Priority IAC: Enhancing Rumen Function & Protein Conversion Efficiency

by Paris Reidhead

In last month's issue of *The Milkweed*, I detailed cutting-edge, ruminant, nutrition technology, the mission of which is to improve rumen function ... and thus boost profitability of farmers who own and feed ruminants.

The goal of enhanced rumen performance is at least two-fold: first, improve the cow's feed conversion efficiency; second, improve her health. In my April 2021 article, the folks at Manitowoc, Wisconsin-based Priority IAC (International Animal Concepts) pointed out the similarities between laboratory fermentation vats and bovine rumens. In the words of Priority IAC's Ken Schneider (Microbiologist), "Fermentation tanks in the laboratories and rumens in cows are all very similar—- they all are little fermenters. The digestion tract of all animals is all about proper fermentation."

My first encounter with on-farm attempts to productively orchestrate cows' ruminal events (as well as their complete gastro-intestinal system) took place in 2014. On a writing assignment for the October 2014 issue of *The Milkweed*, I interviewed, in person, Ken Wilson at his North Country New York Holstein dairy farm. The Wilson family managed 120 milking cows, 20 dry cows, and 150 heifers on 635 acres, which bordered Black Lake, a 26-mile-long water body, very much protected by that state's conservation department. The Wilsons contained their cattle's off-pasture manure in an A.O. Smith Slurrystore. Their feeding program centered on sprouted barley, with large amounts of corn silage. The need to minimize the amount of undigested manure solids (and thus total manure volume) forced them to research ways to increase total feed digestibility in their cows' diets. That challenge made Ken and his father John receptive to sprouted barley feeding … a practice perfected by Australian producers.

Prior to embracing sprouted barley feeding management, Wilsons had tested their cows' manure and learned that almost 30% of the starch was undigested. That fact represented a serious feed loss, and also caused their Slurrystore to fill up much more rapidly than desired. But shifting to a feeding regimen that included 18 pounds per head, per day of barley sprout fodder lowered manure starch levels from 30% way down to 5-7%. As a result of this increased feed digestibility, daily manure output dropped by 15-25%, year-round. That reduction in overall manure volume per day meant that their manure tank didn't need emptying until May… compared to March during the "pre-fodder" days. The extra six to eight weeks' grace period for emptying the Slurrystore meant that slurry could be applied to ground just before corn planting … rather than much of it being spread on un-melted snow.

Revisiting Priority IAC

When I last visited Wilsons, they told me that foot health had improved significantly, and that annual culling rate had dropped from 19.23% (pre-fodder) to 16.92%. Somehow, their feeding barley sprouts fostered … inside the bovine digestion system … an environment highly favorable to micro-flora occurring naturally in the rumen. The greatly increased feed conversion efficiency, observed at Wilsons, made me aware that opportunities for improvement in ruminant feed conversion do abound. This in turn made me most receptive to Breunig's (and Priority IAC's) philosophy: "We're the only company bringing the fields of microbiology and novel nutrition together for animal health, as well as providing a more cost-effective and easier approach to nutrition."

On May 7, 2021, I reconnected with Breunig by phone… flattered that Priority had added my April 2021 article in *The Milkweed* to their firm's website (priorityiac.com). Richard Breunig told me that Priority IAC presents orchestrated (my word choice) fermentation as a health tool. He said that the mainstream dairy industry in the U.S. increasingly uses sexed semen to offset cattle losses caused by poor cattle health … due in great part to unhealthy rumens. Such losses are bad enough that the average American dairy cow produces milk in her herd for little over two years, until she's culled for health-related reasons … or just dies on the job. Contrary to that debacle, Priority IAC's approach is to use nutrition/biology to shore up animal health. Because the firm's approach works, Breunig's team early on encountered heavy opposition from the mainstream feed industry. "Bad-mouth the competition" is a very common marketing tool, when some business owners exhaust good things to say about their own products.

Richard Breunig explained that if the immune system isn't robust, vaccines won't perform the way they're supposed to … a statement that applies equally to animals as well as humans.

The bovine's rumen is dynamic. Breunig pointed out that rumen troubles aren't caused by too much starch, rather by the fermentablity of fiber as it is a source of energy, just like corn. Fiber falls into two categories: usable and unusable carbohydrates. He strongly recommends against feeding straw for scratch factor: "You may as well feed wood shavings as they are both unusable". The usable carbohydrates in fermentable fiber chemically change to glucose when the right microorganisms are present to ferment them; fermentable fiber is a very efficient source of nutrients/energy for the cow.

Priority IAC uses several very select strains of genus *Lactobacillus* to ensure that all the carbohydrates are digested. In digestion, these carbs morph into lactic acid (with pH of 2.4). Those compounds are then crafted by the bacteria into volatile fatty acids (VFAs). Microbiologists consider these VFAs to be waste products of the *Lactobacilli*. Those waste products now boast a pH of 4.8. He said that if the pH stalls at pH 2.4, "everything shuts down with acidosis; if the pH is right, the rumen will gyrate like a sloshing washing machine."

The optimal pH of the rumen is 5.8-6.6, the ideal environment for the rumen microorganisms to perform best yet is a very small window on a pH log

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scale. The **Smart***bacteria* eat something, make something, and then they die. When the microorganisms die, they make microbial protein. The cow benefits not only from the VFAs produced in the process, but the microbial protein from the dead bacteria as these cells are broken down and used by the cow as amino acids. Microorganisms are the life in the rumen and make nearly everything.

