

Fourth QUARTER 2011

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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.



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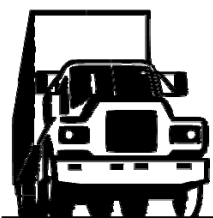
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an editorial:

Truck Inspections...

...are akin to checking the oil on the combine before going to the field to pick corn. How in the world does that figure? Actually, it may even be more important in a lot of ways. Let's take a look this!

Any piece of equipment whether a tractor or a truck or an auger needs to be checked over before using to make sure it's safe to use. A tractor or a truck low on oil may start and run, but for how long?



And when it just quits, then what? Usually a nasty repair bill results along with lengthy downtime and major hassle. How expensive and time consuming is a routine of stopping to look at the dipstick first anyway? If the oil is right up where it should be, we might have *wasted* a few minutes. What did it cost in time and money even if it was a quart low? Do we even think of this as a cost to avoid? Of course

not. While we're at, how much time does it take to inspect an auger or a drag chain to make sure it is tight and tracking the way it should or needs greasing? Even if we need to schedule time to routinely check over the cups on the elevator in the feed mill, is that going to be harder and costlier than having to replace the belting and cups if it breaks and falls? How about overlooking the grease zerks this week because we're in a big hurry to get done? What these routine steps represent is assurance that all is working well and we will be able to keep going and finish our work without delay and potential problems.



Truck arrival at plant...

A customer sends in a truck to pick up an order of calcium at one of ILC Resources' company plants. For that matter one of ILC's

trucks or one we line up may show up to do the same thing. Picking up the paperwork to fill that order and being dispatched to *loadout* the driver is asked a couple questions, among others to declare what was last hauled on that trailer – *a zerk needing a couple pumps from a grease gun*. Before the truck gets to load the product he's there to pick up, the trailer will be inspected to see if there are **any visible signs** of material present that would **contaminate** the calcium ready to be loaded. If the trailer is clean and no debris is observed, the truck passes on to be loaded. Regardless of which ILC owned plant and specific loadout location at each plant, the inspection process occurs enroute to loadout and only takes a short time to complete. Care is taken to ensure the truck does not lose his place in line either. Now, if the truck is NOT clean, the driver will need to slip out of line and clean his trailer before he comes through inspection again. The time to clean out if necessary should be after the last load is delivered and prior to arrival at our company plant. If the inspector determines the truck needs to be cleaned out and it is a "first time" offense, the driver is sent out to clean and is likely to be brought back inside for re-inspection as soon as he's ready, depending on traffic at the time. Experience dictates

that if confronted with multiple offenses, the driver will probably be sent to the end of the line. The point here is simple. Inspections do not take long to perform. If the truck is properly presented for loading by being clear of debris, virtually no delays occur.

What's the big deal...?

Some may still wonder why this inspection business is even necessary. Go back to the oil issue or grease zerk. The short time required for inspection is time well invested not time wasted. A quart low may freeze up an engine. A dry bearing may cause friction to burn up a gear wheel. A dirty trailer means a contaminated load of calcium. In today's world of hypersensitivity demanding safety of feed products resulting in a safe food supply, we cannot regard this issue lightly. We cannot afford to burn up the motor. We cannot afford to have the drag auger break and shut down production. Neglect or taking shortcuts won't save time except maybe once. It will ALWAYS cost dearly in the long run. Regarding ILC Resources' loading calcium onto truck trailers, the FDA does not differentiate between contaminated product being put into a clean vessel or **clean uncontaminated product** being put into a **contami-**



nated vessel. Either way, liability issues exist. ILC Resources limits potential contaminations by looking to see if anything is visible inside the vessel before loading good clean calcium onto a truck. Some have wanted to forego that process. If they are willing to accept that responsibility, we offer a *waiver of inspection*. That does not mean inspections are unimportant. That means the company receiving the product is willing to fully accept that responsibility instead.

"It's the right thing to do!"

