% of the cost of diesel.

Table 2 (see page 11) presents equivalent price factors for the common irrigation energy sources. To compute equivalent energy prices for irrigation pumping, select an energy source on the left margin with a known price per unit (dollars per gallon, dollars per kWh). In that row, find the price factor in the cell under the second energy source. Multiply the known cost per unit of energy selected by the price factor to find equivalent energy price per unit for the second energy source. For example: If irrigation diesel is $1.60 per gallon, the price per gallon for LP that results in the same energy cost for pumping is $1.60 x 0.551= $0.88 per gallon. Interpretation: If LP can be purchased for less than $0.88 per gallon, the energy cost per hour is less for LP than diesel. If LP is higher than $0.88 per gallon, the energy cost is higher for LP than diesel at $1.60 per gallon.

Factoring Operating & Ownership Costs

Operating costs are dominated by the fuel cost component but repairs and labor costs are also a part of the operating costs. Ownership costs include: return on capital investment, taxes, insurance and depreciation.

The annualized cost of an irrigation system depends on the design. Different systems have different costs. For example, a center pivot sprinkler system likely will have a higher initial cost and a higher pumping cost per inch of water delivered to the field, than a gated pipe system. However, due to improved irrigation efficiencies, a center pivot system nearly always requires less total water pumped to meet crop needs and fewer labor hours to irrigate as compared to a gated pipe system. The question is, will the savings in inches of water pumped plus savings in labor offset the higher pumping cost per acre-inch (due to higher system pressure) and higher ownership costs of the center pivot versus the gated pipe system?

The energy source selected dictates the type of power unit needed. The purchase price and expected service life is quite different when comparing spark ignition and diesel engines. The lower purchase price, lower maintenance costs and longer service life for electric motors can be a big plus when considering switching to electric power. However, the cost of bringing in three-phase electrical power, annual hookup charges and potential for load control during peak electrical demand periods, must be considered as well.

"Irrigcost" Interactive Online Spreadsheet Can Help Compare Costs

To help irrigators estimate costs, I've developed a user-friendly, electronic spreadsheet in Microsoft Excel. "Irrigcost" helps compare different energy sources and computes estimated operating and ownership costs. Costs are presented as total annual cost (dollars per year), annual cost per acre and annual cost per acre-inch of water pumped.

This spreadsheet is available at no cost on the Lancaster County Extension Web site at lancaster.unl.edu/ag/crops/irrigate.htm#CPISC — look for the file named "Irrigcost.xls Notebook." You can download the file to your computer (downloading instructions are on the Web page) or you can run the worksheet as an interactive Web page in Microsoft Internet Explorer.

see IRRIGATION COSTS on page 11

Water Conservation Strategies

The drought has prompted a renewed interest in water conservation practices in crop production. University of Nebraska Cooperative Extension has extensive resources on these practices which can be accessed online at lancaster.unl.edu/ag or ianrhome.unl.edu/drought or at the Lancaster County Extension office.

No-Till Farming

There has been increased statewide interest in learning to use no-till farming methods which save both fuel and soil water. Extension has more than 75 educational publications on the topic.

Improved Irrigation Management

Many crop producers are *overwatering*. Proper irrigation management can maximize water and energy efficiencies. UNL Cooperative Extension's "Irrigation Management Home Study Course" can be ordered online at nerec.unl.edu/homestudy/irrigation/ihsindex.htm. Chapters include: measuring soil water, crop water use, irrigation efficiencies and scheduling irrigations.

Alternative Crops/Limited Irrigation

Aided by University of Nebraska research and extension personnel, some farmers in western Nebraska are planting alternative crops requiring less water.

Others are adopting strategies that produce optimum yields under limited irrigation. Recent studies in the Panhandle have demonstrated with proper management, it is possible to produce 80 percent of normal yield with only six inches of irrigation.

Extension Irrigation Engineer Dean Yonts, at the Panhandle Research & Extension Center near Scottsbluff, can be contacted at (308) 632-1238.