Computer Decision Aids for Estimating Machinery Ownership & Operating Costs

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The most accurate method of determining machine costs is using complete records of the actual costs incurred in a specific situation. Actual cost data are often incomplete or not available, however, a number of university extension services have free computer decision aids to help with estimating costs. Not all of these decision aids are the same, and it takes a certain amount of time and determination to download one of them and become familiar with it. This article will review several of these decision aids which might be useful to producers.

The first is by Dr. Ron Schuler, retired University of Wisconsin-Madison extension agricultural engineer. It can be downloaded from http://www.uwex.edu/ces/crops/uwforage/dec_soft.htm. The second is file A3-29, "Estimating Farm Machinery Costs" by Dr. William Edwards, Iowa State extension economist, on the ISU Ag Decision Maker website at http://www.extension.iastate.edu/agdm/crops/html/a3-29.html. These two spreadsheets were compared to a University of Minnesota spreadsheet available at http://www.apec.umn.edu/faculty/wlazarus/interests-farmmachinery.html. All three use similar cost formulas for straight-line depreciation, interest on average investment, fuel and lubrication based on engine horsepower, and labor at a specified wage. There are a few differences that show up if one enters the same inputs into each, however.

One feature of the Wisconsin spreadsheet that may be appealing to a forage producer is an input line for the number of times the operation will cover the field each year, such as when several cuttings are taken from an alfalfa field. The costs are calculated both per acre and per time over the field, as well as per hour. Another feature of this spreadsheet is a "timeliness" cost which attempts to estimate the loss in crop yield and/or value if the operation is not done on the optimal date. The timeliness cost is calculated based on the crop yield, price, hours per day, and coefficients suggested by the American Society of Agricultural and Biological Engineers (ASABE) for different operations. Timeliness costs are useful when comparing machines of different capacities, such as a four-row chopper vs. a six-row. A producer would need to review the timeliness cost estimates carefully to see if values accurately reflect the weather probabilities and crop quantity and quality reductions expected.

The Iowa State spreadsheet is simple and nicely organized. Forage producers with large operations may appreciate the fact that self-propelled forage harvesters, windrowers, and sprayers are provided as power unit choices along with tractors, combines, and skid-steer loaders.

All of the spreadsheets include formulas for estimating repair costs and trade-in values. In general, there is a lack of recent data with which to validate the repair cost functions, as was discussed in last month's Forage Focus Equipment article. One such attempt at validating the repair cost functions is a combine repair cost survey that Dr. Edwards completed in Iowa in 2007. Dr. Edwards summarized the results in information file A3-16, at http://www.extension.iastate.edu/agdm/crops/pdf/a3-16.pdf. The research indicated that reported combine repair costs were lower than the ASABE formulas predicted.

Although the University of Minnesota spreadsheet is similar to the others, it includes two side-by-side copies of inputs and results. This makes it easier to do a side-by-side comparison of two scenarios, such as comparing costs of a self-propelled chopper with a corn silage head vs. a haylage windrow pickup head.

ASABE gives two separate formulas, one for two-wheel-drive tractors and another for four-wheel-drive tractors. Four-wheel-drive tractors are more expensive and the four-wheel-drive formula calculates repair costs that are half (as a percentage of purchase price) of the cost for two-wheel-drive models. When one thinks of a four-wheel-drive tractor, the large models with all four wheels the same size come to mind. But it has been unclear about which formula to use for the mechanical-front-wheel-drive (MFWD) tractors that are popular today (smaller front wheels than rear wheels). To address this, a third formula was added for MFWD models, with a coefficient that should calculate a cost that is halfway between the ASABE two-wheel and four-wheel-drive formulas.

The University of Illinois Farmdoc website also has a set of spreadsheet decision aids called FAST. A machinery economics spreadsheet is included at http://www.farmdoc.uiuc.edu/pubs/FASTtool.asp?category=farm. One feature of this spreadsheet is a description of workday probabilities available over a range of dates, with a calculation of the probability of getting a particular operation done during a specified time period. The probabilities are specific to Illinois, however. The choice of operations for analysis includes tillage, planting, crop maintenance, and combining, but not forage equipment, which limits its usefulness for forage growers.

Reviewed decision aids were done in Microsoft Excel. For those without Excel, a program can be downloaded from http://aede.osu.edu/programs/FarmManagement/Budgets/download.htm#MachCosts (a user guide is also available). A quick comparison of this site to the Minnesota site produced similar results.