

NEWSLETTER

CRYSTAL CREEK



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A complete water hygiene system for livestock that enhances water quality by breaking down the structural components of biofilm, thus removing deposits that facilitate the growth of dangerous



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APRIL 2021

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The Elegance and Wisdom of Simplicity: As Applied to Dairy Ruminant Nutrition



By Dan Leiterman

Preface: This is the first part of a two part article addressing my thoughts about common sense strategies for dairy nutrition.

Throughout the ages and in all walks of life, mankind has demonstrated a relentless and instinctive desire to learn, to explore and to discover answers

for the many complex mysteries of life and science. The quest for knowledge is essential to our success as a species. However, managing the new knowledge and applying it to our benefit is an ever increasing challenge. During our journey to learn as much as we can, it is important to remember the role of simplicity as an essential tool to help us manage the overwhelming amount of information we are exposed to every day. No matter how complex the topic, it must adhere to simple, basic and sound principles so information can be applied easily and efficiently with balance. If simplicity is not taken into account, it is too easy to lose perspective on the task at hand, forget the lessons of history, and become lost in a sea of data. Information that is consistent with simple principles will advance a cohesive, wise and efficient strategy that helps us to reach a sustainable goal. Keeping a solid tie to simplicity can provide clarity and help us stay on course in the growing complexity of our world.

Many Dairy Nutritionists Have Forgotten About Supporting Proper Rumen Function

At a nutrition conference a few years ago, I was having a conversation with a fellow nutritionist about ration balancing and protein requirements. I asked this gentleman where a cow gets the majority of her daily protein from and he responded "Well, the haylage and soybean meal in the diet obviously." He was a well-respected nutritionist and his answer was incorrect. Not just incorrect, but shockingly incorrect! The single biggest source of protein (amino acids) in a dairy cow's diet comes from ruminal microbial protein. The forages eaten by the cow enter the rumen where they are broken down by a vast array of ruminal microbes, protozoa and fungal organisms. These microbes grow and flourish, digesting the feedstuffs while multiplying rapidly. Eventually these microbes exit the rumen and enter the intestinal tract where their protein rich bodies are digested and absorbed by the cow. Ruminal microbial protein typically provides 45% to 65% of a cow's daily protein requirement. This nutritionist had forgotten all about properly supporting the rumen microbes for fiber digestion and the most basic principle of ruminant nutrition: Feed the rumen microbes properly and they will feed the cow.

In an industry that touts the scientific advancement of bypass amino acid supplementation, how many nutritionists are balancing a diet that focuses on growing more ruminal microbial protein? After all, you can buy protein from the feed mill, or your cows can grow more of their protein in the form of microbes in the rumen. I have visited with many other nutritionists that may know the right answer to this question, however, do not have a clue how to formulate a dairy cow diet that will properly support rumen function. Saying the right thing many times does not equate to an understanding of the principle nor a well-constructed diet, but the cows know the difference.

Has the Dairy Nutrition Industry Lost Its Way?

I believe that in the quest for knowledge, the dairy nutrition industry has lost its way many times and abandoned key foundation nutritional principles and the wisdoms of simplicity. The intentions of learning can be admirable, and the discovery of knowledge can be intoxicating. The more we learn the more we get to peek into the wonders of our world. However, many times the basic principles of simplicity and



it's wisdom seem to be ignored; especially when there is the potential to apply new knowledge to the sale of a product/idea for business profit, or a misguided agenda.

Ration balancing has become so complicated today, that even the most advanced nutritionists are finding it very difficult to apply their experience and common sense to the art of dairy nutrition. Rather, they are overly reliant on a computer software that is designed by others to calculate the ration. Many of these "optimized" dairy rations are pre-programmed to ignore the basic biological principles of healthy cows and sustainable profitability of the dairy producer, in favor of advancing commercial product sales. Consequently, the ration can look good on paper according to targeted nutrient goals, yet totally ignore many of the simple biological principles of a healthy, sustainable cow. It is easy for many to accept these rations without challenge, in large part due to the momentum of the industry's marketing machinery to support product sales which is supposedly legitimized by the desire for higher milk production, rather than long-term returnon-investment (ROI). The narrow focus on higher milk production seems to have become a license for key members of a dairy producer's team to ignore the common sense, simple biological dairy cow principles that support the ultimate goal of a sustainable business model for the dairy producer.

