ilc resources

MINERAL WRITES

SECOND QUARTER 2006

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.

Focus on FreFlo

In the next several issues of *Mineral Writes*, we will focus on our feed-grade calcium carbonate products for greater understanding of their properties – both similarities and differences, and applicable situations for use. Our intent is to confirm existing choices and expand thoughts for additional consideration.

In this issue we will explore FreFlo.

Let's begin with the basics of processing, which result in core gradation particle sizes of the different products. As raw rock is brought into the plant after being initially crushed, the material moves through a system of grinding and rolling equipment. As different sized particles are produced, the material flows across a series of screens. Precise ranges of particles are separated and subsequently stored according to basic gradation products. These range from larger pebble-sized material targeted for layer hen use to finely ground pulverized $CaCO_3$ typically used in liquid feed suspensions for cattle. There are several specific gradation products available in between. After separation and storage as core products, many options present themselves for potential blending. Our product FreFlo is an excellent example of this. It is a combination of large-to-fine granular material. Blended in a precise manner to form a consistent free-flowing product, Fre-Flo fits a wide variety of feeding applications.

Why would one consider a product that ranges in particle size from large to small? To answer that question, let's consider factors surrounding the nutritional needs of the livestock being fed as well as the physical handling and processing measures.

The nutritional needs of the animal being fed $CaCO_3$ are certainly important. Another factor is the actual form of the feed that will be presented to the animal. Will the feed be pelleted or in a meal? Will it be finely ground meal or a coarser texture? Will the manufactured

(continued on page 4)

Limestone or Calcium Carbonate? What's the Difference? Does it matter?

In previous issues of *Mineral Writes*, we've explored the origins of limestone in the prehistoric deposits of tiny and ancient aquatic animals called crinoids. Some 350,000,000 years ago these small creatures lived and died in warm water inland seas. During 75 million years those crinoids formed sedimentary rock on the ocean's floor. Their skeletal remains left rock ledges we know today as limestone. But just what is limestone? Are all limestone deposits the same?

According to *Chemistry and Technology of Lime and Limestone*, second edition published in 1980, Limestone is a general term embracing carbonate rocks or fossils; it is composed primarily of calcium carbonate or combinations of calcium and magnesium carbonate with varying amounts of impurities…"

This is an important fundamental definition to build upon. Limestone is a broad term, and the numerous varieties of forms, types, and purities of limestone are confusing. A listing of limestone varieties in common use includes the following:
Argillaceous limestone, bastard limestone, bituminous limestone, brecciated limestone, calcitic limestone, carbonaceous limestone, cement stone, chalk, chemical-grade limestone, compact limestone, ***coral limestone,*** *cherty limestone, clam limestone, coquina,* ***dolomitic limestone****, feruginous limestone, fluxstone, fossiliferous limestone, glass stone, glauconic limestone,* ***high calcium limestone****, hydraulic limestone, Iceland spar, lias limestone, lithographic limestone, magnesian limestone, marble, marl, metallurgical grade limestone, oolitic limestone, oyster shell, phosphatic limestone, pisolitic limestone, shell limestone, stalactites and stalagmites, travertine, tufa, whiting…*

You are to be applauded if you actually read every word. Some of the names are of natural forms and some are manufactured products. The point is simple: the list is long but they all actually pertain to **LIMESTONE.**

ILC Resources' business is dedicated to furnishing agriculture with calcium of the highest quality and purity. From the above list, this is accomplished because our source of calcium comes from *high calcium limestone.*

To carry this treatise further, we need to consider AAFCO's *(Association of American Feed Control Officials)* definitions of limestone for feed application. Two such definitions expand high calcium limestone into two basic designations: *calcium carbonate* and *ground limestone.*

1. 57.10 Calcium Carbonate ($CaCO_3$), is a product true to name which contains a minimum of 38% calcium (Ca). (Adopted 1946, Amended 1963)

2. 57.90 Ground Limestone, is an acceptable source of calcium carbonate. It must be true to name and contain not less than 33% calcium (Ca). Ground limestone must be used in all labeling. (Adopted 1952)

A third definition deals with magnesium or *dolomitic limestone.*

3. 57.11 Limestone, Magnesium or Dolomitic, is an acceptable source of magnesium and calcium carbonate. The terms

are synonymous and designate a native mineral composed of magnesium carbonate ($MgCO_3$), and calcium carbonate ($CaCO_3$). It must contain not less than 10% magnesium (Mg) and must be declared as an ingredient as magnesium limestone or dolomitic limestone. (Adopted 1946, Amended 1952, 1965)

These definitions are critical to understanding the significance of this feed grade material. ILC Resources' limestone deposits are *high calcium limestone*. The material consistently assays in excess of 38% Ca (minimum 95% $CaCO_3$). Therefore, we are processing high calcium limestone rock to furnish ***calcium carbonate*** for agricultural use in general and specifically to the livestock and poultry feeding industry.

