

CROP NUTRITION

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These guidelines can help you to make the most of your herd's manure and save money on N while you're at it

10 tips to manage manure on alfalfa-grass fields

Are alfalfa-grass fields a good place to apply manure? Technically speaking, the alfalfa component of the stand doesn't need added nitrogen (N) from the manure. The crop typically meets its N requirements through biological N-fixation, if conditions are satisfactory.

That doesn't mean dairy producers must stop applying manure to alfalfa-grass stands. To provide you with sound guidelines on how to make the most of manure N on alfalfa-grass, we dug into U.S. research conducted over the last 50 years or so. Here's what we found:

1. Pure alfalfa and alfalfa-grass mixes are an acceptable place for manure applications, assuming odor is controlled, for these reasons:

- Established alfalfa has a deeper rooting system compared to grasses and corn.
- It has relatively high phosphorus (P) and potassium (K) demand.
- Alfalfa has the ability to reduce N-fixation when N is readily available.

2. Manure application favors grass over alfalfa. When prioritizing fields for manure application, established stands with more than 50% grass can better use the manure N than stands with higher proportions of alfalfa. Older stands are better choices than younger ones because grass content is often higher and alfalfa may be weakening. In fields with a greater proportion of grass, increased traffic is potentially less troublesome.

3. Test soils for P, K and other nutrients at least once every three years to determine P and K needs.

Phosphorus needs in the seeding year for soils with a Cornell Morgan P test greater than 80 pounds per acre P can be met with banded fertilizer or spring-applied manure. Depending on the manure analysis, limit rates to 3,000 to 4,000 gallons per acre.

Applying manure at modest rates can reduce N loss in the seeding year as very little N uptake occurs in the first four to six weeks after germination. Manure isn't best used in fields where soil test

P and K levels are well into the very high range.

4. Under good management and soil conditions, applying pre-plant N either through manure or fertilizer to a new alfalfa or alfalfa-grass seeding won't increase yield and may negatively impact N-fixation.

5. Spring small-grain companion crops, such as oats, spring barley or triticale, harvested for silage or grain require N for optimal establishment and growth.

In these seedings, limit fertilizer N applications to 60 to 80 pounds per acre for agronomic returns. If using manure to meet the N needs of companion crops, keep rates below 6,000 to 8,000 gallons per acre, depending on the manure's N content and handling. This helps avoid lodging of the companion crop and N loss to the environment.

Also, removing the small grain for silage reduces the impact of competition on the new seeding. New

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FYI

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■ For more information, see "Manure Use for Alfalfa-Grass Production" by Quirine M. Ketterings, Jerry H. Cherney, Karl J. Czymmek, Erica Frenay, Stuart D. Klausner, Larry E. Chase and Ynte H. Schukken. The Department of Animal Science Mimeo 231/Department of Crop and Soil Sciences Extension Series E08-3 is downloadable from the Nutrient Management Spear Program website: <http://nmsp.css.cornell.edu/publications/articles/extension/Manureandalfalfa.pdf>. The sections on manure application to established alfalfa-grass stands were published in *Forage and Grazinglands*, a journal of the Plant Management Network, and are printed with permission of that group.

Website: www.plantmanagementnetwork.org

Potassium management makes good crop sense *continued from page 22*

past two years. The 420 pounds of potash equated to expected crop removal. (Table 2)

When we add the yields of the past two years, we see no significant response to this extra potash. Though there is a trend to slightly higher yield in the highly fertilized plots, it's nowhere near enough to pay for the potash at current prices. The overall yields in the K fertilized plots may start to pull away from the others in 2009, but the yield differences seen in 2008 don't yet justify the extra K.

How can the lack of an economic response to K on non-manured fields be explained? Where is this potassium coming from? We believe the key is in New York soils – most of them have a fairly high potassium-supplying capacity because of the type and amount of clay present.

Looking ahead

Based on our results, we want to test the current Cornell K guidance on more dairy farms. While we seek funding for this research, we'll conduct limited studies in New York this year.

One thing we know for sure: Dairy farm fields where manure is

Table 2. Alfalfa/grass yields in tons dry matter per acre

Year	Cut	K applied in spring (lbs. 0-0-60 per acre)				
		0	140	280	420	560
2007	Total	2.84 a	2.63 a	2.62 a	2.56 a	2.61 a
2008	Total	6.28 a	5.86 b	6.46 ab	6.74 ab	6.95 a
07+08	Total	9.12 a	8.49 a	9.12 a	9.31 a	9.60 a

Where yields are followed by the same letter (a, b) within a year (so comparing the manure, compost and fertilizer N treatments within a year), we are 95% certain that any slight yield differences are not caused by the treatment.

the main N source during the corn portion of a rotation should be in very good shape for potash going into hay.

Here's our recommended strategy:

- Use the Cornell soil test to determine K requirements before establishing new seedings.
- If you plan to apply extra potash to hayfields with a manure history, consider leaving untreated check strips to begin building some observations on your dairy.

If you're a New York producer and would like to work with us as we expand testing on potassium, let us know. Watch future issues of *Eastern DairyBusiness* for updates on this project. □

Getting a good read on P *continued from page 21*

stances, reliability dropped off quickly when fewer than three soil cores per acre were collected. In two scenarios – sampling too close to manure application and sampling in July instead of after harvest – collecting one soil core per acre gave a 40 to 50% chance that the field average soil test result was more than plus or minus 10 to 15 pounds per acre (plus or minus 20% for these fields). On the other hand, when soil is tested in the fall before manure application, one or two samples per acre were reasonably reliable (plus or minus 15%).

Based on Grandt's study and results from other research work, follow these guidelines where you need or expect higher accuracy on phosphorus soil tests:

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seedings with companion crops work better on some dairies and in some locations than others, so test it out on a few acres first if you're not sure.

6. For established hay stands, the risks of smothering and/or salt injury increase with manure application rates exceeding 4,000 gallons per cut, especially when applications are delayed beyond three to four days after cutting.

7. Where you want to maintain – not increase – P levels, limit manure application rates to 4,000 gallons per acre for the year across all years of the stand. If fertility levels are very high, it's unnecessary to apply manure in the seeding and early production years.

Here's a practical approach to maintaining P levels: Apply 4,000 gallons of manure per acre after cuttings – where field conditions allow – in the final years of the stand to rebuild P and K levels after drawdown. Always check manured fields for forage K content if you

Conditions	Number of soil cores/acre
Spring/summer sampling	3
Fall/winter sampling before manure application	1-2
Planning to convert Mehlich-3 to Morgan soil test P	3
Fall sampling after manure application	2-3
Annual sampling*	1-2

* *Mehlich-3 to Morgan conversion may provide unsatisfactory results across years. When using a conversion, one sample per acre annually is only a substitute if the accuracy of the conversion equation has been checked (i.e. sample is split, sent in for both Morgan and Mehlich-3 analysis, and both the true Morgan and the estimated Morgan compare well).*

plan to feed the crop to dry cows.

8. If you apply manure in the last production year to address P and K levels, apply it while the crop is actively growing to enhance N uptake during summer or early fall. Then kill the alfalfa-grass the following spring rather than the previous fall to reduce the potential for large N losses prior to planting corn.

9. Follow these practices to minimize wheel traffic damage:

- Plant traffic-tolerant varieties.
- Use small tractors if possible.
- Avoid unnecessary trips across a field.
- Use larger harvesting equipment and drive on fields as soon after cutting as possible.

10. Field applying manure from animals infected with pathogens, particularly Johne's disease, may spread these infections. In the case of Johne's, don't expose animals younger than a year to contaminated pastures or to feed coming from these fields. □