Simple and Wise Principles That Stand the Test of Time

Having been in the livestock nutrition industry for 47 years now, I find it fascinating to reflect on how much science we have learned in dairy nutrition since I started in 1974. However, some foundational, simple and wise principles that still hold true, seem to have faded from memory and provide little guidance for many in the industry today. For example, consider some of these simple, but key principles, like:

- Feed a cow like a cow.
- There is no good substitute for high quality forages in the diet.
- Listen to the cows, they will not lie.
- That old cow made me money.
- It is hard to be efficient with inefficient tools.
- Feed the ruminal microbes, and they will feed the cow.
- Do not fight Mother Nature, work with her.
- Whatever you do, don't make it worse.
- It is not about how much money you make, but rather how much money you can keep.

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The Elegance and Wisdom of Simplicity: As Applied to Dairy Ruminant Nutrition

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These simple and fundamental principles may seem colloquial, but I believe they hauntingly clear the fog of science and can remind us of what is, and always will be, important for the health of dairy cows and the related profitable success of dairy producers.

Dairy Cow and Calf Nutrition Ideas That Have Come and Gone

The following is a list of some products and feeding concepts that have been introduced into the dairy industry during my career that have lost appeal for a variety of reasons. Despite the supportive research that was presented, they may not have performed according to expectations, did not provide a positive ROI, had serious logistical problems, were proven to actually be detrimental, did not support sustainable business goals for the dairy producer, or all of the above. For whatever reason, the initial excitement at the introduction of the new product or feeding concept eventually met with the realities of life/ science/simplicity/common sense/economics and lost favor in the market. It is a bit staggering to think of all the money that has been spent in the dairy industry over the years on ideas that were inevitably destined to fail before they were even introduced, despite all of the "supportive data" and strong marketing efforts. If some basic, simple principles of dairy nutrition would have been considered properly at the onset, I believe many of these products and ideas would not have entered the market to begin with.

Here is my walk down memory lane and a reflection on some ideas that were thought to be great, but time proved they were not. Included are a few of my personal observations and overviews:

Energy Sources That Failed Ruminant Nutrition

The following energy sources have been found to be counter-productive to fiber utilization by ruminal microbes, reduced milk components, were destructive to rumen microflora, inhibited protein utilization, and had low bioavailability during early lactation, warm weather or heat stress conditions. Some of these energy sources also challenge optimum liver function. The higher energy values these ingredients provided on paper gave the perception of solving the energy needs of a high production cow. However, biologically these sources did not pass the simple and fundamental principles of ruminant biology and became problematic:

- Tallow fat
- Raw soybeans
- High oil corn
- Full fat distillers grains
- Loose vegetable oil

Protein Sources That Failed Ruminant Nutrition

- Soy protein based calf milk replacer for newborn and young calves. Calves struggle to cope with soybean sourced protein, especially in the first three weeks of age.
- High protein (19-21%) rations for early lactation dairy cows. Ruminal microbes are, and should be, the primary source of protein and amino acids to the cow, not the dietary/supplemental protein.

Dietary Concepts and Additives

- Organic Acids: Extremely unpalatable and did not deliver on production expectations even if the cows ate it.
- De-worming Lactating Dairy Cows: Use of a five day de-wormer with no milk hold. Mature lactating dairy cows typically have very low internal parasite challenges compared to heifers/youngstock. The result was a wasted effort and expense. Need was low. ROI was low.
- Feeding Digestive Enzymes Direct to Cows: Expensive, low ROI, and unreliable performance.
- Direct Fed Microbials (DFM): To enhance rumen function in lactating dairy cows.

Question: If a cow's diet cannot support the proper rumen microflora, why would the DFM do any better? This does not address the root issue. A more common sense approach would be to fix the ration to properly support optimum rumen microbial function so the cow can grow their own microflora.

Macro Minerals

• Feeding high phosphorus lactating dairy rations to improve reproductive performance: Instead of asking, "Why can't the cow utilize the phosphorus in the diet properly?", increasingly high levels of phosphorus were fed in the misguided hope that it would improve reproduction.

How Did We Get Where We Are Today vs. the Old Days?

