ilc resources

MINERAL WRITES

FOURTH QUARTER 2004

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.

Unical-P

Livestock Bedding Amendment

As an amendment to livestock bedding, powdered limestone improves the effectiveness of different bedding materials. In powdered form, $CaCO_3$ has odor-absorbing properties to help eliminate foul air conditions associated with animal waste. Further, powdered limestone helps absorb moisture, thus, improving the bedding's ability to maintain a drier environment for animals. This not only addresses animal comfort but reduced moisture helps eliminate this key component necessary for harmful bacterial growth. Yet another important feature powdered limestone exhibits is its ability to neutralize acidic conditions (low pH). What causes a potential acidic environment in bedding and why is this potentially harmful?

Many pathogenic bacteria thrive in a low pH range (4.5–6.0). Urine pH may be in the acidic range (below 6.0), especially when chronic disease is present. Common to dairy situations is on-going occurrence of elevated somatic cell counts (SCC) which are indicative of mastitis. The possible resulting acid urine deposited in bedding may stimulate additional harmful bacterial growth outside the animal, thus leading to re-infecting livestock. Applying powdered limestone to bedding, especially organic bedding, will not only help eliminate obnoxious odors but help reduce bacterial populations needing acid conditions and moisture for growth.

Yet another benefit to applying powdered limestone to bedding has been seen by farmers. Observably, there has been an equipment *lubricating effect* identified with powdered limestone treated bedding. Why might this be the case? In handling powdered limestone one experiences a slippery coating on hands and equipment alike. One might think of this in a similar way to the use of *graphite* as a lubricant. Frictional force nearly disappears when surfaces are treated with graphite.

(continued on page 4)

Recent Poultry Calcium Research

An article published in the February, 2004, issue of the Journal of Poultry Science reported results of a study involving *calcium* (Ca) levels and *phosphorus* (P) in turkeys. Animal scientists from Michigan State University evaluated the effects of various dietary Ca and nonphytate P (nPP) levels in male turkeys from 3 weeks to 17 weeks of age. The author's literature search showed that virtually no studies to determine Ca and P requirements of growing-finishing Large White toms have been conducted in nearly 40 years. The objective of this study was to evaluate the Ca and *nonphytate* P needs of Large White commercial toms with respect to growth performance and bone integrity through the entire grow-out of consumer-size toms. Much of the study's details are left to the reader's further enquiry. However, several research situations and particular findings were of interest.

One of the difficulties encountered in the experimental design of the study was realizing potential discrepancies in nutrient values for meat and bone meal, as evidenced in both Ca and P content. In later stages of growth, to spare high inclusions of fat to meet energy demands, meat and bone meal is often used in turkey diets. Actual levels of Ca and P analyzed in the feed were notably lower than formulated values. This would certainly suggest that significant differences occur between accepted book values versus actual in meat and bone meal sources. Perhaps variations may exist in bio-availability estimates as well. This realization would suggest close attention should be given to proper determination of Ca and P levels in sources of meat and bone meal used as turkey feed ingredients. On the other hand, greater and more consistent values for both Ca and P are observed in inorganic sources such as $CaCO_3$ and di-calcium phosphates.

Researchers showed bone ash to be generally higher in relation to higher levels of dietary Ca and nPP in grower-finisher phases. They observed no benefit to feeding Ca and P levels at high levels from 3-9 weeks of age. However, there was clear benefit from feeding Ca and nPP levels above NRC requirements after 9 weeks of age for bone strength and mineralization. This would seem particularly beneficial to raising heavy toms in regards to structural integrity and support during late grow-out.

There is much more information available to this study than has been reported here Please refer to the JPS 83:689-695, or contact ILC Resources. We can share the additional information as well.

Their conclusions stated that "due to the importance of P in nutrient management planning to address environmental concerns about water quality, more research is needed to confirm the dietary P needs of turkeys."

What can be said about this research? Two to three points merit consideration. There is much current emphasis on environmental and animal welfare issues that are demanding research. Indisputably, these issues are worthy of funding to find solutions. However, we should not overlook the importance of basic nutritional research as well. As genetic potential in animal performance continues to evolve and progress, there remains a great need to keep pace with basic nutrient requirement understanding. Secondly, accurate evaluation needs to continue to be given to feedstuff ingredients in assessing their *Ca* and *P* values and biological availabilities. Thirdly, consistent quality and biological availability of *Ca* and *P* furnished from $CaCO_3$ and dicals are well documented. Thus, they should continue to provide foundational contribution in dietary formulations.

For additional information contact

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Transportation Talk

by Mike Tjarks

NOTE: This newsletter typically addresses ingredient quality, research, and pertinent technical concerns in the feed industry. However, one issue that seems to be on the minds of everyone moving products in the industry is fuel surcharges. In this article, Mike Tjarks, our Vice President of Transportation, Logistics and Special Projects, provides us with an explanation of the issues involved in higher transportation costs.

A number of questions have been asked on the subject of fuel surcharges. How are they calculated? Where can we find the cost to calculate what the surcharge should be? Why should we support a fuel surcharge? What impact will ultra-low-sulfur diesel (ULSD) have on fuel surcharges? These are all good questions.

