ilc resources

MINERAL WRITES

FOURTH 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.

Unical-L – What's special about this product?

Unical-L is ILC Resources' large granular $CaCO_3$ product that is uniform in calcium content and gradation. Calcium content consistently exceeds 38 percent, typically ranging from 38.5 percent to over 39.5 percent, depending on rock deposit location. In size, the particles range from 750 to 800 microns, giving Unical-L a large granular texture. Uniformity in both calcium content and particle size gradations results in Unical-L's appealing appearance and handling characteristics.

By visual comparison, Unical-L's particle size is comparable to a variety of common ingredients, including SBM, coarse ground corn, and dical phosphates. When mixed together, these like particles tend to stay well mixed with less potential for separation. This is especially desirable in free-choice range minerals for beef animals, where maintaining similar particle sizes throughout the mix is important. Whether a mineral mix is fed out of a well-constructed heavy-duty "weather-vane" feeder, a "turned tire," or even off the ground, uniformity in ingredient particle sizes and good material density weight are important to assure consistent delivery of mineral nutrients with each lick. Unical-L fits this profile well.

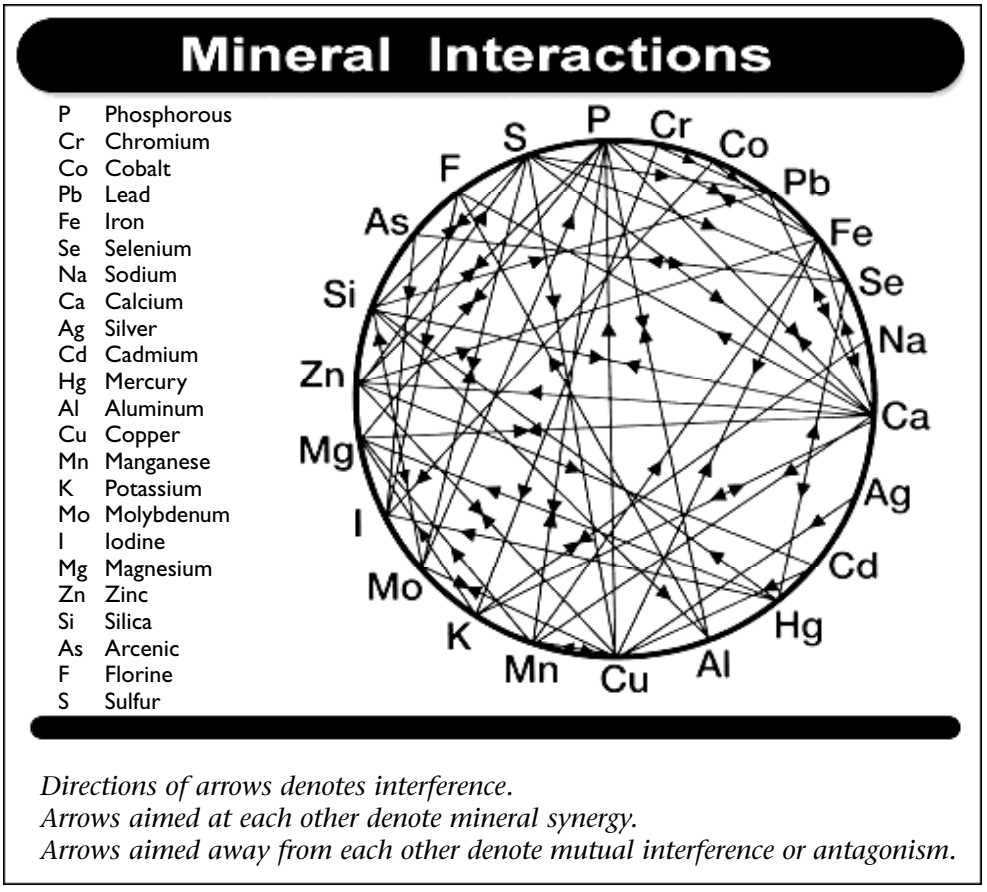
Nutritionally speaking, adequate performance is achieved in grazing cattle supplemented with free-choice minerals containing Unical-L. Beef research demonstrates that finely ground $CaCO_3$ tends to improve performance by enhancing starch digestion, presumably due to its buffering effect by raising small intestinal pH. This is an important point under high grain-feeding feedlot conditions and strongly supports the use of ultra-fine $CaCO_3$ in feedlot liquid suspensions. However, under high forage diets, fiber (or cellulose) digestion is the issue. Starch digestion leads to low pH, needing buffering; forage digestion does not. Rate of digesta passage through the GI tract under grazing conditions is relatively slow, allowing for adequate ionization of Ca^{++} from large particle Unical-L supplementation for subsequent absorption and utilization to meet animal requirements.