I do not know for sure how the dairy industry arrived at this point, but I believe it is partially due to taking an eye off the bigger picture of net profit (profit after expenses/return-on-investment, ROI). Being distracted by the allure of gross profit (total milk production), which is easier to monitor and demands less accountability to a sustainable business model, also contributes to drifting away from the simple foundational principles of good dairy nutrition and a profitable dairy business model.

I believe that focusing on a goal to achieve the best lifetime production for dairy cows is a smart business model for the dairy producer. It brings cow longevity into the business formula and would require new rules for a biologically supportive nutritional strategy and a different attitude towards a more sustainably managed dairy cow. What is needed are healthier guidelines that are more biologically aware and compatible. For example, the highest milk production occurs in cows during their 4th, 5th and 6th lactation. Much of the United States' dairy industry seems to be attempting to force first and second lactation cows to milk like 4th, 5th and 6th lactation cows before they are biologically ready. The result is higher feed costs, reduced cow health, reduced longevity, poorer reproduction performance, higher cull rates and less profitability for the producer. The genetic industry

truly benefits from a 40% to 50% annual culling rate, but I doubt the farmer does. Goals and management styles that targets a cow to produce 150,000 to 200,000 lbs. per lifetime means the cow must be fed and cared for in a manner that keeps her healthy, lets her naturally reproduce and also meet these lifetime production goals as well. Focusing on lifetime production for a dairy cow is successfully followed in other parts of the world. We can do it here also.

I remember the days when cows were fed only a ground ear corn and soybean meal based grain mix with dry baled hay as the forage. Granted, milk production in the good old days may have been less than now, but "simple" principles were soundly in place that would have off-set some of the lower production. For example, healthier cows that lived longer had higher milk production due to proper maturing of the cow (optimum production during 4th, 5th and 6th lactation), and they actually showed heat without hormone treatments. Milk components were strong and life was a bit simpler. I am not proposing that we go all the way back to the old days. However, we could and should bring some of the simple and wise principles of that time forward in order to help shed much of the financial waste the industry is experiencing. This would help us to refocus on lifetime cow production and net profit for the dairy producer. As I have indicated here, there are still many products and feeding techniques employed today that do not pass the smell test of simple common sense and do not fit into a smarter and more profitable business strategy for the dairy producer.

In part two of this article (to be published in the August 2021 issue of the Crystal Creek® Newsletter), I will be addressing products and concepts that are used in the dairy industry today that I believe are not needed. The Crystal Creek® Dairy Nutrition Model is built on key, simple, biologically sound principles of dairy nutrition that have stood the test of time. Profitable, sustainable, common sense dairy nutrition is achievable in today's dairy industry. Give Crystal Creek® a call and see for yourself. You will be glad you did!

References available upon request.

How to Effectively Manage High Somatic Cell Counts



By Teresa Marker, B.S.

Herd wide high somatic cell count (HSCC) issues can negatively impact both milk quality and overall farm profitability. A recent study estimated that the cost of subclinical mastitis to the U.S.

dairy industry exceeds \$1 billion annually. The overall production loss for the average U.S. dairy farm was estimated at \$110/cow annually. This loss can be attributed to discarded milk, treatment costs, extra labor costs, milk production losses, culling and death loss. The following article will outline what steps are needed to determine the cause of a high somatic cell count, how to interpret diagnostic test results and how to create a plan to help reduce the overall herd somatic cell count.

Step 1: Culture Milk

The first step in determining the origin of a HSCC is to collect and submit milk samples for milk culture testing. Pulling a pooled sample from the bulk tank can help determine what specific type of bacteria is causing the issue. Many creamery field consultants can help with the sample collection process and can be a great resource to have on your team when dealing with milk quality issues. Once milk culture results are received, the next step is to identify which individual cows are contributing to the high count. If DHIA milk testing is used on the farm, evaluating individual cow test results can indicate which cows have the highest somatic cell count. Cow side testing using the CMT paddle test can also be helpful but this method will not identify the cause of the mastitis.

Step 2: Interpret Test Results

When the milk sample culture results come back, the lab will have identified which bacteria are involved. There are two groups of bacteria that could be causing the high somatic cell count, either environmental or contagious. Environmental causes of mastitis are bacteria that the cow contracts from the environment. These bacteria are often related to cow and stall cleanliness. Contagious causes of mastitis are types of bacteria that are spread during the milking process. Table 1 shows the threshold levels for each type of bacteria while Table 2 shows which bacteria are considered environmental and which are considered contagious.

