

# Nutrient Management: Planning for Dairy, Livestock and Equine Operations

## Introduction:

Whether sourced from fertilizer or from organic amendments such as manure or compost, soil nutrients are an essential crop input and a major cost for production. On a typical livestock farm nutrients cycle from the soil, to the crops, to the animals and then finally back to the soil as manure.

Nutrient cycling on most farms does not form a closed loop and farmers often purchase off-farm nutrients to compensate for those lost in various ways to the environment. Farmers may also unknowingly apply nutrients in excess of recommended rates. For example, some farmers may apply commercial fertilizers without giving proper credit to the nutritive value of their manure. This can harm crop production, incur additional costs, and jeopardize soil and water quality. Similarly, the application of too few nutrients can sacrifice yield, quality, and profits.

## Nutrient Management Planning:

Planning for proper soil nutrient management helps ensure that a system is both economically efficient and environmentally sound. Developing a nutrient management plan is a complex task and requires collecting information about current and past farm management practices as well as understanding the resources available to the farm. The fundamental steps in developing a nutrient management plan include:

1. Nutrient inventory, including: nutrient status of soil, nutrient content in manure, nitrogen fixation by legumes, and nutrient availability from cover crops and/or previous crops.

A soil fertility test evaluates the nutrient-supplying power of soil. The results of the test are used to predict if fertilizer is required and how much is needed for optimum plant growth. More information on soil sampling for meaningful results can be found at:

<http://extension.umass.edu/cdle/fact-sheets/sampling-soils-meaningful-results>

2. Crop nutrient requirements based on: type of plant, yield expectation, and nutrient removal by crop.

The exact amount of fertilizer required for optimum plant growth and yield varies with potential yield and nutrient removal by plant species; however, information on nutrient removal alone is not adequate for making fertility recommendations because it does not take into account the ability of soil to retain and supply nutrients.

It can; however, show variations in nutrient needs among different crops. In addition, it can indicate the rates at which reserves of soil nutrients will be depleted.

3. History of cropping management, including: crop rotation, past manure application, and cover crop.

Approximately three-fourths of the nutrients consumed by livestock from forage and from purchased feed and supplements can be recycled back to crop fields in manure. Thus animal manure is an excellent source of nutrients for crops including forages. Manure nutrient concentration can vary significantly among different farms based on animal species, size and number of housed animals, feed ration, manure handling, and manure application method. Nutrient credits should also be considered when legume cover crops were grown or if the previous crop in rotation was a legume.

4. Information about type and number of animals, manure storage capacity, and spreader capacity.

Information about animal manure inventory, manure storage, and manure spreader capacity and calibration can be found at: <http://extension.umass.edu/cdle/fact-sheets>

5. Environmental risk assessment for individual fields which requires information about soil, topography, flooding frequency, as well as current cropping management.

Due to the complexity of the calculations and vast knowledge that nutrient management planning requires, computer software is often used to aid in decision making. Programs can calculate manure and/or fertilizer rates to meet nutrient needs. Software can also help identify when fields are receiving excessive nutrients.

## Resources:

Agronomy fact sheets. Cornell University nutrient management spear program.  
[nmsp.cals.cornell.edu/guidelines/factsheets.html](http://nmsp.cals.cornell.edu/guidelines/factsheets.html)

Nutrient recommendation for field crops in Vermont. University of Vermont Extension.  
[pss.uvm.edu/vtcrops/articles/VT\\_Nutrient\\_rec\\_field\\_crops\\_1390.pdf](http://pss.uvm.edu/vtcrops/articles/VT_Nutrient_rec_field_crops_1390.pdf)

The Agronomic Guide 2013-2014. College of Agricultural Sciences, Penn State.  
[extension.psu.edu/agronomy\\_guide](http://extension.psu.edu/agronomy_guide)

For more information visit:  
<http://extension.umass.edu/cdle>

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