ilc resources

MINERAL WRITES

FOURTH QUARTER 2007

CALCIUM

Feed-grade calcium products are available in a wide variety of particle sizes, from liquid suspendable products to large particle products for laying hen diets.

DICALCIUM PHOSPHATE

Both 18.5% and 21% phosphorus products are available.

SODIUM BENTONITE

Bentonite products are available in a wide variety of particle sizes suitable for any purpose.

POTASSIUM

ILC Resources has both potassium chloride (KCl) and potassium magnesium sulfate (K/Mg/S) available.

All products are available in both bag and bulk.

Ham 'n Eggs

When was the last time you enjoyed a hardy breakfast of ham and eggs or maybe eggs with bacon or sausage? Do you like your eggs scrambled or over-easy? It kind of makes a person hungry just remembering.

Another image worth recalling is sitting down to a juicy steak grilled either on your own bar-b-cue last summer or maybe at your favorite steakhouse last Saturday night. Do you prefer a T-Bone or a good ribeye? Whatever suits you, stop and think about it now, okay? Let's not leave out other delectable delights such as a thick pork chop or maybe chicken Marsala with mushroom gravy and wild rice. While we're at it, remember Thanksgiving's turkey not long ago? Goodness, what about the good eating this Yuletide season?

There are so many wonderful meals that include meat, milk and poultry products, aren't there? Just recalling with delight starts the mouth watering.

Readers may share the common memories this introduction conjures up. If, on the other hand, the reader practices a vegetarian lifestyle, that preference is fine too. But, one way or another, all probably share an interest in the production of meat, milk and eggs making up these images. Our career choices in this industry attest to that.

What would be our reaction if these images became memories only and it was not possible to ever enjoy them again? Would that make us sad? Would we become angry? There are many decisions we make about what we eat based on numerous considerations from personal preference to what is healthy for us to what we are accustomed to—the list goes on and on. Bona fide arguments can be advanced from a huge range of justifiable reasoning.

Science and history continue to confirm that meat, milk and egg products are nutritious and safe. And yet there are forces attacking not only science and historical safety but the very choices we make personally about these foods.

There is a mounting movement—expanding across our continent—that targets complete elimination of these foods. Mostly, the shouting sounds innocent, sometimes convincing.

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Phytase unlocking Phosphorus in Monogastric Diets

(More to it than meets the eye)

Environmental pollution of phosphates is an on-going concern today. Excess phosphates excreted into the environment can be a cause of pollution in surface waters, leading to eutrophication (algal bloom) and consequent oxygen deficit, leading to anoxia (a condition in which there is an absence of oxygen supply to tissues) for fish and other aquatic life. Excess phosphates certainly may come from a variety of sources. Phosphates in detergents may find their way into environmental waterways. Heavy landscape fertilization of lawns and gardens may result in high phosphate levels in grass clippings and falling leaves. These in turn may find their way into waterways affecting our environment. Excess application of phosphate fertilizers on crop lands may also be a source of phosphate pollution during heavy rain runoff. Another source could be manure from livestock and poultry operations. Much effort has been expended on scientific studies in the past decade or more to reduce this potential source of pollution by minimizing dietary phosphorus (P) intakes while at the same time adequately meeting essential requirements for maintenance and performance. Plant cells contain a complex molecular structure called phytate. Phytate serves as P storage for utilization during seed germination and seedling growth. Enzymes in monogastric digestive systems cannot break down this complex and release P. Phytase enzyme added to diets will accomplish this and thus can reduce the amount of supplemental P needed to meet requirements. Not only does this action reduce excessive additions of supplemental P but at the same time reduces the potential for subsequent environmental pollution from excess P in manure. One must bear in mind that there are a variety of sources of environmental pollution of P, but fine tuning dietary sources leads to good land stewardship and improves efficiencies in animal agriculture production.

One might wonder what phytase in low phosphorus diets may have to do with calcium (Ca) nutrition. After all, ILC Resources' focus remains primarily on calcium. First of all, calcium nutrition is inseparably linked to P nutrition, whether involving bone development, egg production, milk production, or a variety of other metabolic functions.

From prior research reported on broiler poultry (refer to *Mineral Writes* 3rd Qtr 2006), we learned that calcium particle size and solubility rates play a pivotal role in P utilization after phytase enzymatic release of P from the phytate molecule. One of the *take-home* messages from that research was the need for supplementing larger particle/slower solublizing calcium carbonate in the diet to prevent reconnection of the phytate molecule from binding P again and rendering it unavailable. This is because fine particle/highly soluble calcium carbonate ($CaCO_3$) solublizes Ca^{++} too rapidly.