Table 1	THRESHOLD LEVELS OF COMMON MASTITIS BACTERIA Shown in CFU (Colony Forming Unit) / ml			
Type of Bacteria	LOW MODERATE levels levels		HIGH levels	VERY HIGH levels
Strep. agalactiae	< 50	50-200	200-400	> 400
Staph. aureus	< 50	50-150	150-250	> 250
Non-ag. strep.	500-700	700- 1200	1200-2000	> 2000
Coliforms	< 100	100-400	400-700	> 700
Staph. species	< 300	300-500	500-750	> 750

	Table 2 SOURCES OF INFECTION: ENVIRONMENTAL OR CONTAGIOUS				
	Type of Bacteria	Usual Infection Source	Major Means of Spread	Mastitis Control Measures	
	Strep. agalactiae	Contagious: Infected udders of other cows in herd.	Cow-to-cow by contaminated udder wash rag, teat cups, etc.	Use separate towels to wash / dry, teat dipping, dry cow treatment, eradication in special cases.	
Source: Minnesota DHIA and The University of Minnesota	Staph. aureus	Contagious: Infected udders of other cows, contaminated bedding from milk of infected cows.	Cow-to-cow by contaminated udder wash rag, milkers hands, contaminated milking equipment, and improperly functioning equipment.	Use separate towels to wash / dry, teat dipping, dry cow treatment, milk infected cows last, cull chronically infected cows.	
	Mycoplasma	Contagious: Infected udder of other cows, often from infected purchased cows.	Cow-to-cow by hands of milkers, equipment, and common towels. Aerosol transmission from animals with respiratory signs may also occur.	Careful purchasing of cattle using bulk tank and cow culturing. Use separate towels to wash / dry, teat dipping, dry cow treatment, milk infected cows last, cull any positive clinical case.	
	Non-ag. strep.	Environment	Environment of the cow by wet, dirty lots, contaminated bedding, milking wet cows, poor cow prep, milking machine air slips.	Improve stall and lot sanitation, milk clean dry cows, avoid air leaks and liner slips, change bedding frequently. Keep cows standing after milking.	
	Coliforms	Environment	Environment of the cow by wet, dirty lots, contaminated bedding, milking wet cows, poor cow prep, milking machine air slips, hot humid weather.	Improve stall and lot sanitation, milk clean dry cows, avoid air leaks and liner slips, change bedding frequently. Keep cows standing after milking.	
	Staph. species	Environment	Environment of the cow by poor teat dip coverage, poor cow prep, old bedding.	Consistent teat dipping, adequate cow prep, and more frequent bedding changes.	

Step 3: Enact a Plan

Contagious Bacteria

Contagious types of bacteria can easily be spread from cow to cow. Cows with Mycoplasma or Staph. aureus infections are the highest on the cull list because these types of bacterial infections are not treatable. While it is not ideal to keep cows with contagious mastitis, they can be managed by being milked last, thoroughly sanitizing milking claws in between cows, and properly pre- and post-dipping. These cows should ultimately be removed from the herd.

Environmental Bacteria

There are numerous factors that can contribute to a HSCC caused by environmental bacteria such as bedding type, milking procedure, milking equipment failure and other stressors.

Bedding

Bedding should be clean and dry. If bedding is not completely dry, it can be a breeding ground for bacteria and will increase the chances of bacteria entering the udder. Klebsiella bacterial infections are common in herds that use

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How to Effectively Manage High Somatic Cell Counts

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organic bedding such as sawdust or recycled manure. Making sure your bedding is clean and plentiful will help reduce HSCC issues.

Milking Procedure

Crystal Creek[®] can help producers evaluate milking procedures and provide suggestions for areas that may need improvement. It is important to perform each step in the milking routine as accurately as possible. As the teat canal opens to let milk out, it also becomes an entry point for bacteria to enter. Key points to remember in a proper milking routine include:

