Diluting Maintenance Cost and Marginal Milk

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Feed cost accounts for half of all production costs on a typical Louisiana dairy farm. There are several different measures (feed cost per cow per day, feed cost per cwt milk produced and income over feed cost) used to analyze feed cost. All of these measures have some usefulness as indicators of economic and production efficiency. Milk production per cow is another indicator of economic and production efficiency. Determining what level of milk production and feed cost yields the most profit for the farm should be the main objective of any measure of economic and production efficiency; because at the end of the day, the main thing that counts is the number of cwt produced and the amount of profit from each cwt. This is the economic indicator that tells you the total net income for the farm.

Higher production per cow will tend to yield greater profits because cows convert feed to milk more efficiently as they produce more milk and eat more. The maintenance cost of the cow is diluted at higher levels of milk production. Maintenance cost is the feed cost associated with the cow being able to maintain normal body functions. The amount of feed needed for maintenance does not change regardless of the level of milk production.

A typical Holstein cow requires 10 Mega-calories (Mcal) of Net Energy of Lactation (NE_L) per day just to maintain normal body functions. If her diet on a Dry Matter basis (DM) contains 0.76 Mcal/lb of NE_L , she must eat **13 lb of feed DM** to meet maintenance requirements.

If a cow produces 30 lb/day of milk, she needs an additional 10 Mcal of NE_L. Therefore, she must consume **26 lb of feed DM** or twice as much feed as needed for maintenance. In other words, she is using 50% of her diet for maintenance.

If she produces 61 lb/day of milk, she needs to consume a total of 30 Mcal/day of NE_L or **39 lbs of feed DM**. In other words, 33% of her diet is being used for maintenance.

As the cow produces more milk, the **amount of feed** needed for maintenance remains constant. However, the **percentage of feed** needed for maintenance decreases. Therefore the more milk a cow produces, the more her maintenance costs are diluted to a smaller percentage of the total feed cost per day. At about 120 lb of milk, only 20% of feed NE_L goes toward maintenance and 80% into the bulk tank. Feed efficiency increases as a cow produces more milk up to a certain point; probably somewhere between 100 and 150 lb of milk daily.

Although feed efficiency is closely related to profitability, the relationship is not absolute. As the cow produces more milk and eats more feed, eventually she will no longer have the ability to consume more feed. Therefore, as cows produce more milk, their diets must become more nutrient dense to offset the decrease in additional Dry Matter Intake (DMI). Increasing the nutrient density of the diet requires adding ingredients that are more expensive. The following table* ranks feed according to cost per Mcal of NE_L with the lowest cost ingredients listed first.

1. Pasture – 2 to 3¢/MCal
2. Corn Silage – 4 to 5¢/Mcal
3. Corn grain and byproduct feeds – 5 to 8¢/Mcal
4. Alfalfa – 7 to 10¢/Mcal
5. Oilseeds and animal fat – 8 to 12¢/Mcal
6. Protected fats and protein supplements – 12 to 40¢/Mcal
7. Minerals, vitamins and buffers – very expensive per Mcal because they do not contain energy

*Table adapted from Focus on Profits Rather Than Feed Costs by M.J. VandeHaar, Ph.D., Alliance Nutrition ® Dairy webpage.

Dry Matter Intake (DMI) is influenced by a variety of different variables such as cow comfort, heat stress, energy level of the diet, ration digestibility, palatability and others. Therefore, increasing DMI requires not just adding more expensive ingredients to increase the nutrient density of the diet, but also changing the management of the cow to offset the other variables affecting DMI.

Feed cost per 100 pounds of milk produced is a common indicator of economic efficiency and decreases considerably as daily production increases. For example, suppose the feed cost per cow per day is $2.50 for cows producing 30 lb per and $3.00 per day for cows producing 60 lb of milk per day. Feed cost per cwt milk produced for each production level would be:

*Milk Level (lbs)	Feed Cost	Feed Cost/CWT
30	$2.50	$2.50/30 X 100 = $8.33
60	$3.00	$3.00/60 X 100 = $5.00

Feed costs per 100 lb of production would further decrease above 60 lb of milk production; even though feed cost per cow per day and DMI would continue to rise as more of the expensive ingredients are incorporated into the diet. Even though feed cost per cow per day and DMI continues to increase, feed efficiency and economic efficiency would also still be increasing.

Now let's look at another example of feed costs per 100 lb of production and determine which ration is more profitable.

*Milk Level (lbs)	Feed Cost	Feed Cost/CWT
80	$3.50	$3.50/80 X 100 = $4.38
90	$4.50	$4.50/90 X 100 = $5.00

* Milk is valued at $15.00 per cwt.

The difference in milk production is 10 lb per cow, feed cost per cow per day is $1.00 higher and feed cost /cwt is $0.62 higher. It appears that the milk level of 80 lb of milk would be more profitable. However, the price of milk is $0.15 per lb, so the extra 10 lb of milk would be worth $1.50 and it only cost $1.00 to get the extra 10 lb of milk. This would be considered ***marginal milk*** which is defined as the additional amount of milk that is produced from increasing feed intake or nutrient intake over and above the amount of feed and nutrients required to cover the total maintenance cost of the cow. The marginal milk cost in this case would be $1.00 for the extra 10 lb of milk produced per cow. This still amounts to an extra $0.50 per cow per day of potential profit for cows producing 90 lb of milk even over cows that are producing 80 lbs of milk. In this particular scenario, the feed cost per cwt of milk produced is, by itself, not a good economic or feed efficiency indicator. You also have to take into consideration feed cost, level of production ***AND*** the value of the milk being produced.

Increasing milk production per cow will usually mean greater profitability. However, striving to maximize production requires more nutrient (particularly energy) dense rations which can lead to more management challenges. Meeting these challenges requires close monitoring of the forage DM content; overall feed quality and dietary DMI along with routinely adjusting the overall nutrient content of the diet. The level of milk production and the feed cost associated with a particular level of milk production are key indicators of the profit potential of the herd. Keep in mind also, as milk production increases non-feed cost variables will also usually increase. These factors should also be taken into consideration in determining the level of milk production that is the most profitable for your operation.

The main questions are these: do you know the level of milk production that is most profitable for your operation? Are you maximizing the potential returns from your assets by maximizing the potential output from your farm? Are you getting the best return for your assets, your labor and your management knowledge? Are you diluting those cow maintenance costs and maximizing your ability to capture those marginal returns from your efforts and expertise? Are you leaving money on the table that could be in the bank? Are you interested in learning more about increasing your profit potential? Contact your local county agent or the LSU Department of Dairy Science at 225-578-4411.