PRIORITY REPORT
For Healthy Cows®
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A Thought Provoking Discussion

It may seem a contradiction, associating nutrition as simple. But with unpretentious principles based on microbiology, nutrition is simple with Priority IAC. By understanding the function of the microorganisms and their ignition and fueling of rumen fermentation, Priority IAC is doing something that has never been done before – That's why it is so unique.

As the industry continues to use old nutrition concepts, Priority IAC has taken a different approach to nutrition, building a strong foundation on principles around microbiology. To learn more directly about the nutrition approach Priority offers, the following dialogue provides insights directly from Richard Breunig, President and Founder of Priority IAC, and Ken Schneider, Microbiologist and Nutritionist.

Background

Richard Breunig: Richard, as a self-taught entrepreneur, founded Priority Int'l Animal Concepts (Priority IAC), Inc. in 1998. Priority IAC is a farm-developed concept, family-owned company bringing this technology directly to producers. As a dairy producer managing the world-renown Clover Mist Farms, Richard saw firsthand the impact of microbiology on animal health and has strived to bring this knowledge and power directly to producers.

Ken Schneider: Ken brings 28-years of fermentation experience to Priority IAC, having specialized in growing unique microorganisms in laboratory fermentors. By understanding the function and interactions of the microorganisms, Ken would fine-tune the nutritional variables and environmental conditions, like pH, to improve their growth and ability to produce specific metabolites. His next steps with Priority were applying his many years of fermentation and microbiology experience to the rumen, the fermentor that is in every cow.

Why bring fermentation knowledge to the dairy industry?

Ken: After 28 years of experience in the laboratory, I was looking for a new challenge and heard Richard was looking for a microbiologist at Priority IAC. I saw this as a chance to learn new things, researching and applying microbiology while learning about the dairy industry. You can never stop learning, coming to Priority gave me that opportunity.

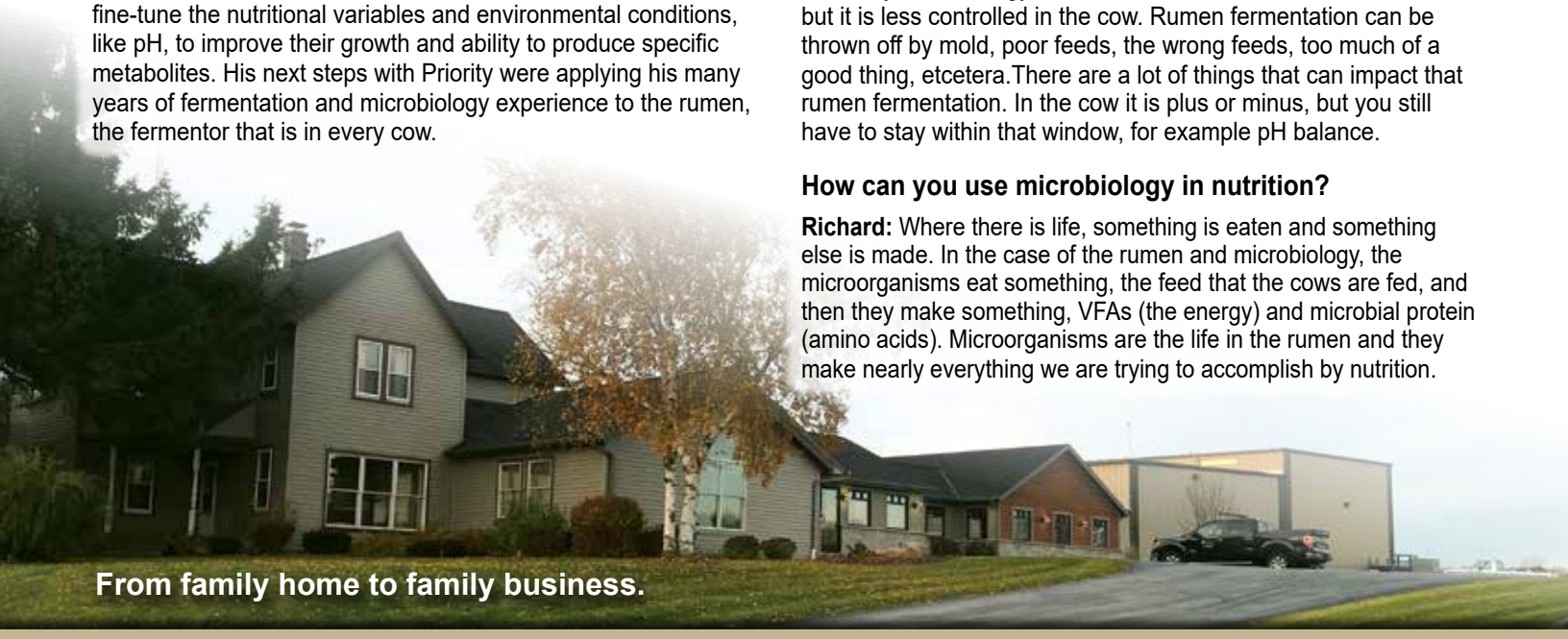
My experience with research and fermentation work was a 7 day a week, 24 hours a day job. Research isn't a 9-5 job, just like dairy farming the cows are always going.