- 1. Provide a low stress environment. Stressed animals will not milk out properly.
- 2. Wipe off teats with a clean paper or cloth towel. Use different towels for each cow to reduce spread of bacteria.
- 3. Pre-dip to disinfect the teats. Pre-dip should stay on the teats for at least 30 seconds to kill any bacteria. Crystal Creek® Teat Saver II or Teat Saver Concentrate are both high quality pre-dip options that will help with overall teat condition.
- Forestrip each quarter prior to milking. Remove 3-4 squirts of milk from each quarter to help remove the milk that has accumulated in the teat canal which can contain the highest SCC.
- 5. Wipe the teat with a clean cloth or paper towel. To ensure proper removal of pre-dip is taking place, hold a paper towel flat under the teat ends and press up. No dip should show / be transferred to the paper towel if the pre-dip has been properly removed.
- 6. Attach the milker. Make sure the milker is attached squarely to the cow's udder to prevent squawking.
- Post-dip immediately after the milker is removed. Post-dip should thoroughly cover the entire teat. Cows should stand for at least 10-15 minutes after getting milked to make sure the teat canal closes before the post-dip gets removed.

Take the time to analyze these management areas and periodically review procedures with employees to ensure consistency. Consistent practices will help lower somatic cell counts, increase milk production and increase overall profit.

Milking Equipment

Routine testing and maintenance of milking equipment is key to maintaining a low SCC. If the equipment is not at the right vacuum pressure or if inflations are cracked and damaged, the cows will not be milked properly. This can result in damaged teat ends and infections in the udder. Work with a local dairy supplier to plan routine maintenance checks on all milking equipment.

Stress Factors

There are a variety of stress factors that can lead to a HSCC. Transitioning into the lactation period and experiencing heat stress are two of the most common stressors cattle face. As cows freshen, the immune system is at its weakest point. This makes it a challenging time to cope with any added stress and increases the possibility of an infection establishing itself in the cow's body. Heat stress can also increase chances for a HSCC to occur. Providing plenty of fresh, clean water and proper ventilation can help reduce the effects of heat stress but will not eliminate it. Crystal Creek[®] Crystal Pellets[™] are a nutritional tool that can be used during any type of stress event to help cows better manage the effects of these stressors.

If you are having a herd wide somatic cell count issue, submit milk samples for culturing to determine if the bacterial infection originates from an environmental or contagious cause. Create a plan of action to address problem areas that may be noted in the milking procedure, the equipment itself or stress related factors. Consistency in your plan will be key in its effectiveness. Including a Crystal Creek[®] representative on your team when dealing with high somatic cell counts will be time well spent. Don't let high somatic cell counts take away from your farm's profitability.

References available upon request.

Monthly Promotions



April 2021

- 1-3 boxes: \$10/box discount
 - **4-9 boxes: \$18/box discount** (\$10/box discount + \$8 per box existing volume discount)
 - 10+ boxes:\$23/box discount (\$10/box discount + \$13 per box existing volume discount)Pail:\$2/pail discount

HEIFER PRIDE[™] \$10/bag discount & \$2/pail discount



THE MEDICAL REPORT

May 2021

Receive a **FREE Jar of Jam** or **4 oz. Udder Fancy**[™] for every \$150 of product purchased. Limit 5 per order.

June 2021



Base 1000

FLY REPELLENT \$5 per gallon discount

(4 gallons or more) **\$2 per gallon discount** (2-3 gallons) Normal Volume Discounts Do Not Apply CRYSTAL ADVANTAGE[®] EQUINE FLY REPELLENT

Concentrate: \$4 per bottle discount Ready-To-Use: \$2 per bottle discount



July 2021

Save 10% on all HabiStat[™]/Sanitation Products HABISTAT[™] LIQUID, HABISTAT[™] TABLET, CHLOR-A-FOAM DETERGENT,

FOAMASTER CLEANING GUN

August 2021

VETERINARY DAIRY LINIMENT[™] Save 10% <u>IN ADDITION TO</u> Normal Volume Discounts

Water Hygiene: How Often Do You Think About It?



By Ryan Leiterman, D.V.M. Director of Technical Services

Water is the most critical nutrient for all animals, but how often do people think about it? Would you drink out of your animal's water trough? Research shows that poor water quality dramatically reduces water consumption, which in turn lowers production and

deteriorates overall animal health. A common cause of poor water quality is biofilm formation. Preventing biofilm formation and improving water quality can be done at a low cost while providing a high return on investment for farms.

What is a Biofilm?

A biofilm is the slimy, glue-like substance that can be found most anywhere in a farm's water system. Any environment containing moisture and nutrients can produce biofilms. Common biofilm locations It is estimated that over 99% of disease-causing organisms are found within a biofilm.

include inside of pipes, holding tanks, plate coolers and water troughs. A biofilm can consist of a mixture of many species of bacteria, as well as fungi, algae, yeast, protozoa, debris, and corrosive agents.

