

The what, why and how of ration design

Brian Sundberg for *Progressive Dairyman*

As a dairy nutritionist working with over 50,000 cows, I am constantly asking myself these questions: "What do I feed in my clients' rations? Why am I feeding it? How should it be fed?" The answers to these questions are multifactorial and can change rapidly with the volatility of today's markets and dairy economy. In 2011, I am responsible for over \$100 million that will be spent on feed, and I must maximize each of those dollars. Consider how your dollars are being spent. Furthermore, as you read through this article, challenge yourself to understand the what, why and how of your dairy's ration design.

What to feed in dairy rations needs to be evaluated on a continual basis to ensure optimum return on investment. Is each ingredient of value? Does it support rumen and cow health? Is it taking up room in the ration that can be filled with another, more economical ingredient?

In today's dairy economy we can't feed cows just because "that is what we have always fed them." Too many times we evaluate rations that have feedstuffs in them which were once of value, but today these same feeds are not providing the same return on investment.

Your nutritionist must first understand what nutrients and physical attributes exist in each feed, then determine if there is a more economical way to deliver those to the cow. For example, soybean meal versus canola: Calculations need to be done to determine the best value considering the main nutrients each ingredient offers.

There are tools developed to evaluate multiple nutrients, bioavailability and cost comparisons among ingredients. However, these

linear programs do not incorporate the value of the physical attributes of ingredients. Furthermore, there can be a large spread on cost per unit of protein, allowing dairymen to capitalize on the market differences. For example, corn gluten feed versus corn germ meal: At various times, one is a value over the other and the rations need to be changed accordingly.

Another common question is: "Should we feed cottonseed?" The answer is usually "Yes, because we have always fed it." Wrong. Cottonseed is an excellent feed, but we must ask if there is a price where we just can't afford to feed it. This means your nutritionist must work harder and get more creative to deliver the same results from feeds that are more economical. What we feed in rations can also be dictated by each producer's goals. Is the goal high production, low cost, to maximize

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What to feed in dairy rations needs to be evaluated on a continual basis to ensure optimum return on investment. Photo by **PD** staff.

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home-grown forages, cheese yield, etc.?

What is fed in rations will change depending on where the producer's goals are on the spectrum. A herd that is looking for maximum

production will want to consider extensive amino acid balancing, while the lowest-cost producer will want to maximize the best-valued ingredients such as dried distillers grains.

“Understanding the quality of forages and how that impacts overall feed cost is important. Forages account for approximately 50 percent of the ration dry matter.”

To maximize home-grown forages, forages must be of excellent quality. The higher the quality of the forage, the more you can feed in the ration. In addition, producers looking for cheese yield will need to focus on milk components and what to feed to maximize fat, protein and non-fat solids. Typically higher fiber and lower unsaturated fat rations will achieve cheese yield goals.

Why do we feed the ingredients we do to dairy cows? It's simple: nutrients. The nutrients we provide a cow will be converted into milk in the tank. Think of the cow's digestive

system as a fermentation vat. The better the fermentation, the better the results. If fermentation does not take place at optimal levels, then the conversion of nutrients to milk is compromised.

Wineries pay close attention to the fermentation of their wine because it ultimately determines the quality of their end product and their profitability. Cows are the same. If we don't feed the bugs in the rumen properly, then the efficiency of fermentation drops and profitability suffers.

Cows are consumers of byproducts, the ultimate recyclers, so there is an inherent risk of inconsistency in what we feed. Creating a good consistent protocol for sampling feeds is important to track and confirm nutrients delivered in these feeds. A feed that was a value at 25 percent dry matter but has now changed to 21 percent may no longer be a value. You then have to ask yourself, why am I feeding this?

Sampling to confirm expected nutrient values will allow you to support why you are feeding that ingredient or why you should not be feeding it anymore. Bioavailability is another reason we feed certain ingredients and it will vary in all the feeds we feed dairy cows. From commodities to forages to vitamins and minerals, there is a difference in the way the cow can or cannot utilize the nutrients contained in feed.

There are certain feeds fed for their protein content that have the crude protein values we are looking for, but do not have very good digestibility of that protein. Poor digestibility kicks off the cascade of events we all want to avoid. If the cows are not digesting nutrients, then they are just taking up space in the ration, as well as reducing the intended nutrients we want delivered to the cow, which in turn costs money rather than saving money.

So what may be interpreted as “a good buy” quickly turns into just the opposite. Vitamins and minerals are another area that will have different bioavailability depending on the sources. Chelated minerals will have much higher bioavailability than inorganic sources because of the way they are manufactured. Chelation helps prevent it from being converted into insoluble compounds or colloids which do not diffuse through an animal membrane.

The final question in designing rations is: How do we feed it? This

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answer is debated every day in the dairy nutrition profession. Just because you are feeding a certain feed does not mean you should continue feeding it when markets or seasons change. It is the follow-through on how it is fed that will determine your profitability.

Let's take dried distillers grains for example. There is a huge debate among nutritionists on how it should be fed. For many months DDG has been one of the best-valued ingredients that can be fed to a dairy cow in many parts of the country. However, it needs to be optimized by keeping in mind that the unsaturated fat level in DDG is high, which, if overfed, is toxic to the rumen bugs and can reduce butterfat. The low lysine levels need to be accounted for as well to ensure proper amino acid balance.

Some ingredients are more beneficial for certain stages than others. For example, beet pulp or soyhull pellets: I have encountered dairies that have these ingredients on-farm but are not using them where they are the most beneficial, which is in the close-up ration. Soyhulls are high in digestible neutral detergent fiber and beet pulp is hydrophilic, which means it expands in water to create more gut fill, and it is also high in pectins. These unique ingredients need to be fed to the close-ups that require unique nutrients for transition success.

Understanding the quality of forages and how that impacts overall feed cost is important. Forages account for approximately 50 percent of the ration dry matter. Today corn silage makes up the majority of the forage portion of the ration and, depending on the quality, will dictate the level of supplemental corn formulated into the ration and how corn silage is fed. It is simple: As

corn silage improves in digestibility and starch, less corn will be fed.

To achieve optimal digestibility and starch, the most important factor is whole-plant dry matter. Target range for dry matter should be 35 to 40 percent, keeping in mind the drier the silage, the more intensity is needed to pack it for proper fermentation and density.

These dry matter recommendations may seem high, but after focusing on this with my clients over the years, the most digestible, highest-starch samples are analyzed at 35 to 40 percent dry matter. In general, there

is a 1:1 ratio for dry matter and starch. Thirty percent dry matter, 30 percent starch; 40 percent dry matter, 40 percent starch. The great thing about improving corn silage from the current harvesting practices is that it does not take any extra work on the dairyman's part – just paying attention to when the crop is harvested. As the corn plant matures, the starch and whole-plant digestibility will increase as the grain becomes a larger percentage of the plant.

Asking these three questions (what, why and how) when it comes

to feeding the dairy cow will allow you to do your due diligence to ensure you are feeding your cows as optimally and profitably as you can. Next time you meet with your nutritionist, ask him or her what, why and how. What are we feeding? Why are we feeding it? How is it being fed (Can it be fed differently)? Stimulating this discussion may in fact stimulate some change for increased profitability in these volatile economic times. **PD**

References omitted due to space but are available upon request.

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