(**Unical-L** *continued page-2)*

Unical-L *continued from page 1*

Consequently, maintaining uniformity of ingredient particle size in mineral mixes reduces the potential for separation of ingredients. Unical-L helps accomplish this. Further, Unical-L fits a pattern of acceptable particle size range to allow for desired animal performance resulting from good bioavailability of Ca^{++} in free-choice mineral feeding schemes.

In typical winter to early spring calving schedules for the brood cow, those gestating animals would now be in their third trimester. Requirements are rapidly ramping up and nutrient needs must be met for successful calving to take place. Naturally, protein and energy needs are important, but mineral requirements are increasing as well. If we consider Ca^{++} alone, what is its significance prior to calving and following through the breeding season? The obvious role *calcium* plays is related to bone formation and teeth development, which are critical in calf development as well as maintenance for the cow's system. However, blood clotting, regulation of heartbeat, enzyme activations, and hormonal secretions involve calcium too. As the cow calves and starts lactation, milk production for her calf's nourishment is critical. The calf gets its Ca^{++} for proper bone structure, teeth development and other vital functions from the dam's milk. Soon after calving, the dam starts preparation for rebreeding. One important postnatal function is uterine retraction, and calcium plays a role. Proper mineral supplementation for the brood cow is a critical consideration for the cow-calf producer. It extends beyond calcium to other major minerals, include phosphorus, magnesium, potassium, salt (NaCl), and sulfur. Plus, the trace minerals such as copper, zinc, selenium, manganese, iron, and iodine all play vital structural and regulatory roles in maintaining proper balance for the cow and her calf in prenatal as well as post-calving growth and development. Interactions either synergistic or antagonistic exist that must be considered to ensure successful calving, nurturing, and rebreeding. To illustrate this important interaction, refer to the following chart.



Directions of arrows denotes interference.
Arrows aimed at each other denote mineral synergy.
Arrows aimed away from each other denote mutual interference or antagonism.

Unical-L *continued from page 2*

Although it appears to be a bit mind-boggling, the chart points out the necessity for balancing the brood cow's mineral program. Calcium is the single most abundant mineral needed, but it must be well balanced in relationship with all the other mineral nutrients. Paying close attention to this fact during the last trimester of gestation and into lactation through rebreeding not only will ensure good calving this season but set the stage for success next year too.

One additional thought here about *calcium* supplementation and the current attention to feeding distiller's grain co-products, either wet or dry. With increasing feeding rates of these co-products, significant amounts of added *phosphorus* (P) are being introduced to diets. This reduces demand for supplemental P certainly, but attention needs to be given to how this affects overall dietary considerations. Remember, we still need to maintain approximate 2:1 ratios between Ca:P. With elevated P levels due to co-product feeding, closer attention to additional supplemental Ca is needed. This issue may trigger change in the mineral formulation needs too as these high P co-products are fed. Food for thought anyway.

Broiler Breeder Nutrition

Collaborative Study

Ca Particle Size Effect on Eggshell Quality, Bone Ash, and P Excretion

University of Arkansas – Departomento de Zootecnia (Brasil) – USDA/ARS (Beltsville, MD)

Poultry researchers from Arkansas, Brazil and the USDA/ARS-Maryland presented their findings at this summer's Arkansas Nutrition Conference. This extensive collaborative study, led by Dr. Craig Coon (University of Arkansas), looked at different metabolic dynamics in broiler breeder hen nutrition. While the study primarily focused on amino acid and protein requirements, plus energy factors in broiler breeders, our interests here from Dr. Coon's report involve *Ca Particle Size Effect on Eggshell Quality, Bone Ash, and P Excretion.*

Feeding broiler breeders the proper amount of Ca and P is a major concern for maintaining optimum eggshell quality for hatching egg production. Calcium and phosphorus are also extremely important for maintaining skeletal bone strength and bone ash in breeders. Over the years considerable research has been conducted with commercial laying hens to define optimum levels of calcium and calcium particles size with corresponding solubility values needed for optimizing performance and eggshell quality.