There are two reasons this definition and designation are so important. First, it completely eliminates a great deal of confu-sion among the many varieties and forms of limestone. Second, the name ***calcium carbonate ($CaCO_3$)*** embodies the very essence of what this material is, what it furnishes, and why it so effectively performs as needed.

For years the term "limestone" has been used in the feed industry. The mind needs to then translate that term to identify it as a source of calcium (Ca). What nutritional considerations and formulations are demanding is calcium, not generic limestone. Calcium is therefore furnished by calcium carbonate ($CaCO_3$). When ingested in the diet, $CaCO_3$ reacts with acid in the digestive system (i.e. hydrochloric acid [HCl] in the stomach). The carbonate $(CO_3)^-$ portion reacts with the acid's hydrogen ion (H^+), thus neutralizing acid, elevating the pH and at the same time freeing ionized Ca^{++} for absorption. This process has a twofold benefit. Neutralizing excess stomach acid may be beneficial (same way an "Alka-Seltzer" is for humans). Plus, calcium (Ca) is released as a vital nutrient to be used metabolically as needed.

This same basic reaction is how and why calcium carbonate is effectively used as an aglime for increasing soil pH from an acidic condition to a more favorable pH range for crop production. Thus, $CaCO_3$ not only neutralizes acidic soil where needed but furnishes Ca as a vital nutrient as well.

Consequently, ***Calcium Carbonate ($CaCO_3$)*** is the appropriate name to use and best describes its role in nutrition and as a soil amendment. As a mineral product, **Calcium Carbonate** was officially adopted by AAFCO sixty years ago.

It is time we in the livestock and poultry feeding industry fully adopt the nomenclature of this mineral ingredient as *Calcium Carbonate*, not accept generically *limestone* any more. Iowa Limestone Company recognized this several years ago when deciding to reposition itself as ILC Resources. We are a resource for calcium carbonate, along with other vital mineral ingredients and added services that reach beyond being simply purveyors of limestone.

Limestone

to

$CaCO_3$

Focus on FreFlo *(continued)*

feed be a mineral fed free-choice on pasture or range? There are more questions to be factored in and answered before all pieces of the puzzle fit together to form a complete picture.

What about an acceptable particle size to optimize biological availability for best metabolic efficiency?

From a milling or processing perspective one must consider how a $CaCO_3$ product will be received into the plant, transported to storage, sent out of storage to the mixer, moved to additional processing (such as pelleting) and/or sent to final storage prior to bulk loadout or bagging. Will the $CaCO_3$ product be legged up and typically moved by auger system, belt conveyor system, or gravity flow? Does the receiving system need to be by air discharge pneumatic conveyance or from hopper-bottom through an elevator leg? Such physical considerations have bearing on what product is used, but should not necessarily be the sole determinant. Sometimes modifying handling procedures to accommodate better nutritional form is worthy of consideration.

FreFlo's particle sizes range from large-granular down to fine-granular with a small amount of particles as small as powder. This basic profile coincides with similar particle-size patterns found in soybean meal and ground corn. Broiler research has demonstrated that when $CaCO_3$ granules range from fine to large there is improved feed consumption and reduced feed efficiency versus feeding larger particles alone. Improved growth performance in pigs has been observed with $CaCO_3$ particles ranging from medium to large. In ruminants, fine particle $CaCO_3$ tends to support better starch digestion whereas coarser particles result in better growth performance. FreFlo encompasses this wider range in particle sizes.

Nutritional studies support the benefits of feeding $CaCO_3$ that range from finely ground particles to larger granules. Remember, finely ground $CaCO_3$ particles are powder, not DUST. Dust implies dirt. Speed of conveyance equipment and other measures of agitation contribute to more airborne particles. If possible, handling procedures may need to be adjusted to help reduce this. Powdered $CaCO_3$ particles are an important source of calcium.

It may be obvious that pelleted feed cannot tolerate large particle $CaCO_3$ due to scouring of pellet dies. Further, a free-choice range mineral cannot afford finely ground particles. Both of these situations — and perhaps others — warrant different product choices. That's why ILC Resources offers a variety of gradations for a variety of considerations. We welcome the opportunity to work with you in identifying your best options.

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