

## **POTENTIAL USES OF UW-FARM (UW-FARM VERSION 1.0b)**

S.M. Combs and S.M. Lindsey<sup>1/</sup>

UW-FARM (Field nutrient Application and Recommendation Manager) is designed to identify acceptable strategies for managing on-farm and purchased nutrients in both a profitable and environmentally responsible manner. The program relies on soil test results consistent with Wisconsin Soil Test Recommendations for Field, Vegetable and Fruit Crops (UWEX A2809) to maximize optimum use of nutrients and restricts nutrient/manure applications in environmentally sensitive areas consistent with best management practices and NRCS-590 (USDA-Natural Resources Conservation Services-Wisconsin, 1993).

UW-FARM can be used for asking “what if” for many aspects of manure management and crop production. For example, most dairy farms in Wisconsin continue to produce their own feed and recycle manure for crop use. However, remaining economically viable means increasing herd size or modernizing their operations (Jackson-Smith and Powell, 2000). It has become more common that environmental aspects of farming be considered prior to implementing expansion or other “modernization” practices because of the increase in local and federal regulatory oversight of farming practices. UW-FARM can be used in a “what if” mode when producers are considering implementing expansion or other modernization practices. Assessing the impact on meeting current best management practices and NRCS-590 prior to actual expansion will allow producers to meet environmental constraints in a proactive manner.

### **Program Highlights**

The program consists of a series of screens asking the user for specific information about individual field and farm management. Much of the required information in UW-FARM reflects that needed for field soil test recommendations from Wisconsin FSA certified soil testing labs. All initial farm and field information and soil test results can be electronically transferred from the UW Soil and Plant Analysis Lab to UW-FARM.

UW-FARM includes an option for considering manure quantity and nutrient value from two animal species or manure storage options within one plan. Estimated total weight of manure to be hauled annually is determined for each system. Total manure quantity for the farm is expressed on a nutrient basis to account for different manure densities and nutrient values between animals/storage options. Each field to receive

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<sup>1/</sup> Outreach Program Manager and Information Processing Consultant, Soil and Plant Analysis Laboratory, UW-Madison, with contributions from D.A. Johnson and S.W. Bullington.

manure requires selecting a spreader (i.e., box-end or tank) in order to have appropriate loads per field and ground speed estimates calculated. Fields considered for manure application are chosen based on crop rotation, soil test P and slope.

Ground speed to drive in order to deliver recommended manure application rates is estimated by actual equipment data or default values. This option is currently limited to box-end and tank spreaders having an easily defined spread pattern. Default values are based on a 4-minute unload time (medium apron chain setting for a box-end spreader) and an 8-foot spread pattern. Different spread patterns and unload times can be entered to refine speed estimates for individual equipment.

An overall nutrient management plan based on nitrogen or phosphorus is available that identifies the user selected fields, recommended crop nutrient needs, nutrient credits, manure application rates and remaining unmet nutrient needs. Fields planned for manure application and fields requiring additional fertilizer nutrients are summarized on separate pages. This option allows advisors to offer clients concise, easy to read mini-plans. The field manure summary identifies loads of manure per field and ground speed appropriate to deliver the planned application rate for only those fields planned to receive manure. The field fertilizer summary identifies only those fields where fertilizer nutrients are needed, because either no manure will be applied or manure nutrients will not meet expected crop needs. The amounts suggested represent a 'group' rate — fields within  $\pm 20$  lb N, 15 lb  $P_2O_5$ , and 40 lb  $K_2O$  are combined and a rate suggested for the 'group' to better match equipment capabilities.

The economic section includes an option for determining the value of a spreader load of manure (assuming N,  $P_2O_5$ , and  $K_2O$  have full value), a per field value of manure nutrients spread (assuming N,  $P_2O_5$ , and  $K_2O$  have value only if recommended), and plan value (based on per field nutrient needs). Typical costs for common fertilizer separates are used as the reference but other materials and corresponding actual costs can be substituted.

### System Requirements

UW-FARM runs on all versions of Microsoft Windows beyond version 3.x. Internet Explorer 4.01 (SP2) or later must be installed, all other necessary components are supplied with the setup program. For further information on program updates, see web site at: <http://uwlab.soils.wisc.edu>.

### Evaluating Expansion and Modernization Plans

Industry professionals and producers who are considering modernizing their dairy operations can use UW-FARM to identify potential agronomic and regulatory impacts associated with the changes. Some modernization choices include herd expansion, changes in crop rotation and feeding practices. Information from 302 of 694 Wisconsin dairy herds that expanded at least 40% between 1994 and 1998 showed most producers were in the expansion process with a long-term goal of over 450 cows (Bewley et al. 2001). Many had more than doubled their cow numbers during the 5-yr study period. UW-FARM can be used to assess how herd expansion will increase manure production and evaluate potential

environmental constraints.

Increasing cow numbers increases the need for dry matter, either grown on the farm or imported from off-farm. Producers may opt to grow less alfalfa and more corn for silage when acreage is limited because greater tonnage can be realized from corn silage. The change in both nutrient recommendations and greater potential acreage for nitrogen-based manure application as a result of the substitution of a high nitrogen requiring crop (corn) for alfalfa can be determined by UW-FARM either on a per field or per plan basis.

Another modernization practice considered by highly skilled dairy managers is limiting 'excess' feeding of supplemental phosphorus. According to on-farm interviews, producers from the top Wisconsin dairy counties using computerized ration balancing were feeding phosphorus in excess of published dietary guidelines (Jackson-Smith and Powell, 2000). Satter and Wu (1999) identified a positive relationship between fecal and dietary phosphorus. Fecal phosphorus levels decreased roughly 0.32% for every 0.1% decrease in supplemental phosphorus fed with no change in milk production until below current dietary guidelines. The decrease in manure phosphorus content from reducing 'excess' supplemental feeding and its effect on total manure quantity/field distribution can be determined by UW-FARM.

### Summary

UW-FARM has the capability to quickly and realistically determine outcomes from several modernization options. These assessments can then be evaluated with respect to agronomic practices needed to meet current or anticipated future environmental constraints. Recognizing these outcomes prior to implementing modernization options means the producer can proactively minimize the effect these constraints may pose later on.

### References

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