



# NUTRITION PLUS

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## IDEAL PROTEIN SYSTEM NOT QUITE IDEAL...YET

The 2001 Dairy NRC's abandonment of the crude-protein system in favor of the metabolizable-protein system for predicting ideal ration protein may not have qualified as a paradigm shift. But it certainly qualifies as a break from tradition, with all the resulting uncertainty and debate.

The good news is the change promises significant advancement in replac-

ing traditional ration-formulation art with a little more science, notes Cornell animal scientist Dr. Thomas Overton. Yet a significant challenge remains, recognizes University of New Hampshire's Dr. Chuck Schwab, whose work led the changes in NRC's protein recommendations. On one hand, the current models do a much better job than the traditional reliance on crude protein in predicting how the important amino acids survive the rumen fermentation process to reach the small intestine. On the other hand, they're still just that: predictions.

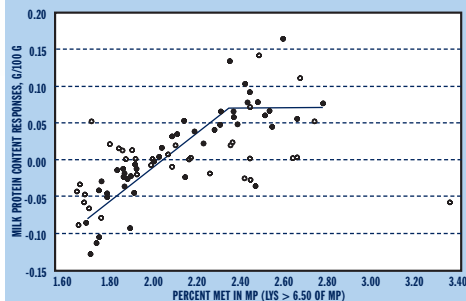
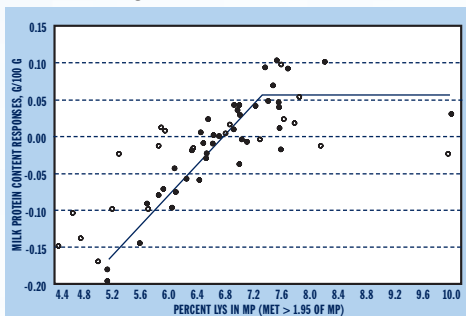
That's not to say predicting lactation responses from changing the supply of lysine, methionine and histadine levels in metabolizable protein is impossible. Researchers are gradually building on the experimental data to test and confirm the models that standardize decision-making.

Dr. Schwab's recent work with the University of New Hampshire Research Herd, for instance, replaced a traditional diet with one containing increased lysine in the metabolizable-protein portion. The new ration was balanced at three parts lysine to one part methionine, as recommended by the new NRC. That new formulation reduced the

### FUNDING THE SEARCH FOR ANSWERS

West Central is a founding sponsor of the new Ruminant Feed Analysis Consortium. The collaborative effort between industry and public researchers, headed by Dr. Schwab and his colleague Dr. Paul Kononoff, supports research to:

- Develop accurate and validated chemical and *in situ* data for feedstuffs.
- Improve and validate formulation models.
- Better quantify the relationship between chemical analyses of feeds and their *in vivo* and *in vitro* derived ruminal digestion rates, and their digestibility coefficients.
- Develop feedstuff NIR calibrations.
- Encourage innovative feed characterization.



SOURCE: PROCEEDINGS 2004 FLORIDA RUMINANT NUTRITION SYMPOSIUM.

crude-protein level nearly a full percentage point, rumen-degradable protein by 0.2 percent, and bypass protein by 0.7 percent, leaving predicted metabolizable protein at 8 percent less than the previous ration. Yet the resulting improvement in both amount and ratio profile of

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# MOVING CLIENTS FORWARD



The public and proprietary mathematical models that underpin the Metabolizable Protein school of ration formulation, by simulating ruminal fermentation and helping predict the supply of nutrients to the small intestine, remain a continual source of discussion, frustration and/or admiration. Two studies reported by the *Journal of Dairy Science* in 2001 pointed out the significant shortcomings in the models' abilities to predict the actual outcome *in vivo*.

Do those practical constraints leave those responsible for balancing rations talking about the science in theory, but still relying on the subjective art of ration formulation?

Only if you choose to let them, believes independent nutritional consultant Dr. Bob Patton. Dr. Patton, head of Nittany Nutrition and author of one of the models, believes both the availability of the models and their lack of perfection leaves nutritionists with the same choice faced when most new technology enters the field: "We can either choose to do nothing or we can choose to move ahead.

"NRC deserves credit for taking a bold

step," Dr. Patton says. "I have been slow to come to accept some of the thinking about amino-acid balance myself—and in fact I still don't concur with some of the ratios it espouses.

"But we have to remember that when we talk about the state of dairy cattle nutrition—particularly protein nutrition—we're still in our pre-teen years...if that. There's still a lot we don't know. But every day we learn more, and we get a little better."

Consultants can find the most benefit from mathematical modeling in helping explain to clients the physiology behind why balancing for amino-acid nutrition while maximizing microbial protein works. But at the end of the day, clients will judge the quality of advice by the same yardstick they traditionally have: Did ration changes make them money, or cost money?

"Once dairymen understand what needs to be done, they usually do it," Dr. Patton says. "And we have been pretty successful in reducing overall protein costs and getting them a little better protein yield by balancing amino acids."