We firmly believe inspecting trucks is not only necessary but is right for both parties. Regardless of circumstances, very little time is required to look in the trailers to assure their readiness for accepting good clean calcium. Why not do so?

While at present our affiliated plant locations do not offer this truck inspection procedure, we do document previous loads and have expectations of vigilance from the transportation company, their equipment, and their integrity to ensure delivery of non-contaminated products from those locations.



Broiler performance and health enhancement — Black cumin seeds and Artemisia leaves



Black cumin seeds



Black Cumin — *Nigella sativa* plant



Artemisia sieberi plant

In the fourth quarter 2008 edition of *Mineral Writes*, we reported medicinal benefits of feeding black cumin seeds in layer diets as an alternative to antibiotics. That study concluded that *black cumin seeds* supplementation positively affected egg production, egg weights and eggshell quality while actually decreasing concentrations of cholesterol in the egg yolk. Questionable availability and cost effectiveness remained unanswered. Recently another study focused attention on the possible beneficial qualities of supplementing poultry diets with *black cumin seeds*. This time supplemented broiler diets were studied that examined possible influence on both performance and health in broilers.

A team of Middle East researchers from the University of Tehran, Iran reported results in the November 2011 Journal of Poultry Science. Their study examined “Black cumin seeds, Artemisia leaves ... as phytogetic products in broiler diets and their effects on performance, ... immunity, and ... microbial populations.” {JPS 90:2500-2510}

Background:

In review, the literature reveals that “aromatic plants are frequently used in traditional medicine as antimicrobial agents, and their extracts, mixtures of natural volatile compounds isolated by steam distillation, have been known since antiquity to possess antibacterial and antifungal properties. Phytogetic additives ... have received considerable

attention as alternatives to the traditional antibacterial feed additives such as antibiotics, probiotics, and prebiotics.” Black cumin seeds grow in Asian and Mediterranean countries and the extracted oils have been used for centuries in the Middle East, Northern Africa, Far East and Asia as medicinal treatments for asthma and anti-tumor agents. More recently, black cumin seeds have been demonstrated to possess beneficial properties for broiler performance and egg production in laying hens. Also, Artemisia (*are-Ti-MEEZ-ee-a*) leaves have exhibited inhibitory effects on growth of bacteria and fungi along with weak antioxidant activity. Subsequent studies showed varying degrees of growth inhibition against the microorganisms such as *Escherichia coli*, *Staphylococcus epidermis*, and *Staphylococcus aureus*. The Iranian study presented here in part investigated the effects of feeding ground black cumin seeds (BCS) and *Artemisia* leaves (AL) have on broiler performance, blood constituents, and immunity.

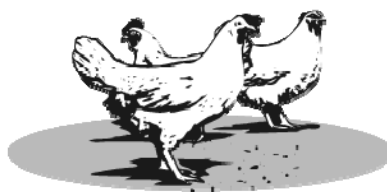
The experiment:

Day old male Ross 308 broilers were raised over a 42-day experimental period divided into two phases from day (d) 0-21 and d 22-42. A 2-phase feeding program was followed, beginning with a 22% C.P. starter diet fed from d 1 to 21 and a 19% C.P. grower diet from d 22 to 42. Treatments were 0 or 1% BCS & AL. Performance parameters studied were body weight gain, cumulative feed intake, and feed conversion ratio

(FCR) during the 42 day period. Treatment effect on immunity was measured by collecting blood serum samples post antigen injection and analyzed for antibody responses. Also, cecal microbial populations affected by treatment were measured by cecal samples collected and bacterial populations counted after *in vitro* inoculation and incubation. Organisms of interest included *Lactobacillus*, *Clostridium perfringens*, and *Escherichia coli* and coliforms. Finally, blood characteristics were examined by taking venous blood samples and measuring components including plasma triglycerides, cholesterol – *low-density lipoprotein (LDL)*, *high-density lipoprotein (HDL)*, red blood cells (RBC), and hemoglobin concentration.

