

Can We Feed for Higher Levels of Milk Protein?

by L.E. Chase and T. R. Overton*

There has been increased interest in improving milk components in dairy herds over the last few years. One impetus for this is the milk pricing system that prices milk on the quantity of the various components shipped. The price per pound of milk fat and milk protein are primary drivers of the final milk price. With our current pricing structure, the value of milk fat and milk protein account for > 80% of the milk price received for 100 lbs. of milk. Thus, one approach to improving farm milk income is to increase the quantity and value of the milk components shipped. A second reason for improving milk protein content is to increase the efficiency of converting feed nitrogen (N) to milk N. This takes better advantage of purchased feed costs and also decreases the quantity of N excreted to the environment. Additional reasons for desiring higher milk protein levels are higher cheese yields/unit of milk and purebred herds marketing animals or embryos.

How much variation is there in milk protein content within breeds? The recent Northern New York milk component study obtained herd data from 52 herds. The average milk true protein (TP) in these herds was 3% with a range of 2.8 to 3.2%. All of these were Holstein herds. There were 4 herds with milk TP of < 2.8% while 32 herds had milk TP between 2.9 to 3%. There were 16 herds that had >3% milk TP. In a summary of 25 Holstein herds with > 29,000 lbs. of milk/cow, the average milk TP was 3.03% with a range of 2.9 to 3.2%.

How much does milk TP change milk price and farm income? We took a look at this using October, 2009 prices from Federal Milk Marketing Order No. 1 (Northeast area). The published price from the

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market administrator for this month was:

- Milk fat = \$1.2752
- Milk TP = \$2.5584
- Other solids = \$0.1228
- Producer differential = \$0.82

Table 1 contains milk price information for a 100 cow herd with 3.6% milk fat, 5.5% other solids and varying levels of milk TP. Note that for each 0.1 increase in milk TP, milk price/cwt increases by about 25 cents per cow per day. This value provides a starting point for assessing the potential costs and returns of balancing rations to increase milk protein yield. In this example, milk yield was held constant to show the value of a change in milk TP content and resulting increased yield on milk income.

What factors control milk protein content? In addition to nutritional factors, there are a number of non-nutritional factors. These include breed, genetics within breed, season and stage of lactation.

What are the key factors that control milk protein synthesis? The following points provide an overview of these factors:

- Amino acids are the building blocks for milk protein.
- The amino acid composition of a protein is the same each time it is synthesized.
- The profile of the absorbed amino acids does not alter the amino acid composition of a specific protein.
- The profile of absorbed amino acids does affect the quantity of amino acids that can be synthesized.
- The efficiency of amino acid use is maximized when they are absorbed with the correct profile relative to the protein being synthesized.
- Efficiency of amino acid use is decreased if the profile is not correct.
- If the absorbed amino acid profile is < ideal, then the amount of protein synthesized is determined by the supply of the 1st limiting amino acid rather than the total supply of absorbed amino acids.

Thus, the key to enhancing milk protein content and yield is to provide the right quantity and profile of the intestinally absorbed amino acids. There are 2 sources of amino acids available for absorption in the dairy cow. These are:

- Microbial protein synthesized in the rumen.
- The amino acid content and profile of the "bypass" or ruminally undegraded protein (RUP).

The key is to design feeding and management programs that provide the quantity and amino acid profile. At the 2009 Cornell Nutrition Conference, Dr. Chuck Schwab listed the following 5 steps for maximizing milk components and metabolizable protein (MP) by using amino acid formulation of dairy rations:

1. Feed a blend of forages, processed grains and by-product feeds to provide a blend of fermentable carbohydrates and physically effective fiber that maximizes feed intake, milk yield and yield of microbial protein.
2. Feed adequate, but not excessive, levels of RDP (rumen degraded protein) to meet rumen bacterial requirements for amino acids and ammonia.
3. Feed high lysine protein supplements to achieve a targeted level of lysine in MP that comes as close as possible to meeting the optimal concentration.
4. Feed a "rumen-protected" methionine supplement in the amounts needed to achieve the optimal ratio of lysine and methionine in MP.
5. Don't overfeed RUP – let the cows tell you how much they need.

