PRECISION FEED MANAGEMENT

By Larry Chase and Mike Van Amburgh

To assess the environmental impact of your rations, look at nitrogen and phosphorus levels in your feed program

Are your rations environmentally friendly?

When you and your nutritionist develop a ration formulation strategy, do you consider the potential environmental impact of that ration? Adjusting ration formulation strategies will be a primary method to help you comply with existing Concentrated Animal Feeding Operation (CAFO) and Comprehensive Nutrient Management Plan (CNMP) regulations. It can also address a dairy's ammonia emissions.

The goal is straightforward: Your rations should provide the opportunity for profitability from your herd while minimizing nutrient excretions in manure. Research and on-farm observations indicate you can improve income-over-feed-cost by making these adjustments in most situations.

Nutrients in the crosshairs

Nitrogen (N) and phosphorus (P) are the nutrients grabbing the most interest. Your ration should meet the animals' requirements without feeding excess quantities of N and P. Yes, you do have to feed slightly above requirements to account for the daily variations in forage dry matter, feed mixing and delivery, dry matter intake and milk production that occur on dairies. But your overall objective is to maintain milk production while increasing the efficiency of nutrient use.

Dairy cows have a very simple response when N and P are fed in excess of requirements: They excrete the excess in the manure. So you're spending money on feed to help increase the quantity of N and P excreted by cows. This is a poor use of your feed dollar and can increase the acres needed for manure spreading if you're applying manure based on N and P application rates.

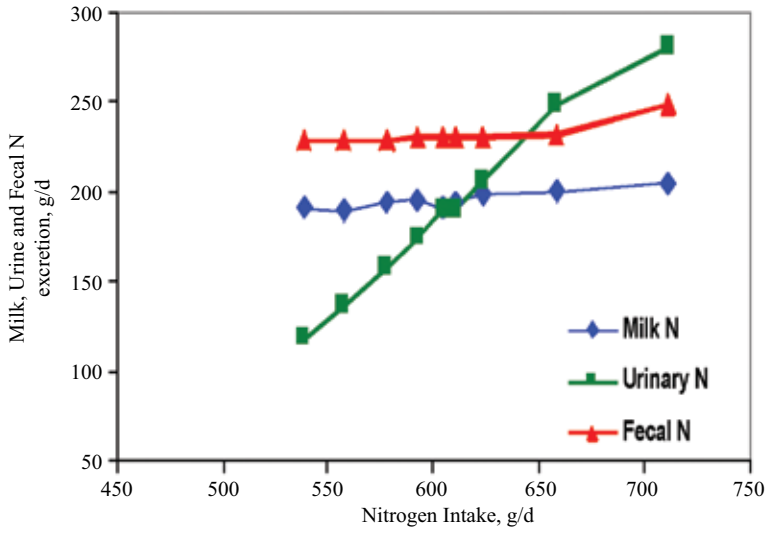
We looked at 81 rations in commercial dairy herds that were averaging about 85 pounds of milk per cow. The average daily N excretion was about 1 pound per cow per day, but the range was 0.75 to 1.4 pounds of N.

The amount of fecal N excreted is relatively fixed with the diets we feed our herds. But the amount of urinary N varies greatly, and it's the source of most ammonia N volatilized into the atmosphere.

Figure 1 shows the relatively constant output of fecal N across a range of N intakes at similar energy intakes, but there's a linear increase in urinary N with increasing N intakes.

To reduce excess N excretion into the environment, balance herd diets so milk N output is at least equal to urinary N excretion.

Figure 1. Relationship between dietary nitrogen intake and milk, feces and urine N excretion



Reduce N and P

Working with your nutritionist, evaluate your rations to identify opportunities to reduce N and P. This person knows what factors enter into your

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or alfalfa stand persistence. They still apply nitrogen to grasses to achieve higher yields – a crucial strategy on their forage-limited dairy.

With more good quality forage on hand going into the winter of 2007-08, the wheels were set in motion to move forage feeding levels higher. PFM team member and herd nutritionist Darrin Nesbitt of Lutz Feed Inc. suggested that the protein mix blended into the Grants' TMR be concentrated further and the dairy feed fewer total pounds of it per cow per day. Simultaneously, ration corn silage levels were increased 10 pounds per cow per day.

In another important step, the Grants eliminated grain topdressed on the TMR. Despite that being a long-time practice, Dave and Laurie concluded from the PFM measures that the extra grain contributed to the low forage diet and animal health problems, not to mention higher feed costs.