The efficacy of phytase on performance of Ca and P digestibility in layers fed a corn-soy diet is well established. Previously, a Nebraska study (Jalal and Scheideler—2001) reported improved Ca and P digestibilities in layer hen corn-soy diets with phytase supplementation. Phytase supplementation also improved feed intake, feed conversion, and egg mass plus showed a response in shell quality at low *non-phytate phosphorus* (NPP) concentrations.

Recently, another study adds to understanding of the complex dynamics involving calcium and phosphorus metabolism as affected by phytase supplementation in poultry layer diets.

Research conducted at the Ganzu Agricultural University in Lanzhou, China, was reported in the November 2007 issue of the *Journal of Poultry Science*. This study examined egg production and nutrient digestibility factors in layers fed reduced phosphorus diets supplemented with phytase enzymes. Findings from this study suggest that supplementation with phytases not only can improve Ca and P digestibility but also amino acids (AA) in layers fed a corn-, soy-, and by-product-based (e.g. *distillers dried grains with solubles* – DDGS) diet. A UNL study in 1999 (Jalal/Scheideler) already demonstrated improvements in AA digestibility with conventional corn-soybean meal diets supplemented by phytase in layers.

Interestingly, the Chinese study broadened the scope of this understanding to include by-product ingredients (DDGS) along with corn and soybean meal. The Ganzu University research team, led by Dr. N. Liu and Dr. F.D. Li, examined the effect of phytase on *feed intake, egg production, eggshell quality, and the digestion of P, Ca, energy, and amino acids* in layers.

Their results showed feed intake, laying rate, egg mass and eggshell thickness were significantly improved by adding phytase to the negative control diet. The experiment consisted of three different phytase enzymes. There were no significant differences observed among treatments but rather only in comparison with no enzyme supplementation to low phosphorus diets. Adding phytases to the negative control diet also improved the digestibility of Ca and P plus both essential and nonessential amino acids. Adding phytases did not significantly affect ileal digestible

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energy. In the absence of phytase, when NPP levels are reduced to borderline hen requirement concentrations, depressed performance is observed in both egg laying performance and nutrient digestibility of Ca and P as well as nitrogen (or protein as measured by amino acids), but apparently not energy. Protein (or nitrogen) and Ca may be linked together more than one would otherwise think. Historic research in the early 1980s (Singh/Krikorian) showed that Ca is required for trypsin activation necessary for protein digestion. Indirectly, dietary protein utilization may be negatively impacted by reduced trypsin-mediated activation of other enzymes. Thus, low Ca and P diets can indirectly affect other nutrient metabolism.

Linking this research with other reported findings, we start to gain a more complete picture of many interactions. From the UARK study (*Mineral Writes*, 3rd Qtr 2006) we discovered that phytase's effect unlocking P from the phytate molecule may be compromised if Ca particle size and relative solubility are not properly optimized. By the same token, we well know phytase's benefits in simply unlocking P from the phytate present in grains and other seeds. If Ca availability is low because of either dietary concentration or inadequate particle size/solubility, protein digestibility may also be compromised. In the past most dietary formulations were performed by allowing overages of nutrients to be formulated into diets to assure meeting requirements. Due to environmental concerns along with economic efficiencies, excessive dietary overages are no longer tolerable.

It is ILC's focus and intent to report on dietary matters mostly concerning Ca. However, rarely are single or simple nutritional interactions involved in dietary dynamics. For the most part, protein (amino acids) and energy are primary considerations in nutritional formulations. Following these nutrients, usually minerals and vitamins come into the picture. All nutritional factors are increasingly recognized as being intricately intertwined. As further research takes place we see these dynamics continue to unfold. Calcium may seem to be one of the less glamorous and non-controversial nutrients in diet considerations, but when we examine mounting evidence from research, we see its indispensable contributions become more evident.

Just factoring Ca supplementation alone into dietary deliberations, several points are vital. Adequate dietary Ca concentrations are certainly important to meet nutritional requirements. Interactive proportions of Ca with other nutrients (especially P) are equally critical. Additionally, biological availability factors affected by particle size and solubility make $CaCO_3$ supplementation play a major role in accomplishing desired results. All these factors need to be synchronized in well-balanced diets. That holds true for all other nutrients too. ■

Announcement of ILC Resources' New C.E.O.

We are pleased to announce that Carl D. Lamberti has accepted the position of C.E.O. of ILC Resources. This became effective following the official retirement of R.W. (Dick) Witt this past summer. As many are well aware, Witt was at the leadership helm of ILC for close to five decades. Lamberti joined the headquarters staff in 1964—just a year after Witt.