What herd considerations should be met before doing a lot of amino acid balancing in a herd? The following is a short list of basic items to consider:

- Does the herd have good and consistent daily feeding management practices?
- Are forage samples routinely taken for dry matter and nutrient composition analysis?
- Do cows have adequate bunk space and/or feed availability?
- Do cow have access to a clean and adequate water supply?
- Are cows under stress? (overcrowding, ventilation, etc.)?
- Does the herd track and monitor dry matter intake?
- Are high levels of rumen available fats being fed?
- Have carbohydrate sources been replaced in the ration by added fats to increase ration NE-1 content?

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- Is a ration formulation program being used that balances rumen carbohydrates and proteins to maximize microbial protein synthesis?
- Is a blend of carbohydrate and protein sources being used to enhance microbial protein synthesis?
- Are highly digestible RUP sources being used?

Once the above items are under control, it becomes logical to balance for amino acids. If the primary goal is to see an improvement in % milk TP, you should see a response within a couple of weeks. Milk plant component analyses can be used to track these changes. As with any biological system, there will not be a response in 100% of the herds. If no response is observed, then it is logical to go back and go through the items listed above.

Table 1. Milk Price and Daily Milk Income

Milk TP, %	Milk, \$/cwt	Milk income/cow @ 65 lbs milk/cow	Daily Herd Milk Income @ 65 lbs milk/cow	Milk income/cow @ 85 lbs milk/cow	Daily Herd Milk Income @ 85 lbs milk/cow
2.9	13.51	8.78	878	11.48	1148
3.0	13.76	8.94	894	11.70	1170
3.1	14.02	9.11	911	11.92	1192
3.2	14.27	9.27	927	12.13	1213

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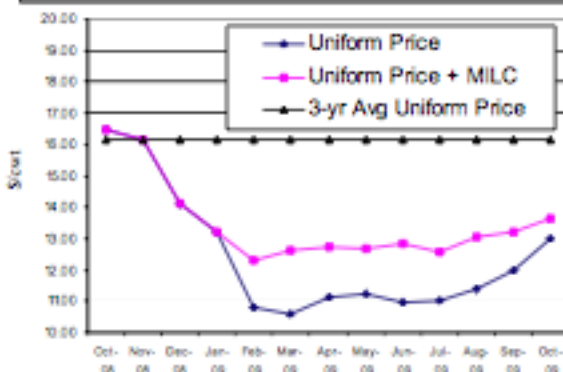
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Milk Price Watch for NNY

A 13-month summary of Statistical Uniform price* for Northern NY counties and expected MILC deficiency payments, and the 3-year average Statistical Uniform Price (Source: USDA Ag Marketing Service).



*For milk containing 3.5% fat, 2.99% protein, 5.69% other solids. The Statistical Uniform Price is the Class III price plus the producer price differential (PPD). PPD is adjusted for Watertown/Rochester, NY.

Whose Farm Is It Anyway?

The cover of the Ag Digest features a different Lewis County farm each month. The contest works like this:

1. The challenge – look closely and let us know if you think you know either of the following:
 - Farm name
 - Farm owner name
 - Detailed description of its location
 NOTE: If you need another hint, visit our web site at <http://counties.cce.cornell.edu/lewis> and click on "Agriculture" where you will see the same farm from a different (often more common) angle.
2. Call CCE of Lewis County at 376-5270 with your guess no later than December 4th.
3. All correct entries received by the deadline will be entered into a drawing. The winner will receive a prize, sponsored by our advertisers.
4. The answer and the winner will be announced in the next issue.
5. You can only win a prize once each calendar year; however, the person with the most correct answers in a year will receive the Grand Prize.

Last Month's Winner!

Last month's winner was **Joe Lyndaker** of Croghan who correctly guessed it was the farm of Joseph and Josh Zehr located on Route 812 in the town of New Bremen. Joe receives a sweatshirt complimentary of the American Dairy Association and Dairy Council.