

## **The Vermont Dairy Farm Sustainability Project: Reducing Environmental Risk While Maintaining Profitability**

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Nutrient management and environmental resource concerns have become hot topics in agricultural regions like Vermont. Water quality of lakes and streams is becoming more of a public concern and the focus to clean up or maintain clean water is increasingly aimed at agricultural operations. This is in part due to large amounts of nutrients from animal manure and fertilizer in concentrated areas within local watersheds. Research has shown that 60 to 80% of the nitrogen and phosphorus brought onto a typical Northeast dairy farm in feed and fertilizer remains on the farm. This nutrient build-up increases the risk of runoff and leaching losses that can adversely impact water quality.

With mounting pressure on farmers to be good land stewards and with historically low milk prices, Ben & Jerry's Homemade, Inc. set out to improve nutrient management on dairy farms supplying milk for their ice cream operation by forming the Vermont Dairy Farm Sustainability Project (VDFSP). This unique collaborative involved dairy farmers, a dairy cooperative, feed and fertilizer dealers, crop consultants, and university extension faculty. According to project coordinator Greg Weber the intent of the project was "to involve all dairy industry stakeholders in making direct impacts to improve water quality while maintaining or increasing farm profitability". Major players, in addition to Ben and Jerry's and cooperating farmers, were Poulin Grain, St. Alban's Coop, Bourdeau Brothers of Middlebury, and the University of Vermont.

Eight dairy farms, seven in Vermont and one in New York, were identified and became cooperators in the project. Baseline data was collected from each farm for one year in order to estimate whole-farm nutrient balance and develop farm-specific recommendations. Data collected or measured included manure analysis, soil tests, crop yields, manure and fertilizer application rates, feed intakes, forage tests, and milk production and quality. The data was entered into software programs for crop management (Vermont CropMD or, in one case, a proprietary program NNYCMA.) and dairy ration evaluation (Cornell Net Carbohydrate and Protein System, CNCPS). VDFSP professionals developed nutrient management improvement plans, in conjunction with consultants and farm suppliers, which were presented to each farmer for review and finalization. These farm-specific plans identified opportunities for improvement in both crop and feed components of each operation and formed the basis of the next years evaluation phase.

Several areas for improvement were common to most farms. On the cropping side of the operations, application of nutrients in excess of crop need on many fields and large field-to-field variability in soil test levels indicated a need to improve allocation of manure and fertilizer nutrients. In some cases, starter fertilizer was being applied to corn at excessive rates. Few farms used the Pre-sidedress Nitrate Soil Test (PSNT), a valuable tool to assure that N supply from manure and fertilizer is adequate but not excessive for corn production. On the animal side there were opportunities to improve nutrient efficiencies in the feed program. In some cases, the potential existed to reduce imported phosphorus sources; in other cases, increased precision in ration formulation could allow for increased efficiency of nitrogen utilization.

The data collected during the second year, after nutrient management plans were implemented, showed improved nutrient balances while sustaining or enhancing farm profits. One area was fertilizer use, which represents the greatest import of nutrients aside from feed. For example, two of the farms decreased annual imports of P<sub>2</sub>O<sub>5</sub> by four and nine tons, respectively, by reducing starter fertilizer rate, resulting in savings of over \$4000 per farm. Reductions in dietary P led to improved feed P conversion efficiency (percent of intake nutrient converted to product nutrient) for 6 of 7 dairy farms without negatively affecting milk production. Ruminant N Balance and P Intake (% of required) were improved on all farms, with the exception of one farm that was already feeding P at 100% of the requirement.

The overall whole farm conversion efficiency showed that 7 of 8 farms had made improvements in phosphorus, meaning that there was less P build-up and potentially lower risk of runoff loss. Five of 8 farms improved in nitrogen conversion efficiency. Nitrogen is more difficult to manage, as milk production is more sensitive to changes in N in the ration and thus feeding some excess may be considered necessary to maintain production and animal health. Furthermore, manure sources can have significant losses of N through volatilization if handled inefficiently.

Farms in the VDFSP made significant changes to improve farm nutrient efficiency. However, it is important to recognize that, in doing so, they were sometimes reducing excess nutrient levels for crop production or animal feeding that some consider a safety margin to compensate for inherent variability and possible errors. Fine tuning feed and fertilizer inputs requires increased precision and consistency in measuring nutrient levels in soil, manure, forage, feed concentrates, etc. More care is required in operations such as ration formulation and mixing and fertilizer application. Keeping accurate records becomes more critical. And maintaining good, stable relationships between the farmer and the suppliers of inputs is essential for making reliable risk assessments and decisions. Moving towards better nutrient balance and sustainability depends on improved management on the part of both farmers and suppliers to deal successfully with any potential risk. The community as a whole must be aware and appreciative of a farmer's decision to take a risk in the name of environmental stewardship. Weber states that, "The public and farmers have a responsibility to promote an atmosphere of understanding and cooperation in addressing issues of dairy farm sustainability. In particular, the public should understand the direct benefits they receive from efficient agricultural production and the production challenges farms face in a market economy."

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*For more information about the VDFSP see project Web page at:  
<http://pss.uvm.edu/vtcrops/?Page=vdfsp/VDFSP2.html>*