Richard: My time on the dairy provided profound learning. A misformulated feed created tremendous animal health issues. I was quite fortunate, when things were at their worst a PhD rumen microbiologist appeared stating there were ways to alter things with microbiology. This was my first exposure to microbiology, more than 25 years ago. Having Ken's microbiology experience at Priority made sense because of what he was doing in fermentation. Fermentation tanks in the laboratories and the rumens in cows are all very similar - They are all little fermentors. The digestive tract of all animals is all about proper fermentation.

Ken: Many things we were doing in the fermentors in the laboratory are parallel to what occurs in the rumen of cows. Yes, I saw cows in the field, they produce manure and they make milk. The in between part that was happening, that is the fermentation driven by microbiology. In the lab we can control conditions, but it is less controlled in the cow. Rumen fermentation can be thrown off by mold, poor feeds, the wrong feeds, too much of a good thing, etcetera.There are a lot of things that can impact that rumen fermentation. In the cow it is plus or minus, but you still have to stay within that window, for example pH balance.

How can you use microbiology in nutrition?

Richard: Where there is life, something is eaten and something else is made. In the case of the rumen and microbiology, the microorganisms eat something, the feed that the cows are fed, and then they make something, VFAs (the energy) and microbial protein (amino acids). Microorganisms are the life in the rumen and they make nearly everything we are trying to accomplish by nutrition.



From family home to family business.

Ken: Without microbiology the cow would die. Without those microorganisms, she wouldn't be able to break down the feeds into the form she can absorb and perform on.

In the laboratory we controlled everything: temperature, pH, oxygen conditions, the food and nutrients, and the microbes required – All of these things we could monitor and control very closely. There are a lot more variables on the farm and with the cows, it's a lot different for the cow's fermentation. Her feed is different each and every day from moisture variations to fluctuations in the ingredients. We can control some of these variables by feeding our bacteria and minerals because they bring consistency. What we are feeding the bacteria has a big impact on how they grow and what they produce.

So, you are feeding these microorganisms?

Ken: Ken: Yes. They break down the feeds into a form the cow can utilize.

Richard: Yes, we are looking at each bacteria as being an individual organism that requires research and understanding of what nutrition it needs to grow, and then how to optimize their growth.

Ken: Growth and producing their metabolite. In the laboratory we were growing a specific microorganism that produced the specific end product, for example an enzyme, antibiotic, or chemical.

Richard: So, everything is life. Bacteria is life. Life needs a food source to optimize its growth and then it makes something. It can make something good, very beneficial for the body, or it can make something very harmful.

Ken: How you feed them will affect that. A great example is yeast. If you feed yeast too much sugar they will produce alcohol, whether you want them to or not. But if you feed the yeast at a low sugar level, you can get a different product and not alcohol. The same is true for other organisms.

Priority IAC producer meeting

Richard: I look at the industry as microbiology first and then nutrition. In fermentation, it is understanding who is the individual you are working with and determining what nutrition it needs for the best performance.

Ken: Yes, the correct nutrition and the correct growth conditions.

Richard: And those growth conditions can be optimized through supportive nutrition. You took the environmental things into account and worked around them through their nutritional needs. Looking at the organism to figure out the environmental factors that inhibited or deterred life, then looking at the nutrition that would complement the growth of the organisms and overcome the challenges the organism would face.

Why is pH important?