Lamberti began as assistant bookkeeper and his financial skills and savvy have served the company well throughout his tenure. His leadership and management capabilities have been key to company growth as he fulfilled "second in command" responsibilities at our company. Lamberti has consistently demonstrated steadfastness and commitment to the sound principles ensuring our positive achievements.

Many personal and professional qualities add up to successful leadership for both an individual and a company. Fundamental adherence to consistent quality and proven performance of products is certainly one. In that regard, both Lamberti—with his numerous attributes—and ILC Resources have positioned themselves as leaders. Our company's 83-year history has focused on agricultural needs in general and the nutritional needs of animal agriculture specifically. That has been, is now, and will continue to be bedrock to our business. To remain a leader in our industry, we have supported and encouraged continued research and product development of our core business, which is feed-grade *calcium carbonate*. We have stressed for years that it is NOT simply limestone. Harvested from high calcitic limestone deposits, yes, but after precise and consistent processing the results are high quality supplemental calcium to meet that vital nutrient's requirement in livestock and poultry. ILC has not been content with this posture alone. We stand firm on quality and consistency, indeed. But, we historically have embraced and supported new research to enhance the understanding of how our products perform. Lamberti brings a high level of continued commitment to this basic tenet.

We wish Dick well in his retirement and feel well assured of an optimistic future under our new C.E.O.'s leadership.

Ham 'n Eggs *(continued from page 1)*

One message seems to be directed towards a more humane consideration of how food animals are raised. When one puts a human touch to confinement, for instance, it unquestionably conjures up images of prison and deplorable conditions. Thus, caged hens laying eggs are being punished. When sows are depicted as hardly being able to stand up much less turn around and walk, they are purported to be cruelly punished and deprived. Interestingly enough, could it possibly be that these very animal conditions that are portrayed as deplorable are in fact actually protecting animals, not punishing them? Good animal husbandry practices backed up by sound scientific research proves exactly that.

Much of the populous have adopted a silent posture of inaction to these mounting efforts of curtailing animal production. It seems easier to think that if one ignores the ranting, it will go away. Or, leave the battle to organizational groups lobbying for animal agriculture. Quite bluntly, this approach is not working. As the war is being waged, the battles are increasingly being fought and won by those who oppose society's right to decide what to eat.

Bedrock to this nation has been the American farmer. He embodies the strength and positive image of what has made the United States great. It is sobering to realize that only about one percent of America's population is actively farming. Imagine how efficient and productive that one percent is, however. They are feeding the other 99 percent of us! The farmers' dedication, efficiency and very existence are under attack. The reality is that much of the U.S. still derives its living from agriculture. Just because one percent of the population can hardly sway any political vote certainly does not mean it is insignificant. What honestly should be insignificant is the loud raucous clamoring by those who would force our entire country into vegetarianism. To live and choose a vegetarian lifestyle is undeniably an individual choice. The right to choose should be staunchly defended by all. However, it is positively wrong for a small group or any group to prevent others from making their own choices. Many producer organizations are speaking out to tell the other side of this story in defense of meat, milk and poultry producers. Those voices are not being heard well or loud enough. The vast majority of us really cannot afford to sit back and rely on a few to do all the work. What can just one person do, though? He can talk to his neighbor about how economical our food really is the next time they visit about the Saturday's football game and the burgers and brats they'll be grilling. He can converse with others at the coffee shop about how much better "half 'n half" cream is instead of powdered creamer. He can tell someone at the church potluck about his farm buddy's new hog building and how clean it is. A mom could share ideas with her child about the "Incredible Edible Egg." That kid might tell a buddy next time his pal wants to order French fries instead of an omelet in the school lunchroom. Moms could buy milk instead of Pepsi for their households. There probably are unlimited actions a person could take if we ponder opportunities. Think about it. Ask yourself, "What can I do next time I run into someone who says pigs are gross?". There's nothing gross about a juicy pork chop or a good ham steak. Besides, pigs are actually very clean animals.

One of the basic tenets of this country is found in the United States Constitution. It is just as applicable today as it was over 200 years ago. "We the People of the United States, in order to form a more perfect Union…" What is at stake here is our living, our family's quality of life, and our right to the pursuit of happiness. That is fundamentally American. Think about it the next time your fork lifts a bite of egg from the plate or a juicy steak sizzles with goodness on the platter or a dish of ice cream finishes off a meal. ■

For additional information contact

Richard H Bristol, MS
ILC Resources Director of Nutrition and Technical Services

ILC Resources
500 New York Avenue
Des Moines, Iowa 50313
(515) 243-8106
Fax (515) 244-3200
1-800-247-2133

www.ilcresources.com
richardb@ilcresources.com