Coon and fellow researchers sought to determine if feeding larger particles of $CaCO_3$ to broiler breeders improved shell quality and bone ash similar to the findings of commercial layers, and if it helped decrease the amount of P lost in the excreta. While these are known positive benefits for laying hens, broiler breeders are not typically fed large particle $CaCO_3$ for several reasons. First, they do not produce as many eggs as layers, thus, it may not be as critical during a production period. Second, much of breeder feeds are pelleted and large particle $CaCO_3$ is not conducive to pelleting. Third, competition for limited bin space may not allow for more than one source of calcium carbonate. However, feeding large Ca particles may result in slow release of Ca^{++} since larger particle $CaCO_3$ remains longer in the gizzard, leading to availability of Ca^{++} for intestinal absorption during the period of greater shell formation. Along with this continuous availability of Ca^{++} for gut absorption, there may be a reduction in

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bone mobilization of Ca and its counter ion P, especially during shell calcification, thereby reducing P excretion. Earlier research by Coon and Leske (1999) observed that commercial layers fed large particle $CaCO_3$ excreted less total P than did hens fed small particle $CaCO_3$. To increase the availability of Ca^{++} for shell calcification from the diet rather than from bone mobilization, hens need adequate metabolic Ca^{++} during the time of eggshell formation. In commercial laying hens fed large particle calcium deposited in the gizzard, Ca^{++} is available during dark hours, the typical non-feeding time, when egg shell calcification occurs. The two-fold objective of this study was to evaluate the effects of two different Ca particle sizes on a) Ca and P retention, percentage tibia ash and egg shell quality and b) the pattern of Ca and P excretion during egg laying.

A six-week experiment was conducted on broiler breeder hens to examine Ca and P retention along with percentage tibia ash while also measuring urinary Ca and P excretion. Identical basal diets were fed to the two groups of birds, with the source of calcium added to the diets consisting of two different particle sizes of $CaCO_3$. The smaller particle size $CaCO_3$ passed a 300 micron mesh screen (ILC Resources' *Unical-S),* and the large particle size $CaCO_3$ passed a 4750 micron mesh screen (ILC Resources' *Shell & Bone Builder).*

The studies found numerical improvements in both P and Ca retention in breeders fed large particle $CaCO_3$ versus smaller particle size $CaCO_3$. There was significant improvement in tibia ash content in the group fed large particle $CaCO_3$ compared to hens fed smaller particle size $CaCO_3$. The feeding of larger particle size $CaCO_3$ significantly increased the specific gravity of eggs compared to the smaller sized $CaCO_3$ fed group. A numerical improvement in both *percentage dry shell weight* and SWUSA (*shell weight per unit of surface area)* was also detected. The studies concluded that feeding large particle size Ca compared to small particle size results in a reduction of P excreted and an improvement in tibia ash in broiler breeder hens.

What type of interpretive suggestions might be drawn? The three areas of applicable poultry endeavors are: 1) any broiler breeder enterprises could potentially benefit directly from this study's findings; 2) any layer breeder applications. Perhaps due to corresponding use of large particle $CaCO_3$ in layer egg production, any breeder flock use of large particle $CaCO_3$ could easily adjust as well; and 3) turkey breeder applications. For all the points set forth by this study, nutritionally, use of large particle $CaCO_3$ makes sense here.

Very likely the biggest challenge comes into play if pelleting of feeds is involved. Use of *Shell & Bone Builder* in a pelletized feed is essentially impossible. However, offering *Shell & Bone Builder* free choice, if the feeding system allows, could be one solution. Another would be adding *Shell & Bone Builder* to the pelleted feed downstream from pelleting but prior to feeding. Points to ponder.

For additional information contact

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