The Elegance and Wisdom of Simplicity: As Applied to Dairy Ruminant Nutrition

By Dan Leiterman

Preface: This is the first part of a two part article addressing my thoughts about common sense strategies for dairy nutrition.

Throughout the ages and in all walks of life, mankind has demonstrated a relentless and instinctive desire to learn, to explore and to discover answers for the many complex mysteries of life and science. The quest for knowledge is essential to our success as a species. However, managing the new knowledge and applying it to our benefit is an ever increasing challenge. During our journey to learn as much as we can, it is important to remember the role of simplicity as an essential tool to help us manage the overwhelming amount of information we are exposed to every day. No matter how complex the topic, it must adhere to simple, basic and sound principles so information can be applied easily and efficiently with balance. If simplicity is not taken into account, it is too easy to lose perspective on the task at hand, forget the lessons of history, and become lost in a sea of data. Information that is consistent with simple principles will advance a cohesive, wise and efficient strategy that helps us to reach a sustainable goal. Keeping a solid tie to simplicity can provide clarity and help us stay on course in the growing complexity of our world.

Many Dairy Nutritionists Have Forgotten About Supporting Proper Rumen Function

At a nutrition conference a few years ago, I was having a conversation with a fellow nutritionist about ration balancing and protein requirements. I asked this gentleman where a cow gets the majority of her daily protein from and he responded "Well, the haylage and soybean meal in the diet obviously." He was a well-respected nutritionist and his answer was incorrect. Not just incorrect, but shockingly incorrect! The single biggest source of protein (amino acids) in a dairy cow's diet comes from ruminal microbial protein. The forages eaten by the cow enter the rumen where they are broken down by a vast array of ruminal microbes, protozoa and fungal organisms. These microbes grow and flourish, digesting the feedstuffs while multiplying rapidly. Eventually these microbes exit the rumen and enter the intestinal tract where their protein rich bodies are digested and absorbed by the cow. Ruminal microbial protein typically provides 45% to 65% of a cow's daily protein requirement. This nutritionist had forgotten all about properly supporting the rumen microbes for fiber digestion and the most basic principle of ruminant nutrition: Feed the rumen microbes properly and they will feed the cow.

In an industry that touts the scientific advancement of bypass amino acid supplementation, how many nutritionists are balancing a diet that focuses on growing more ruminal microbial protein? After all, you can buy protein from the feed mill, or your cows can grow more of their protein in the form of microbes in the rumen. I have visited with many other nutritionists that may know the right answer to this question, however, do not have a clue how to formulate a dairy cow diet that will properly support rumen function. Saying the right thing many times does not equate to an understanding of the principle nor a well-constructed diet, but the cows know the difference.

Has the Dairy Nutrition Industry Lost Its Way?

I believe that in the quest for knowledge, the dairy nutrition industry has lost its way many times and abandoned key foundation nutritional principles and the wisdoms of simplicity. The intentions of learning can be admirable, and the discovery of knowledge can be intoxicating. The more we learn the more we get to peek into the wonders of our world. However, many times the basic principles of simplicity and

it's wisdom seem to be ignored; especially when there is the potential to apply new knowledge to the sale of a product/idea for business profit, or a misguided agenda.

Ration balancing has become so complicated today, that even the most advanced nutritionists are finding it very difficult to apply their experience and common sense to the art of dairy nutrition. Rather, they are overly reliant on a computer software that is designed by others to calculate the ration. Many of these "optimized" dairy rations are pre-programmed to ignore the basic biological principles of healthy cows and sustainable profitability of the dairy producer, in favor of advancing commercial product sales. Consequently, the ration can look good on paper according to targeted nutrient goals, yet totally ignore many of the simple biological principles of a healthy, sustainable cow. It is easy for many to accept these rations without challenge, in large part due to the momentum of the industry's marketing machinery to support product sales which is supposedly legitimized by the desire for higher milk production, rather than long-term return-on-investment (ROI). The narrow focus on higher milk production seems to have become a license for key members of a dairy producer's team to ignore the common sense, simple biological dairy cow principles that support the ultimate goal of a sustainable business model for the dairy producer.

Simple and Wise Principles That Stand the Test of Time

Having been in the livestock nutrition industry for 47 years now, I find it fascinating to reflect on how much science we have learned in dairy nutrition since I started in 1974. However, some foundational, simple and wise principles that still hold true, seem to have faded from memory and provide little guidance for many in the industry today. For example, consider some of these simple, but key principles, like:

- Feed a cow like a cow.
- There is no good substitute for high quality forages in the diet.
- Listen to the cows, they will not lie.
- That old cow made me money.
- It is hard to be efficient with inefficient tools.
- Feed the ruminal microbes, and they will feed the cow.
- Do not fight Mother Nature, work with her.
- Whatever you do, don't make it worse.
- It is not about how much money you make, but rather how much money you can keep.

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These simple and fundamental principles may seem colloquial, but I believe they hauntingly clear the fog of science and can remind us of what is, and always will be, important for the health of dairy cows and the related profitable success of dairy producers.