With May 2021 soybeans priced over $16.00/bushel and one to two years of adverse weather having hit U.S. dairy farmers, Microbiology Nutrition is about helping the cow make her own protein, allowing for producers to be more efficient with less fed proteins as the microorganisms as the source.

Breunig's initial motivation

Richard's introduction to microbiology came through a feed formulation error. Reflecting on this misfortune … which occurred while he was managing Clover Mist Farms … he states that the "train-wreck" in question was caused by a feed-mixing error that decimated the herd. With animals dying … some trusted consultants bolting, and other consultants offering less than helpful information,… Richard was in a lonely position, struggling to rescue the remainder of the herd.

But what was one of Richard's greatest challenges, has turned out to be the greatest part of his professional life's learning process. Clover Mist Farms, a premier breeding establishment at the time, was saved by Richard's intense study of nutrition and microbiology. While still in recovery mode at Clover Mist Farms, Breunig founded Priority IAC, Inc. in 1998. Thus far, Priority IAC is the only company combining the fields of microbiology and novel nutrition together for animal health; as well as providing a more cost-effective and easier approach to bovine nutrition. He refers to this plan of action as Microbiology Nutrition.

As part of this plan… according to their website… "Priority IAC maintains a research and product development mentality that starts on the dairy. Priority IAC provides education on how each branded strain of **Smart***bacteria* works, how the most fermentable, home-grown forages can be used, and how producers can monitor their cow performance to know what adjustments to make. P-One™ (their "flagship" product) is a new concept. It's different: less costly, more efficient, and a much more effective way to feed cows." The inclusion rate of P-One™ is very small, as numerous **Smart***bacteria* are delivered in this small package. The return back to the producer through the use of Microbiology Nutrition is tremendous with reduced ration costs, less added proteins, and fewer costly feed additives; all while making use of high-quality forages.

According to Breunig, for optimum performance the pH of the milk cow's rumen should be in the 5.8 to 6.6 range. The more that the rumen pH falls below that optimum range, the more acidosis is increased. And if the rumen pH swings the other side – above the optimum range – the rumen will experience alkalosis.

Let's get into the dollars and cents details. If a 25# bag of P-One costs $168.00, then adaily dose of 0.05# per head costs $0.34. If feeding P-One at that rate lowers supplemental soybean (protein) requirements by 3# per head per day (as asserted by a respected New York dairy farmer I've interviewed), and soybeans are priced at $16/bushel ($0.27/lb), then the reduction in feed costs amounts to $0.81 per cow per day. At these price/cost estimates, the return on investment is 138%.

Not just another probiotic

Early in our May 7 conversation, I lumped the ***Smart***bacteria* in the general category of probiotics. Breunig asked me not to do that, because "probiotic" has become an all-inclusive term… with no stated … or even implied … performance guarantee. Conversely, Priority IAC's **Smart***bacteria* have guaranteed numbers of colony-forming units, plus a statement of purpose, explaining why each of these strains is there in the first place. On the Priority IAC website Breunig explains:

"Not all bacteria or bacteria strains are the same, the strain truly matters. The unique individual that is the needle in the haystack … found from the masses, as there are numerous species of bacteria, with scientific estimates at more than a trillion. There are trillions of strains (or subspecies/subtypes) of each of the different species that form the estimated population on the Earth at five million trillion, or scientifically stated as 5x10 to the 30th exponent, bacteria. Just as there are notable differences among individual people, the same is true between this unimaginable number of bacteria strains. Among the many strains within each family of living bacteria, there are significant differences between individual strains. Some strains have little impact or can even negatively affect the host, while others are beneficial, even smart. Priority IAC understands that all bacteria are not the same, that the strain truly matters. Priority IAC products contain billions of **Smart***bacteria*; in fact, a daily serving of a Priority IAC product actually contains more branded strains of **Smart***bacteria* than all of the people on Earth."

Compared to orchestra

Earlier in this article I likened these very precise Priority IAC microbial ensembles to an orchestra. That said, let me give the reader some of the names of just a sample of these "musicians" and the "instruments" they play. In the gut enhancer category, we find *Lactococcus lactis* A2020™, which uses sugars and has anti-inflammatory properties. Then there's *Lactobacillus plantarum* LP100™, which integrates with the intestine to fight off disease-causing bacteria. There's *Lactobacillus casei* LC222™, which helps regulate digestive systems. Don't forget *Lactobacillus faecium* EF141™, which catalyzes efficient use of sugars.

There's *Propionibacterium freudenreichii* Prop1-IAC™, an acid consumer. In the pathogen inhibitor category, we find *Bacillus subtilis* (strains B5000h™, B50005™, B5150™), which blocks unwanted invaders. And in the immune communicator category we find *Lactobacillus reuteri* 1E-1® and *Enterococcus faecium* 2E-1™.

Increasingly, I am accepting Breunig's assessment that "pro-biotic" is very general concept, best described as a shotgun approach. By comparison, the Priority IAC Microbiology Nutrition approach can be compared to a well-sighted rifle. Additionally, many Priority IAC products are approved by organic certifiers. I have long considered beneficial microbes in agriculture (like in soil health, making cheese, making silage) as the little guys with the big names. Describing his products, Breunig expands that moniker into "the little guys with big names and even bigger jobs."