Certain species of bacteria thrive in high iron and/ or manganese environments. This makes water that is high in iron and/or manganese particularly problematic because iron and manganese loving bacteria often grow rapidly within the water system itself, resulting in a black, foul smelling slime. Biofilms can cause problems within the water distribution system by clogging lines, plugging valves and constantly seeding the water with

Figure 1	BACTERIAL BIOFILM FORMATION - 5 STAGES			
ATTACHMENT	GROWTH	MATURATION	DETACHMENT	RE-DEVELOPMENT
Bacteria attach to a variety of surfaces, from metal, to plastic, to skin tissue, using specialized tail-like structures.	The cells grow and divide, forming a dense matrixed structure, many layers thick. At this stage the biofilm is too thin to be seen.	When there are enough bacteria in the developing biofilm the bacteria secrete a slimy extracellular matrix of proteins and polysaccarides.	The slime protects the bacteria from the harsh environments, shielding them from many chemicals, antibiotics and immune systems.	As the colonies mature, the structures created weaken and cast off bacteria that look for new places to grow and prosper.

potential disease-causing organisms as water flows through the system. Figure 1 shows how biofilms are formed and spread over time. It is estimated that over 99% of disease-causing organisms are found within a biofilm.

The use of chlorine dioxide in water systems is one of the most safe and effective methods of destroying biofilms. AquaSoar[™] is a concentrated, two component, activator / base technology that produces chlorine dioxide on site. The chlorine dioxide can then be injected into a farm's water delivery system at a low, yet effective, concentration to remove biofilms and pathogens from the water source prior to delivery to livestock. Chlorine dioxide has been proven to be more effective than hydrogen peroxide when it comes to biofilm control. The USDA has deemed chlorine dioxide to be safe when added to livestock drinking water at an amount up to 4 ppm.

Figure 2

AquaSoar[™] vs. Hydrogen Peroxide Water Treatment ORP (mV) Values



Figure 2 demonstrates the ORP (Oxidation Reduction Potential) values of each chemical technology / formulation when added to water. Hydrogen peroxide breaks apart (hydrolyzes) immediately when added to water, significantly reducing its disinfection value. AquaSoar[™] retains its high ORP values even when diluted to low concentration levels. Chlorine dioxide's ability to remove biofilms at low concentrations is one of its greatest strengths.

Why Is Chlorine Dioxide a Better Choice for Water Treatment Than Hydrogen Peroxide?

- Safe for livestock use up to 4 ppm
- Cost effective
- Effectively destroys existing biofilms while preventing future buildups
- Has a stronger oxidation-reduction potential (ORP) when compared to hydrogen peroxide. The higher the ORP value, the better it will destroy a biofilm and kill pathogens.
- Rapid killing action across a wide spectrum of disease-causing organisms
- Effective in water throughout a wide pH range
- More stable in water than hydrogen peroxide
- Effective at low concentrations and extremely soluble in water
- Helps reduce iron in water through the oxidation process
- EPA approved technology for water disinfection systems
- Environmentally friendly

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Water Hygiene: How Often Do You Think About It?

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- A = Dual Product Injection Pump
- B = RTU AquaSoar™ Semi-RTU Activator
- C = RTU AquaSoar™ Semi-RTU Base
- D = AquaSoar Activation Chamber
- E = Water Meter
- F = Controller

How Does the AquaSoar™ Chlorine Dioxide Injection System Work?

AquaSoar[™] has specially formulated activator and base precursors which produce chlorine dioxide at the highest possible yield, in the shortest amount of time. The AquaSoar[™] Activation System is then used to inject the chlorine dioxide directly into the waterline.

Figure 3 shows the AquaSoar[™] water treatment injection system. The injection system set-up is simple. A diaphragm pump (A) injects the semi-RTU activator (B) and semi-RTU base (C) into the activation chamber (D) where highly concentrated chlorine dioxide is produced. A water meter (E) senses the water volume flowing through the line and sends a signal to the controller (F) which doses the chlorine dioxide from the activation chamber directly into the water line to provide the desired ppm concentration.



BIOFILM REMOVAL AquaSoar[™] enhances primary water hygiene effectiveness by penetrating and breaking down the structural components of biofilm, removing deposits that facilitate the growth and protection of dangerous pathogens.

