

# Successful supplementation

The nutritional benefits of pasture – high protein, low fiber and high digestibility – also create challenges in providing cows with a balanced diet

By *Karen Sullivan and Larry Chase*

**Nobody ever claimed that feeding** today's high-producing dairy cows is easy. But change your feeding system from all-stored forages to a pasture-based system, and you add a few extra challenges to the job.

Well-managed pastures are higher in quality than almost any stored forage mainly because the forage is harvested while still in the vegetative stage. It will have higher protein, lower fiber and higher digestibility than stored forage.

Fresh also boosts quality because pasture isn't subjected to the rigors of mowing, wilting, chopping, baling or fermentation.

These positive factors of pasture create some challenges:

- Excess dietary protein. Grass and clover combinations can test in the mid- to high-20s for protein, especially in early spring. High-producing cows only need a ration of 16 to 17% protein. Pasture protein is also highly rumen degradable.

The challenge is to provide just enough undegradable protein to meet cows' needs without pushing total protein in the diet to an unhealthy level.

- Carbohydrates, both fiber and nonfiber. Pastures typically run low fiber levels, which may contribute to rumen conditions that depress butterfat production.

Although energy and digestibility tend to run high in pastures, nonfiber carbohydrates (NFC) rarely exceed 25%. Plus, pasture's NFC fraction is primarily sugar, which is rapidly degraded in the rumen. This can result in a lack of total energy if adequate NFCs aren't fed.

- Supplementation strategies. Determining what combination of grains and/or forages to feed in the barn to maintain or increase milk production is the biggest challenge for graziers and their nutritionists.

To develop the best supplementation strategy, producers also must answer: What is profitable? What will address issues related to protein and carbohydrates? What approach is the most labor efficient?

## Where to start?

Rations for pasture begin in the pasture, not in the barn. The grazed forage should



make up the majority of total forage dry matter intake, so build the ration around the quality and quantity of pasture that cows are eating. For the best results:

- Take periodic forage samples to assess changes in forage quality, especially as the season changes from spring to summer or when weather conditions change significantly.

- Sample pastures as a cow would – randomly select “bites” of forage across a paddock based on what you see cows selecting. Since forage is 80 to 85% moisture, you'll need to sample a large amount in order to have enough forage for laboratory testing after drying. Freeze the sample as soon as possible to prevent the plants from continuing to photosynthesize or respire. This could change the test results.

- Estimate the amount of forage available in pastures to ensure cows can have high dry matter intake. New graziers can use a rising plate meter or a “pasture stick” to learn how much forage is available. Those with a few years of experience learn to estimate by “eyeballing” the pasture.

If there is enough pasture forage available, assume cows will eat all they can. Penn State research shows that with no supplementation and high amounts of forage available, cows will consume from 35 to 41 pounds of pasture dry matter.

## Feeding options

There's no single best way to feed dairy cows on pasture. As with confinement, it depends on the dairy's resources: feeding system, forage availability and quality, labor efficiency, etc.

There are, however, two basic options:

**Rations for pasture begin in the pasture, not in the barn.**

## FYI

■ Karen Sullivan is an animal scientist with the USDA-Natural Resources Conservation Service in New York.

■ Larry Chase is an associate professor in Cornell's Department of Animal Science.

■ For pasture quality information, visit the Graze-NY website at [www.grazeny.com](http://www.grazeny.com) and click on “pasture forage quality project.”

**1. Grain Only**

Grain should be no more than 14% protein. Many graziers feed less protein – coming closer to 9 or 10%. This is where the savings really add up with pasture.

The mix, which should be high in NFC, is likely to be mostly ground corn with small amounts of other energy sources, bypass protein sources, minerals and wheat midds if pelleted.

Recommended feeding rates vary with the season and milk production levels. (See Table 1.) At higher grain feeding rates, there may be slug feeding. To avoid this and to minimize the chances of rumen acidosis, split the feedings up into more than twice a day. This may require some creative feed delivery methods, such as feeding grain at the beginning and end of milking or feeding a small amount in the pasture.

**2. Grain + Forages**

Producers who have mixer wagons to feed a partial total mixed ration (TMR) often feed both grain and forage. Graziers without mixers may also feed supplemental forages in outside bunks or individually in tiestall barns.

Don't feed too much supplemental forage. If you feed more than 15 to 25 pounds of wet feed, you may begin to see a significant decrease in pasture forage intake. Since pasture is your least expensive feed and can allow you to reduce supplemental protein, maintaining a high level of intake is important.

You will have to discover how little of some forages you can feed without major spoilage problems in the silo.

Corn silage is a good complementary forage for pasture. High in NFCs, it provides an energy boost that can help milk production and body condition. Corn silage also has some digestible fiber to support butterfat levels. Dry hay, baleage and haylage will provide digestible fiber, but lack NFC.

**Avoid a train wreck**

Learning what grazing management decisions must be made and making rations work well are critical management tasks. These five tips can help you accomplish both tasks:

1. Over-feeding protein in a pasture ration almost always leads to low body condition and poor reproductive performance, because cows use body energy to eliminate the urea formed from the protein. Monitor the potential for protein overfeeding with milk urea nitrogen (MUN). MUN values greater than 16 mg/dl should be a flag that protein is being overfed.

2. Feed a ration that has 38 to 40% NFC. This allows any excess protein from the pas-

# Been there and back

When Dan and Karen Dove of Truxton, N.Y., began grazing their 140-cow dairy herd in 1998, they never expected such a roller coaster ride.

“Basically, our nutritionist didn't have any experience with pasture-based rations,” says Dan. “We knew what we wanted from pasture, but he didn't know how to put together a feeding program that would get those things for us.”