But the dairy industry still needs to bear in mind that we're faced with making some assumptions. "This is a journey," he says. Some people miss out on the better by waiting for the perfect.

## BEYOND BYPASS

### SOYPLUS® AND AMINO-ACID BALANCING

SoyPLUS is an excellent choice to use in amino-acid balancing. It is relatively high in lysine and contains a moderate level of methionine. The patented SoyPLUS process creates rumen undegradable protein while avoiding damage to the amino acids. The SoyCenter has over 400 computer control points to insure the consistency of SoyPLUS. This maximizes the amino acids delivered to the small intestine for absorption and subsequent milk production.

When the writers of the NRC needed the bypass protein and amino acid profiles for expeller soybean meal to include in the NRC Model, they turned to three research trials on SoyPLUS.

## WEST CENTRAL HAPPENINGS

West Central has always been an innovative company creating new products and new systems. West Central recently had the opportunity to exhibit at the 2004 International Bio Conference at the Moscone Convention Center in San Francisco on June 6th through the 9th. In front of an international audience consisting of 16,900 industry leaders, economic development professionals and business executives, West Central displayed

## FROM THE MATERNITY PEN

# DIETS FOR A SHORTENED DRY PERIOD

Continuing interest in the possibility of reducing the number of diet changes by shortening the traditional 60-day dry period by half may leave producers with nutrition questions specific to that shorter dry period. Here's some of what we know, according to University of Wisconsin's Robin Rastani and Dr. Ric Grummer:

Because the science of what to feed cows during an aggressive dry period is in its infancy, research is still lacking on exactly what should comprise the diet, according to the Wisconsin team. Their work suggests producers can expect a decrease in total milk production but not fat-corrected produc-

tion when continuing to feed a high-energy lactation diet throughout a shortened dry period. Because protein requirements won't be relatively as high during the dry period, producers may want to reduce protein below the typical 17 to 18 percent crude-protein levels. Current typical lactation diets offer a good starting point.

They suggest removing the sodium bicarbonate so the cationic diet doesn't increase milk-fever incidence. Feeding anionic diets through the dry period shouldn't have any detrimental effect, Dr. Grummer and Rastani suggest. They note that USDA research has shown the extended period of bone calcium mobi-

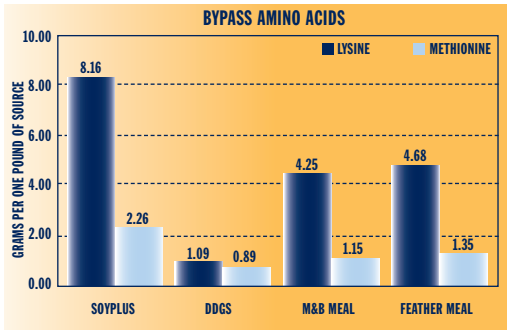
lization caused by feeding anionic salts to dry cows for 30 or 40 days probably doesn't harm bone health.

West Central's SoyChlor® 16-7 offers the ideal alternative to anionic salts for preventing milk fever even while maintaining critical DMI. SoyChlor's key ingredient is hydrochloric acid, the most palatable source of chloride available. Its high level of acidity supports a cow's preference for sour feeds such as silages, improving DMI compared to rations using other sources of anionic salts.

Its low protein level facilitates DCAD formulation using on-farm feedstuffs to reduce feed costs.

## QUALITY CORNER

According to these trials SoyPLUS has an RUP of 69% in high-producing cows that is 93% digestible in the small intestine. The following graph illustrates how SoyPLUS compares with other common bypass protein sources in intestinally digestible amino acids using values listed in the NRC.



its SOYPOWER® biodiesel product. West Central has been producing and marketing SOYPOWER biodiesel at its Ralston production facility since 1996.

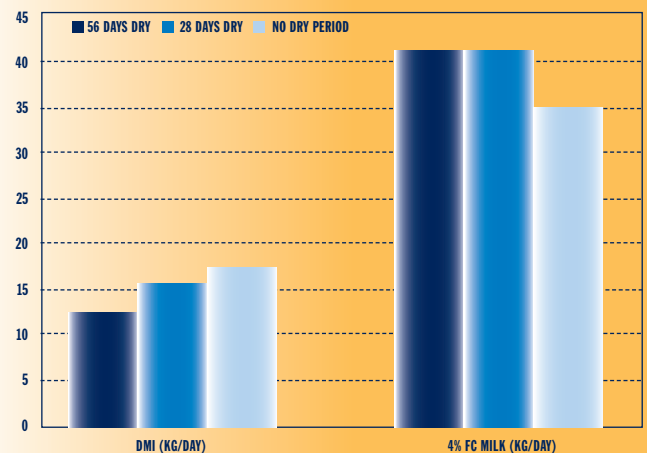
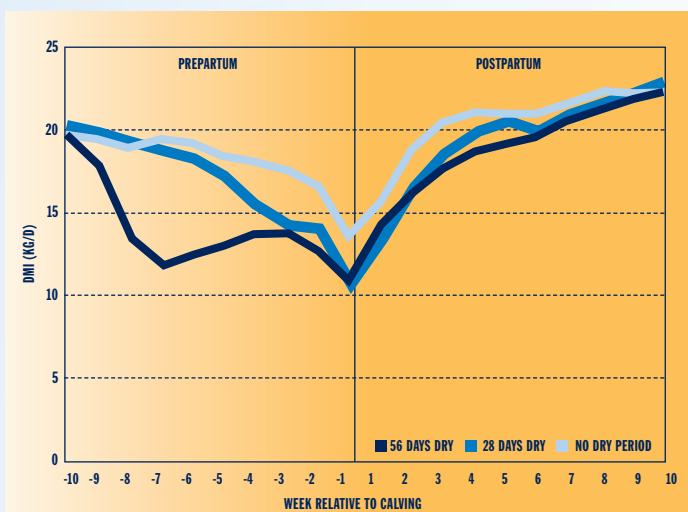
In conjunction with the SOYPOWER product, West Central also exhibited its subsidiary company, Renewable Energy Group (REG). REG is a joint venture with Todd & Sargent (Ames, IA), which was formed to construct turnkey biodiesel production facilities for interested parties.