Dairy Cow and Calf Nutrition Ideas That Have Come and Gone

The following is a list of some products and feeding concepts that have been introduced into the dairy industry during my career that have lost appeal for a variety of reasons. Despite the supportive research that was presented, they may not have performed according to expectations, did not provide a positive ROI, had serious logistical problems, were proven to actually be detrimental, did not support sustainable business goals for the dairy producer, or all of the above. For whatever reason, the initial excitement at the introduction of the new product or feeding concept eventually met with the realities of life/science/simplicity/common sense/economics and lost favor in the market. It is a bit staggering to think of all the money that has been spent in the dairy industry over the years on ideas that were inevitably destined to fail before they were even introduced, despite all of the "supportive data" and strong marketing efforts. If some basic, simple principles of dairy nutrition would have been considered properly at the onset, I believe many of these products and ideas would not have entered the market to begin with.

Here is my walk down memory lane and a reflection on some ideas that were thought to be great, but time proved they were not. Included are a few of my personal observations and overviews:

Energy Sources That Failed Ruminant Nutrition

The following energy sources have been found to be counter-productive to fiber utilization by ruminal microbes, reduced milk components, were destructive to rumen microflora, inhibited protein utilization, and had low bioavailability during early lactation, warm weather or heat stress conditions. Some of these energy sources also challenge optimum liver function. The higher energy values these ingredients provided on paper gave the perception of solving the energy needs of a high production cow. However, biologically these sources did not pass the simple and fundamental principles of ruminant biology and became problematic:

- Tallow fat
- Raw soybeans
- High oil corn
- Full fat distillers grains
- Loose vegetable oil

Protein Sources That Failed Ruminant Nutrition

- Soy protein based calf milk replacer for newborn and young calves. Calves struggle to cope with soybean sourced protein, especially in the first three weeks of age.
- High protein (19-21%) rations for early lactation dairy cows. Ruminal microbes are, and should be, the primary source of protein and amino acids to the cow, not the dietary/supplemental protein.

Dietary Concepts and Additives

- Organic Acids: Extremely unpalatable and did not deliver on production expectations even if the cows ate it.
- De-worming Lactating Dairy Cows: Use of a five day de-wormer with no milk hold. Mature lactating dairy cows typically have very low internal parasite challenges compared to heifers/youngstock. The result was a wasted effort and expense. Need was low. ROI was low.
- Feeding Digestive Enzymes Direct to Cows: Expensive, low ROI, and unreliable performance.
- Direct Fed Microbials (DFM): To enhance rumen function in lactating dairy cows.

Question: If a cow's diet cannot support the proper rumen microflora, why would the DFM do any better? This does not address the root issue. A more common sense approach would be to fix the ration to properly support optimum rumen microbial function so the cow can grow their own microflora.

Macro Minerals

- Feeding high phosphorus lactating dairy rations to improve reproductive performance: Instead of asking, "Why can't the cow utilize the phosphorus in the diet properly?", increasingly high levels of phosphorus were fed in the misguided hope that it would improve reproduction.

How Did We Get Where We Are Today vs. the Old Days?

I do not know for sure how the dairy industry arrived at this point, but I believe it is partially due to taking an eye off the bigger picture of net profit (profit after expenses/return-on-investment, ROI). Being distracted by the allure of gross profit (total milk production), which is easier to monitor and demands less accountability to a sustainable business model, also contributes to drifting away from the simple foundational principles of good dairy nutrition and a profitable dairy business model.

I believe that focusing on a goal to achieve the best lifetime production for dairy cows is a smart business model for the dairy producer. It brings cow longevity into the business formula and would require new rules for a biologically supportive nutritional strategy and a different attitude towards a more sustainably managed dairy cow. What is needed are healthier guidelines that are more biologically aware and compatible. For example, the highest milk production occurs in cows during their 4th, 5th and 6th lactation. Much of the United States' dairy industry seems to be attempting to force first and second lactation cows to milk like 4th, 5th and 6th lactation cows before they are biologically ready. The result is higher feed costs, reduced cow health, reduced longevity, poorer reproduction performance, higher cull rates and less profitability for the producer. The genetic industry truly benefits from a 40% to 50% annual culling rate, but I doubt the farmer does. Goals and management styles that targets a cow to produce 150,000 to 200,000 lbs. per lifetime means the cow must be fed and cared for in a manner that keeps her healthy, lets her naturally reproduce and also meet these lifetime production goals as well. Focusing on lifetime production for a dairy cow is successfully followed in other parts of the world. We can do it here also.

I remember the days when cows were fed only a ground ear corn and soybean meal based grain mix with dry baled hay as the forage. Granted, milk production in the good old days may have been less than now, but "simple" principles were soundly in place that would have off-set some of the lower production. For example, healthier cows that lived longer had higher milk production due to proper maturing of the cow (optimum production during 4th, 5th and 6th lactation), and they actually showed heat without hormone treatments. Milk components were strong and life was a bit simpler. I am not proposing that we go all the way back to the old days. However, we could and should bring some of the simple and wise principles of that time forward in order to help shed much of the financial waste the industry is experiencing. This would help us to refocus on lifetime cow production and net profit for the dairy producer. As I have indicated here, there are still many products and feeding techniques employed today that do not pass the smell test of simple common sense and do not fit into a smarter and more profitable business strategy for the dairy producer.

In part two of this article (to be published in the August 2021 issue of the Crystal Creek® Newsletter), I will be addressing products and concepts that are used in the dairy industry today that I believe are not needed. The Crystal Creek® Dairy Nutrition Model is built on key, simple, biologically sound principles of dairy nutrition that have stood the test of time. Profitable, sustainable, common sense dairy nutrition is achievable in today's dairy industry. Give Crystal Creek® a call and see for yourself. You will be glad you did!

References available upon request.