What they wanted was high production from a high-forage diet and reduced costs. Pasture should have allowed the Doves to do that, but overfeeding protein led to a major loss of milk production.

When milk dropped, the amount of feed consumed in the barn increased and intake from pasture dropped. By the end of the summer, cows were thin with overall poor health, milk was significantly lower, costs were up and pastures were over-mature and unpalatable.

The Doves decided to use a team approach. They switched to nutritionist Steve Judd, currently a Cargill consultant, and followed the recommendations of Karen Sullivan, a specialist in dairy grazing nutrition with the Natural Resources Conservation Service (NRCS). Together they developed a clear plan for how the ration was to be formulated, and the Doves were headed up the roller coaster hill.

The plan included:

- Feeding a ration that was at least 60% forage.
- Formulating a TMR higher in energy and digestible fiber to complement the high protein, low fiber pasture.
- Sampling and testing all forages, including pasture, regularly.
- Feeding 30 to 40% of the forage dry matter in the ration as supplemental corn silage and either dry hay or baleage. Pasture makes up the remaining 60 to 70%. Other ingredients in the diet usually include corn meal, cottonseed and a very small amount of a high bypass protein source.

“They pay attention to details, such as estimating intakes and having high quality forage on hand,” says Judd. “They are very focused on cow health, which is why the ration is so high in forage.”

“We couldn't be happier with grazing now,” says Karen Dove. “Production is back up in the 70 pounds-per-cow range during the grazing season, our costs are lower because we don't feed as much protein, and the overall health of the cows is excellent.”

—By Karen Sullivan



When Dan and Karen Dove, Truxton, N.Y., began grazing their herd, they wanted high production from a high forage diet and reduced costs. They achieved those goals.

ture to be used more effectively.

3. Manage pastures to be 6 to 8 inches tall to maximize dry matter intake. Too-tall forages won't result in high intakes or milk production because of declining palatability and quality.

4. Monitor weather changes, then sample pastures to track quality shifts due to the weather.

5. Pay attention to what your cows are telling you. Any changes in milk production, intake, behavior, manure consistency, breeding or body condition indicate a needed response in management. If you can't determine what it is, call someone who has knowledge of grazing management. Don't wait until it's too late.

**Table 1. Grain (DM) feeding guidelines for a grass-based pasture system\***

4% Fat-corrected Milk Prod. (lb./day)	Spring		Summer		Fall	
	lb.	G:Md	lb.	G:Md	lb.	G:M(**)
>80	20	1:4 to 1:5	22-24	1:3	20	1:4 to 1:5
70	15-18	1:4 to 1:4	19-21	1:3.5	16-18	1:4 to 1:5
60	11-13	1:5	15-18	1:4	12-14	1:5
50	8-10	1:5 to 1:6	10-12	1:4.5	8-10	1:4 to 1:5
<40	6-8	1:6 to 1:7	8-10	1:5	6-8	1:6 to 1:7

\*Source: Lawrence D. Miller, Penn State.

Assume 1,300 lb. bodyweight. These guidelines are based on high quality grass pasture available in adequate quantities, assuming approximate DMI. Lower quality forage requires more grain. Adjust grain based on body condition scores and stage of lactation. Lower amounts are likely needed when pasture contains very high quality grass and legumes.

\*\*Grain:milk ratio (DM basis)

## A smooth transition to and from pasture

Appropriate supplemental feed that supports the pasture system is critical to John and Cathy Burgett's successful grazing program. During the six years that the Tully, N.Y., dairy producers have grazed their dairy herd, it has grown internally from 57 registered Holsteins and a 20,000-pound rolling herd average (RHA) to just over 100 cows with a 23,000 RHA.

The Burgetts' pasture system consists of 60 acres in five major paddocks, designed to provide 60 to 65% of the dairy cattle forage diet. Tumble wheels, further dividing the major paddocks into smaller allotments, are moved four times a day during the grazing season to encourage higher intakes.

About mid-April, when grass is 3 to 4 inches high, cows are turned onto pasture a few hours for two consecutive days. For the next five to six days, the Burgetts turn cows out during the day and after seven days, cows are on full pasture. The only modification to the total mixed ration (TMR) at this point is the addition of magnesium oxide to prevent grass tetany.

The Burgetts' TMR is corn silage, baleage and a protein/energy pack designed by Steve Judd, Cargill nutritionist. He frequently samples pasture forage so that he can modify the ration when pasture grass changes.

The Burgetts reduce the amount of corn silage and baleage in the TMR during the second week of the spring transition. It takes three weeks for rumen microbes to adapt to the pasture, John Burgett says. Dur-

ing the third week, he adjusts the grain and removes all baleage from the ration.

"Much of this change takes a discerning eye and experience to note if the cows are getting enough to eat, sufficiently chewing their cuds and lying down to rest," Burgett says.

In May, when the grass is growing the fastest, the Burgetts feed each cow 1.5 pounds of straw, 20 pounds of corn silage and 20 pounds of the protein/energy pack. In the summer when pasture forage growth decreases, the couple adds grass baleage, harvested earlier from pastures, as needed.

John Burgett monitors butterfat and protein tests. During the 2002 grazing season, he increased the amount of straw and dry hay in the TMR, believing that straw provides an important fiber component. Even during hot weather this past summer, butterfat never dipped below 3.7% compared to 2001 when butterfat dropped to 3.4%.

Transitioning cattle from pasture at the end of the grazing season is less stressful since the winter TMR contains the same types of ingredients as the summer TMR.

— By Roberta Harrison, resource educator with Cornell Cooperative Extension in Onondaga County, N.Y.



**For Cathy and John Burgett, Tully, N.Y., supplement that supports their pasture system keeps cows healthy and productive.**