First, fuel is now the largest component in transportation costs. With costs at $2.15 per gallon and trucks averaging 5.5 miles per gallon, the fuel is about $.39 per mile. When we compare this to prices that averaged $1.20 prior to the year 2000 and trucks averaging 5.75 mpg, the cost of fuel was about $.21 per mile. This represents an 80 percent increase in fuel costs.

When we calculate the surcharge it is based on $1.20 per gallon and is equal to 1% for every $.05 increase in fuel. Some companies use a lower base some a little higher, but almost all use the same formula or a variation based on cents per mile.

The cost per gallon is based on the Department of Energy average and can be found on the internet at *http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp* or call 1-202-586-6966 and listen to a prerecorded message. Prices are adjusted every Monday at 4 P.M. EST.

Carriers have very little choice but to pass the increased costs on to the consumer. These increases can be in the form of fuel surcharges which will cause rates to go up or down. We have seen a major shift in the trucking industry from the large 50-plus truck carriers to an average fleet size of less than 10 units. These smaller carriers are less diversified and cannot easily absorb dramatic shifts in costs. Without a fuel surcharge they simply would go out of business, a trend which we have seen.

The environmental protection agency requires that at least 80 percent of diesel sold after June of 2006 has no more than 15 ppm of sulfur. This is what we refer to as "ultra-low-sulfur-diesel" or ULSD fuel. Engine manufacturers have been mandated to reduce emission on engines in 2007 and 2010. Experts say that emission reductions will affect fuel efficiency as well as the use of ULSD fuel by .25 mpg to .50 mpg. This will result in cost increases for the trucker and ultimately the consumer.

As a result of higher fuel costs and changes in the Department of Transportation regulations we have seen carriers either leave the feed industry and move to more lucrative freight or simply close their doors.

We will face many challenges in the future as changes in the trucking industry continue to impact all of our bottom lines. Higher cost and ULSD fuels are only a part of the dynamic changes. We also will be affected by a new "Hours of Service" rule change scheduled for next year. ILC Resources' logistics team stands ready to take on these challenges and will continue to work on keeping your transportation costs as low as possible while still delivering first class service.

We all need truck transportation to move our products and to receive raw materials in all areas of commerce. The carriers have no control over fuel pricing; however, they have no choice but to pass along the increase in fuel costs or they simply will go out of business. We will be subject to extreme rate increases and a reduction in service without fuel surcharges.

Environmental Concerns over Phosphorus Excretion: Is calcium involved too?

The complex picture of environmental phosphorus contamination involves more than one factor. In the December, 2004 issue of the *Journal of Dairy Science,* an article appeared entitled: "Phosphorus Concentration and Solubility in Dairy Feces: Variability and Affecting Factors." The study was conducted at the Veterinary Medicine, University of Pennsylvania. It would seem logical that higher concentrations of phosphorus in the feces — and thus in the environment — would be a simple function of higher dietary amounts being fed. Certainly it is a well accepted fact that farm P surpluses, as well as potential environmental effects, can be reduced through dietary manipulation. This particular study examined the variability of fecal P under farm conditions and factors affecting the concentration and solubility of fecal P.

As expected, dietary P concentration remains the dominant factor affecting fecal P excretion. However, other factors affecting fecal P include fecal pH (degree of acidity in feces), dietary calcium (Ca) and DIM (*days-in-milk*). Although these effects were small, they were significant contributors to fecal P as well.

This study showed that fecal P concentrations tended to increase as lactation period lengthened

The role pH plays in affecting fecal P is more intricate. Water-soluble P exists in dairy feces mainly as Ca-P complexes. As pH decreases, P in these complexes becomes more soluble. Conversely, however, higher pH ranges result in less soluble P in feces, adding to potential environmental concerns. The Pennsylvania researchers speculate that pH and Ca interact and that together they affect fecal P solubility.

As pH increased in feces so also was seen an increase in Ca concentrations. Added dietary supplementation of inorganic sources of Ca (e.g. monocalcium or dicalcium phosphates) led to increased fecal excretion of P and Ca. The researchers further hypothesized that increasing Ca supplementation with $CaCO_3$ in excess of dietary requirements could lead to elevated pH along the digestive tract. After all, $CaCO_3$ has a buffering effect resulting in elevated pH to help alleviate acidosis. Higher pH, however, also favors Ca-P complex formation in the feces, making P less soluble for absorption leading to higher excretion of fecal P.

What does this data suggest? It confirms that in dairy rations, as with all other species' dietary formulations, one must balance nutrients to adequately meet requirements. It is well understood that feeding excess nutrients is not wise. This research adds validity to that sound principle. However, we must remember that *proper use* of inorganic sources of Ca and P, i.e. $CaCO_3$ and the dicals, are not only cost effective but offer superior nutrient bioavailability.

Unical-P **(continued from page 1)**

The atoms are arranged in layers, one on top of the other, resulting in the different layers sliding over one another. To a similar degree, this describes the likely action of layered limestone atoms as well. They create a gliding effect with reduced frictional resistance. This is not to imply that powdered limestone is applied to bedding solely to improve wear on manure handling equipment, but it certainly points to an added benefit, after its main purpose.