What was found:

What did the researchers discover? Black cumin seeds increased body weight and decreased feed conversion rates, but did not affect feed intake throughout the trial. No interactions between Artemisia leaves and black cumin seeds were significant in these three areas. Blood characteristics were not significantly affected by AL supplementation. However, BCS elevated LDL, LDL:HDL, RBC and hemoglobin, but triglycerides and HDL were not affected. Combinations of the two plants did not significantly affect blood characteristics. Also, combining the two plants had no significant effect on antibody response. BCS alone had no effect on cecal bacterial populations. However, interaction of



AL and BCS altered cecal lactobacilli and coliforms compared with BCS alone or the control group.

Conclusions:

Conflicting results from previous studies were acknowledged, but in this study black cumin seeds significantly increased body weight and decreased feed conversion ratios without any adverse effect on feed intake. The researchers believed that "...improvement in BW and FCR might be related to the black cumin high oils or increased nutrient digestibility because of increasing the digesta retention time in the gizzard." In this study, black cumin increased LDL cholesterol and the LDL:HDL ratio but didn't affect triglycerides, total serum cholesterol, and HDL cholesterol. Previous research has shown that black cumin seeds reduce cholesterol only when administered in high doses. Presumably, the low level in this study was below a threshold of effective beneficial influence. However, supplementing the basal diet with BCS significantly increased RBC and hemoglobin, improving oxygen carrying capacity of the blood. Following additional discussion, the study concluded that "...inclusion of AL has a positive effect on gut health and that BCS alone or mixed with AL may improve broiler growth performance."



Cost effectiveness?:

What can be added from this platform's perspective? As was questioned from previous reporting, what about cost effectiveness? Could supplementing diets with *black cumin seeds* or a combination with *Artemisia leaves* positively influence performance and health while at the same time accomplish such in a cost effective manner? An internet search yielded pricing of black cumin seeds in the neighborhood of \$3.87 per pound when marketed wholesale in 55 lb drums into the human herbal industry. At this expense, 1% dietary inclusion would raise the cost of feed by \$77.40 per ton. Even more difficult to find is a source and cost of *Artemisia leaves*. An obscure website source suggested over \$15 a pound, adding an astronomical additional \$300 to a ton of feed. Costs alone appear prohibitive, but availability poses equal prohibition. Most likely outside of regions surrounding the Middle East, these supplements are simply not feasible for any practical consideration. On the other hand, could it be possible to cultivate these plants closer to U.S. geography? That could dramatically alter these cost factors and bring feasibility closer to home.

Comment:

However, the science presented here strongly indicates effectiveness in growth performance as well as improvement in health status in broiler production by dietary supplementation of AL and BCS. Perhaps the science showing effectiveness as an alternative to conventional antibiotic use may provide promise for future exploration.

More to come...?

One last generalization to ponder here is the overall contributions that *phytogenic feed additives* (PFA) seem to be presenting as possible alternatives to antibiotic growth promoters. The article

reported here certainly points to one. Other areas are gaining attention as well. Even more recently than this Iranian report is a piece of research coming out of Berlin, Germany reported in the December 2011 JPS that looked at a PFA containing essential oils of thyme and anise that demonstrated both growth performance and nutrient digestibility enhancement in broiler chickens. Additional examination of this study may well suggest a future *Mineral Writes*' edition coverage. Definite promise lies ahead with phytogenic alternatives to conventional antibiotic feeding practices which may be discontinued in future.



Mineral Writes says "thanks":

As 2011 draws to a close, this edition of *Mineral Writes* marks the 36th issue of *continuous* quarterly publication. It has been our goal to remain consistent with meeting each quarter's issuance while providing worthwhile reading. If we've pleased or even provoked readership reactions, we've accomplished our objectives, which has been to provide points worth pondering. Thank you for reading

Mineral Writes.