But instead of stopping the practice cold turkey and risking dramatic production drops, the Grants systematically eliminated the topdress over four months by not putting fresh cows on the topdress and slowly backing down tail-enders. This way the couple eliminated topdress with no loss of milk production, and the cows and the Grants are the better for it.

"You could just see the cows were brighter and ate their TMR better," Dave says. "Without the topdress, they had room to eat more forage."

Frequent forage testing is important to implementing PFM. It's given the Grants information to plan rations and to troubleshoot. "We are staying ahead of forage changes before cows are affected," Nesbitt says.

In herds that do not want to spend more money on forage testing, "we tend to see a lot more fluctuation in milk production," he says.

Nesbitt has been using AMTS.Cattle Pro, a commercial application of the Cornell Net Carbohydrate and Protein System (CNCPS) model, to balance diets on the Grant dairy. With this model, he can take into account feed digestibility and nitrogen fractions in formulating more tightly balanced diets.

Building relationships and a process

The Grants success with PFM stems from their understanding what PFM is. "It's a process," says Laurie. "You have to have the basics first and build from there."

Using a team approach is basic to the success of PFM. The Grants' team included Cooperative Extension PFM dairy and crop specialists and Nesbitt, their feed company nutritionist. "Meeting together periodically to make sure that everyone is on the same page is key," Dave says.

Without the Grants' leadership, the PFM process would not have been as effective. Dave and Laurie set up the team meetings and clearly communicate their priorities and goals. They use cow, crop and financial measures made during the process to monitor progress against the PFM benchmarks. They also value their PFM team advisers as resources and listen with open minds to suggestions they make.

"Having someone with an outside perspective who is invested in helping you succeed is valuable," Laurie says.

The Grants credit Nesbitt for both his technical nutrition support and his willingness to implement higher forage diets. "Having Darrin on board with PFM [goals] from day one has made a big difference," Dave says.

PFM is a continual improvement process that builds on the progress made each year. With the PFM benchmarks in hand, productive relationships with their advisers and a willingness to lead the process on their dairy, the Grants are poised for a bright future. "The bottom line is that the PFM process gave us information and confidence to make changes in our best interest," says Dave. ▮

PFM benchmarks on Grantson Farm

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■ NDF intake as a % of body weight	0.96%
■ Forage as a % of diet	62%
■ Homegrown feeds as a % of diet	62%
■ Ration P as a % of requirement	102%
■ Diet crude protein	16.5%
■ MUN	12.2
■ Calving interval	14.1
■ Cows dead or culled less than 60 DIM	3.9%
■ Income-over-purchased-feed cost/cow/day	$9.60

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ration formulation process. There could be good reasons why your ration N and P levels may be different from the guidelines we're suggesting.

The simplest way to asses P status is to look at the percent P in your rations. The 2001 Dairy NRC publication says rations for lactating dairy cows containing 0.32 – 0.38% P (dry matter basis) will meet her nutrient requirements. These values will change in herds with either high or low dry matter intakes.

You can evaluate the N status of your herd in a number of ways:

- Evaluate the crude protein content of your rations.
- Use milk urea nitrogen (MUN) as an index of N use by the cow.

As N is fed in excess of requirements, MUN will go up. Many milk cooperatives provide routine bulk tank MUN data on the loads of milk shipped from a dairy. Some herds get MUN data as part of their DHI test day information.

We obtained the monthly DHI herd MUN data for 822 herds in New York and Pennsylvania tested in July or August. Here is what we found:

- 2% of these herds had MUN values of less than 8 mg/dl.
- 35% had MUN values between 8 and 12 mg/dl.
- 52% of the herds had MUN values between 12 and 16 mg/dl.
- 11% had MUN values greater than 16.

All of these MUN values are the average for the whole herd. MUN levels of less than 8 mg/dl may suggest an N deficient animal with potentially reduced rumen digestibility and microbial yield. ▮

Fact check

You can use the following guidelines to make a quick assessment of the N and P status of your lactating cows' ration:

- Ration P level: < 0.4% on a dry matter basis
- Ration crude protein (CP) level: < 16.5% on a dry matter basis
- Herd or bulk tank MUN level: 8 – 12 mg/dl.

These values are a starting point, and your herd values may deviate from them at times. For example, ration P may increase if canola meal is a good feed buy and replaces some of the soybean meal in a ration. Ration CP or MUN may be higher than these guidelines when you feed high protein forages with high levels of soluble protein. Still, the above guidelines are realistic long-term targets for New York dairy herds.