SUCCESS STRATEGIES 2010

By Karl Czymmek and Quirine Ketterings

Manage potash in your crop rotation and save $

For economic forage production, take advantage of soil test potassium built up during the corn years of your crop rotation

Many dairies use manure on corn silage fields to maximize nitrogen recycling. This can result in significant potassium (K) reserves in these fields by the time they're rotated to hay. Alfalfa and grass harvest can remove as much as 50 to 60 lbs. K_2O per ton of dry matter. So by the third or fourth year of the hay stand, especially if alfalfa is in the mix, potassium reserves will be reduced.

Dairy producers are in a quandary. They aren't always eager to apply manure to hay stands in their later years because of potential odor problems and/or stand damage. But they also aren't eager to buy potash when they know their manure storage has plenty of it. These issues raise the question: How much potash do we really need?

To answer that, we researched the potash needs of an alfalfa-grass stand following five years of corn silage grown on Kendaia/Lima silt loam soils at the Musgrave Research Farm near Aurora, N.Y. When planted to corn in 2001, the field tested around 100 lbs. K per acre. According to Cornell guidelines for group 2 soils, the field was High in soil test K based on the Cornell Morgan soil test. The field had not received any manure for many decades.

We supplemented some plots with manure or compost; other plots had only mineral fertilizer applied during the corn silage years. The annual spring applications of manure and compost during the corn years increased the soil test K levels to Very High. The plots receiving mineral fertilizer remained around 100 lbs. per acre.

Following corn silage, all plots were planted to alfalfa-grass in spring 2006. For the past four years, we monitored the manure and compost plots without adding any more K, and in 2007 we added various rates of potassium to the mineral fertilizer plots.

Lessons learned

Not surprisingly, the higher potassium reserves in the manure and compost plots at the start of the alfalfa stand were reduced after four years of hay harvest. Soil test K levels are almost back to the initial level at the start of the corn years for the plots that received compost or 8,000 gallons of manure per acre. For the 20,000 gallons per acre of manure treatment, soil K levels decreased, but after four years are still very high.

Here is how we handled the plots supplemented with mineral fertilizer. In 2006, the first full production year for the alfalfa stand, we spring-applied at green-up five levels of potash fertilizer to four plots per treatment: 0, 83, 166, 252 and 335 lbs. K_2O per acre. Applications ranged from 0 to about 560 lbs. of 0-0-60. The 235-lb. application rate was estimated to meet expected crop K removal.

After three years of K application and harvest, there was no yield difference among the K treatments. (Table 1) The 335 lbs. per acre K plots averaged 14.2 tons of total dry matter vs. 14.3 tons per acre for the plots that had not received any K fertilizer. The conclusion: No additional K was needed for optimum yield.

Remember, these plots started out with about 100 lbs. K per acre in the soil test. After four years of harvest, the 0- and 83-lb. K plots showed levels now classified as Low in K. The 166-lb. K plots maintained soil test K level, while the 252 and 335 K plots increased in soil test K to 1.5 to 2 times the

Table 1. Alfalfa-grass dry matter yields at various potassium rates*

	0 lbs.K_2O/yr.	83 lbs.K_20/yr.	166 lbs.K_20/yr.	252 lbs.K_20/yr.	335 lbs. K_20/yr
2007	2.84 a	2.63 a	2.62 a	2.56 a	2.61 a
2008	6.28 b	5.86 b	6.46 ab	6.74 ab	6.95 a
2009	5.12 a	4.65 a	4.84 a	4.21 a	4.66 a
3-yr. total	14.3 a	13.1 a	13.9 a	13. 5 a	14.2 a

** We are 95% certain that differences in yields followed by the same letter are NOT due to difference in potassium rates.*

FYI

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initial K level. (Graph 1)

What explains an increase in soil test K when potassium was only applied to crop removal level? Much of the clay in New York soils has fairly significant K content. As the clay particles naturally break down, they release K that becomes crop available. We expect that the plots receiving more fertilizer K will also have higher K levels in the forage, reflecting luxury consumption. The forage samples from this project still need to be analyzed for K content.