Ken: We talk about pH being very important – It's actually the number one thing! If the pH isn't right, that cow's rumen/digestive tract isn't going to be right. And, that was exactly true of what is happening in the laboratory fermentor. If we are growing bacteria, pH is something we have to monitor very closely. If the pH gets off track a little bit, it will slow down fermentation. If it is too far out of line, the bacteria will lyse and die, resulting in a failed fermentation. The fermentation will explode and stop.
No bacteria, failed fermentation.

The same thing can happen in the rumen. If the pH isn't correct, digestion is going to be affected. Intakes will drop, cows will go off feed, production will decline, manure will go off track – There will be signs that something is not right. In the laboratory I knew exactly if the pH was off track as the fermentation tank would have foamed out due to cell lysis and death. The cells would have released all their proteins and cell contents, causing the solution to foam and spill out.

Richard: The same thing happens with the cow, you can tell when the pH is off track as the manure becomes inconsistent and variable.

Ken: pH is huge. Different organisms have different pH ranges where they grow best. As the pH gets too high, growth will slow and they will eventually die if the pH gets too high. The same is true on the other side, if the pH gets too low.

Richard: And if it is really off track you see bloody gut and other digestive disorders. Just like in the laboratory, when the fermentation pH is off track and foams out due to cells dying.

How does pH impact acidosis?

Richard: Acidosis or subacute rumen acidosis is incorrect pH, the fermentation cannot be maintained because the pH drops too low and the environment becomes too acidic. Not only is acidosis inconsistent fermentation, but the acidic environment damages the rumen by killing off the bacteria, burning papillae, even leading to scarring.

Ken: That is where the P-One Program™ and the *Smart bacteria* have a role – They prevent acidosis because they were selected for their ability to metabolize and transport energy efficiently. So the rumen pH is maintained in the proper range.

How can microbiology do this? What are the right organisms?

Ken: We have identified what is important, pH. Stabilize and maintain pH. Keep the rumen, the fermentor, stable with the pH where it is supposed to be. Priority has the organisms that do that. We have identified these individuals, who digest the feeds properly – The first ingredient.

Richard: All this really is, is simple principles. The Priority rations have principles that are simple and effective. 1) The organisms that get the pH right. 2) Carbons. Carbohydrates from NFC for energy. And 3) Nitrogen. Just enough protein, monitored by MUNs in single digits.

Ken: The rumen contains naturally occurring microorganisms, but what the P-One Program™ is doing is supplying the correct strains and enough of them to handle the big loads of fermentable carbohydrates and fermentable fibers that the cows are being fed today.

Why doesn't everyone feed this way?

Ken: I don't know if everyone understands it. My first week at Priority, more than 10 years ago, I asked this same question; "How many microbiology classes are nutritionists required to take?" It surprised me to find out none are required. I hope this has changed because the rumen is a fermentor. With the high quality feeds available to cows today, if you don't have the right microbes you won't get proper fermentation and/or efficiency.

Richard: One cannot do nutrition without microbiology as the foundation, they would simply be guessing - Rumen fermentation is microbiology and nutrition.

Ken: The first ingredient, is exactly right. If you take all the microorganisms out of the cow she will die because nothing would be digested. When you feed a cow, everything she gets has to be broken down into a form she can use and absorb (VFAs and microbial protein). The feeds cannot be used as is, they have to be broken down and you need these bacteria to do that – It really is the first ingredient to get that cow what she needs. To get her the nutrients into a form she can absorb.

Richard: So then it is about finding the right, specific microbes that are going to do specific tasks. Then we test and research and figure out how good they are at doing that task.

Ken: We did that in the lab, looking for the right bugs that grow the best and produce whatever product we were making, produce it more efficiently, and make more of it.

Richard: Nutrition has gotten so far off track. Computer programs are spitting out rations. If the program says the ration works, but the cow says it doesn't, nutrition is saying the cow is wrong! We've lost the basis of nutrition, microbiology has to come first, then nutrition. We need to know who we are working with in the rumen, just like in the fermentor at the lab. Then we need to know what nutrition is needed to support life and bacteria growth.

Cows are so uniquely different, but they are eating the same diet and we are expecting the same results. But microbiology shows us that it isn't possible. Everyone needs their own nutrition. The first ingredient puts the workers there to make the fermentors similar so to be fed and respond similarly to the same ration.

Ken: Those workers have a role. They have a purpose for why they are there.