## HOW IS SOYPLUS MADE?

The process starts with U.S. Yellow Soybeans. The bean pods, weed seeds and other debris are removed first, then the beans are split and heated. Using a patented and proprietary process, the oil is removed with an expeller press, and the remaining meal is cooled and ground. The harvested oil is then degummed and made into SOYPOWER brand biodiesel. The gums — phospholipids (lecithin) including phosphatidyl choline — return to the meal.

The result: A highly standardized, predictable product backed by stringent quality control and continuous monitoring using both in-house NIR and independent laboratory check sampling. Results from those independent tests (Woodson-Tenent, Des Moines, IA) since Oct 1, 2003 (this crop year) are shown below.

	Percent	Standard Deviation
Dry Matter (N=43)	88.62	0.73
Crude Protein (N=43)	44.06	0.63
Crude Fat (N=43)	5.88	0.34
ADF (N=11)	8.59	0.48
NDF (N=11)	16.44	0.87
ADICP (N=11)	2.47	0.22
NDICP (N=11)	7.84	0.72



Rastani and Dr. Grummer fed experimental groups a traditional far-off/steam-up approach (56 days dry), a high-energy pre-calving lactation diet throughout the dry period (28 days dry), and a high-energy pre-calving lactation diet until calving (no dry period). All animals then went on a post-partum lactation ration. Continuous lactation increased DMI pre-partum, but even continual lactation couldn't entirely avoid the pre-calving drop in DMI. Differences in intake between treatments after calving were not statistically significant, Rastani reports. SOURCE: PROCEEDINGS 2003 MIDWEST DAIRY HERD HEALTH CONFERENCE.



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## IN THIS ISSUE

- The evidence grows that balancing essential amino acids improves cost-effectiveness of rations.
- A top dairy consultant asks: How do dairy producers and their consultants trust that applying amino-acid balancing will work in practice?
- Nutritional needs for the cow in a shortened dry-off period.
- How does SoyPLUS work with amino-acid balancing?

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the amino acids increased milk-protein concentration from an average 2.82 percent up to 3.12 to 3.16 after it stabilized following a four-week transition. Milk urea nitrogen levels dropped from an average of 14.5 to an average of 12.4 mg/dL, and milkfat levels rose. Because of the cows' stage on their lactation curve, Dr. Schwab wasn't able to assess the impact on milk production, yet he notes it appeared to increase. He thus assumed milk yield did not increase—and therefore neither did DMI. Based on those assumptions, the cost analysis indicated the approximate \$.05 daily feed cost increase purchased a \$.70 daily increase in milk income due to increased component values.

Dr. Schwab reports similar results on more than 100,000 cows so far that he and others have converted from a protein-formulation basis to an amino-acid-formulated basis. Results have typically increased milk protein levels in a range of 0.1 to 0.25 percent, while lowering both rumen-protected and rumen-degradable protein ration levels. Improved profitability resulted.

"Are the models perfect? Of course not," Dr. Schwab says. "But they do point us in the right direction because

we're no longer downgrading the importance of amino acid balance."

Balance is critical to profitability, he believes, and this will be the next frontier for dairy producers and those who formulate their rations. The next challenge remains to refine formulation strategies for using rumen-protected forms of lysine, which will permit producers to achieve the most cost-effective concentration of lysine in metabolizable protein.

## TWO-STEP AMINO-ACID BALANCE

Dr. Schwab suggests two steps to balance for lysine and methionine:

1. Target lysine-to-methionine values at 3-to-1 using NRC's model or 3.1-to-1 using CNCPS or CPM-Dairy.
2. Try to provide lysine and methionine as close to 6.6 percent and 2.2 percent as possible. The resulting increased amino-acid bypass without increasing metabolizable protein improves cost-effectiveness.