Take home message

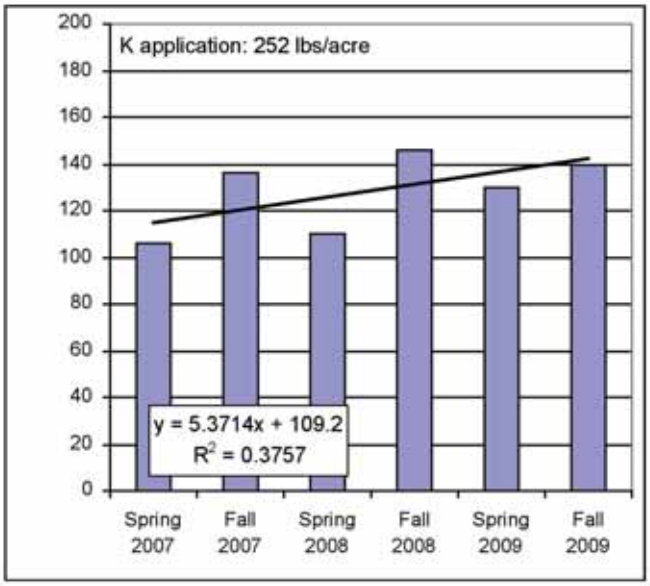
This research supports the current Cornell guidelines for K on alfalfa-grass hay on High K fields. By following the guidelines, we achieved optimum yields economically – that is without applying additional K. However, soil test K levels will go down during alfalfa-grass under high yield conditions if no potassium is added. Application of K to crop removal levels increased soil test K.

The research data stress the importance of using soil testing to monitor and maintain K in the High range. Confirm the K status with soil tests and if High or Very High, take advantage of the soil test K built up during the corn years. It's quite possible that little or no K will need to be applied during the alfalfa-grass years, and the soil test K will be replenished again during the corn silage years.

Fields that receive manure rates of 8,000 to 10,000 gallons per acre or more during several years of corn silage may very likely have High or Very High soil test K levels by the time they are to be rotated to hay.

If K is needed and odor control isn't a problem, applying manure to hay stands in their later years is an excellent way to fertilize and replenish K. That is if it can be done at modest rates and quickly after harvest to minimize burning and traffic damage.

Graph 1. On plots that received no manure in the corn silage years, soil test K levels increased when fertilizer K was applied at approximate crop removal of 252 lbs. per acre per year after establishment of alfalfa-grass plots.



We will be conducting side-by-side tests for K responsiveness on multiple New York dairy farms across the state to see if our results can be repeated on other soil types and under different growing conditions. Please contact us if you would like to participate. ❐

Renovation improves cow comfort and production

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between 83 and 85 lbs. in 2009. "There are a lot of factors that go into that, but cow comfort is one of them," Howland says. "When you make a better environment for cows, it's a better environment for the farm manager and you become a better manager."

The Howlands' veterinarian, Ben Laudermilch of Rome Veterinary Center, Rome, Pa., can attest to that. "[Howland] has time to manage other aspects of his herd compared to putting out fires here and there," he says.

Comfortable cows

The Howlands see lots of evidence that cows are comfortable. Feet and legs are better, and there are few banged-up hocks.

More cows lie down in the tiestalls. "Before we remodeled, it's fair to say a third of the cows would be standing up," Howland says. "It's not unusual anymore to see out of 74 cows at least 70 of them lying down. That tells me that something is going on with those stalls that wasn't going on before."

"I saw 90% or more of the cows lying down vs. the majority of other tiestalls you see, where it's normal for only half the herd to be lying down," says Laudermilch. "We put cows in those stalls all the time and they're uncomfortable, and that filters down and affects all aspects of the cow."

End to 24/7 struggle

In the renovations, the Howlands replaced old tiestalls with stalls designed by Dr. Neil Anderson of the Ontario Ministry of Agriculture, Food and Rural Affairs and built by PBZ LLC (formerly Zimmerman's) of Lititz, Pa. The new stalls are larger than standard tiestalls, and have modifications to stall dividers, tie chain length and other components.

Anderson also recommends precisely locating trainers 48 inches forward of the gutter curb. But Howland thought he could get away with leaving his old trainer line. Not so fast. The cows still got dirty.

"Then we moved the new line 3 to 4 inches, and overnight the dirty cow problem went away," Howland says. "Neal's measurements are perfect. You can't short-cut this thing. If you're going to do anything, do it from the ground up."

"Many, many families struggle along 24/7 in cow spaces that lead to injuries and a chronic stress that leaves cows vulnerable immunologically to every pathogen in their immediate environment," Conway says. "Unlike the tractor with the blown engine that needs a $40,000 overhaul, the lights still come on in the old barn and the pipeline still works. No action is taken with this quietly egregious profit robber. ❐