How can fiber be fermentable? Can fiber really be a carbohydrate?

Richard: The rethinking of the word fiber. Or maybe it is revisiting the meaning of fiber – Fiber means wood, or something that cannot be used. But there are two forms of fiber as there is a portion of fiber that can be used. Plant breeding has advanced significantly, reducing the wood portion of fiber. This, along with earlier harvesting methods are increasing the fermentable portion and reducing the wood portion. The fermentable portion is a carbohydrate and needs to be relooked at. It functions as a carbohydrate, is just another form of corn/sugar. This has created an overload of carbohydrates, it's not the corn but the fermentable fiber that is increasing the prevalence of acidosis.

If we look at the rumen as a box, a much higher percent of what we are putting in the box is able to get used and at a faster rate. This increase has tripped the cow's rumen. If you were to overload the fermentor without the workers there, wouldn't you trip the fermentor?

Ken: Yes, it is similar – The rumens are little fermentors. The cellulose and hemi-cellulose in the fermentable fiber part are actually long chained sugars that can be used by the cow. That is why fermentable fiber is energy. With the right bacteria, they can be used. It is another carbohydrate source that isn't taken into account. They may not understand that.

Richard: Everything matches.

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Does fiber need to be long?

Richard: I believe you are thinking particle length, which is referred to as effective fiber, that it would scratch the rumen to keep it healthy, when in fact it's not doing that at all. What the wood is doing is reducing the energy load as it is not fermentable.

Ken: So it's just taking up space. Feeding straw is a good example, it is just taking up space and reducing the energy load.

Richard: Effective fiber has nothing to do with scratching the rumen or enhancing rumination. The rumen wall has nerve endings. If the pH is right, the weight of what is in the rumen will be sensitive to the nerve endings, which will enhance rumination. And these organisms, the *Smart bacteria*, when they are fed with the right nutrition, they grow exponentially. This bacteria growth is producing CO_2 and methane, producing gasses that the nerve endings are stimulated by.

So a TMR doesn't need particle length?

Ken: The gases the bacteria produce cause the rumen mat to expand. You can have shorter/small pieces, you don't need these big long pieces to get the rumen wall stimulated. Just another component that shows the impact of the bacteria in rumination.

Richard: It's not effective fiber that gave the response, it's reducing the energy load. In this case straw is not being used. To put straw in, something that was being used was taken out, therefore reducing the energy load.

The cow doesn't go to the pasture to eat the tall grass, she goes to the short, lush grass because she can ferment it efficiently and it contains more energy. Animals tell us, but we aren't listening.

Ken: It's common sense.

What is the value of microbiology in the field of nutrition?

Richard: The nutrition field has simply disregarded the field of microbiology, they say there's nothing to it. But the organisms are life and they want the right food, they want an environment that they can survive in, that they can thrive in. Feed us the right food!

Ken: There is old thinking that hasn't included microbiology.

Richard: The in-tune producer has his university study right there on the dairy. The cows are telling them every day if it is right or wrong. The producer needs someone to help him connect these dots and understand why the cows did what they did.

An example, when the cows go out to pasture they all go to the short, lush grass; not the tall stuff. So why do others say cows need this long stuff. The cow is showing us what she needs and wants.

Ken: Nutrition programs are only a guide, there still needs to be thought and respect to what the cows are telling us.

How different is the ration Priority recommends from what producers have previously done?

Ken: I am so surprised at what I am seeing producers feeding. The list of ingredients is so long; it seems like they are just trying everything.

Richard: Quite different, we work with simple nutrition principles.

Ken: It allows the producer to feed what he is growing on the farm. Producers are told to make their forages the best they can, but then they are told they are too good to feed. It is surprising because producers spend all this time and resource to grow this feed, only to be told they cannot use it. They don't understand. On the P-One Program™ we can use the best feeds possible because we have the right bacteria there to handle these really good forages. We have the right strains metabolizing the sugars and transporting them into energy the cow can use, VFAs.

Richard: Bacteria grow, reproduce, and then they die. They get recycled in the rumen and provide protein in the best form, as amino protein. We are feeding the bacteria, which then feed the cow.

Ken: Producers are coming to us looking for answers and help. I think producers should know what is happening, what they are feeding, why they are feeding it. It gives the power back to the producer. They will be able to react quicker to identify and fix challenges.