AquaSoar[™] destroys the biofilm structure and eliminates the bacterial presence within the water system.



A cow water trough after long-term water treatment with chlorine dioxide. Note the lack of biofilm and algae on the waterer sidewalls, despite the fact it is summer when the picture was taken.

Most farms use a step-down approach when it comes to the chlorine dioxide concentrations used in the water treatment program. It is common to start injecting chlorine dioxide into water lines at a 4 ppm concentration for the first one or two months. This starting concentration will aggressively and rapidly attack and destroy any pre-existing biofilm that may have been built up over the years within the water distribution system. The chlorine dioxide concentration is then typically stepped down by an amount of 1 ppm every 6 weeks until reaching a continual maintenance dose of 1 ppm. Using a higher concentration of 4 ppm up-front will help speed up the elimination of existing biofilm while using a lower maintenance concentration of 1 ppm will help reduce long term product usage and save the farm money.

Water is the most important nutrient on the farm but it is often forgotten. Using the AquaSoar[™] water treatment system gives producers an opportunity to improve the most critical nutrient in their animal's diet through both biofilm and pathogen load reduction. Ask yourself, would you drink out of your animal's water system? If the answer is no, your farm should consider AquaSoar[™] for improved water hygiene.

References available upon request.

CRYSTAL CREEK®

A texturized grain mix of corn, oats, roasted soybeans and molasses formulated so you can add the appropriate amount of Crystal Creek[®] mineral based on your individual animal's needs.

- Flexibility for use in multiple species
- 16% Protein
- · High quality ingredients, economically priced
- Promotes improved performance resulting in increased feed efficiency and greater return on investment
- Easy to mix
- Supports endurance and production during times of challenge

The Impact of Fly Pressure and the Importance of Fly Control



By Alex Austin, B.S.

When winter is over and warm weather arrives, it is goodbye to plowing snow and dealing with frozen water and hello to green pasture and sunshine. The warmth of spring and summer can present new challenges with the hatching fly population. Livestock

owners know flies cause pain and discomfort to animals but they can also have a negative economic impact. It is important to enter the summer season with an effective fly control plan in place to maintain animal health and minimize fly pressure effects on producer profitability.

When fly pressure is high, livestock will be stressed, spending much of their time moving to avoid areas of high fly pressure and engaging in behaviors such as tail swishing, stomping and licking to remove flies from their bodies. These behaviors have a negative influence on animal health and performance by decreasing both feeding and resting time of the animal. Figure 1 shows some of the most common fly species and their correlating significance in the livestock industry.

Studies evaluating the economic burden of flies on the United States' cattle industry show an estimated total loss of over \$4 billion annually. The top two contributors to this economic loss were Stable flies and Horn flies. Stable flies had the largest negative impact, estimated at over \$2.2 billion in annual loss. Horn flies were ranked as the second most detrimental fly species with over \$1 billion in estimated economic annual loss. These evaluations were based on decreased animal production and performance, as well as consequences on animal health and cost of disease treatment. Other fly species that were determined to cause stress and decrease performance in livestock were the House, Face, Horse, Deer, and Heel fly.

Figure 1	FLIES THAT AFFECT LIVESTOCK			
		- All		
Stable Fly	Horn Fly	House Fly	Face Fly	
Stable flies prefer to land on the lower legs of livestock and need a combination of moisture, organic matter and animal waste to reproduce.	Horn flies feed mostly on an animal's back, shoulders and sides. An individual fly can bite their host up to 40 times/day.	While house flies do not have sucking mouth parts like the stable or horn fly, they are a nuisance to livestock and known for spreading disease.	Face flies congregate around the eyes and noses of livestock and spread disease causing pathogens.	
Economic threshold of 5 flies/leg.	Economic threshold of 200 flies/animal.	Adult House flies can live for 3-4 weeks and produce up to 1,000 eggs each.	Known for negative economic impact in spreading <i>Moraxella bovis.</i> (pinkeye).	

Figure 2 CRYSTAL CREEK[®] FLY REPELLENT EFFICACY TRIAL

There are several management tools and strategies producers can use to provide animals with relief from fly pressure such as removing waste (manure, urine and dirty bedding), providing shade for livestock and using fly traps and predatory fly parasites. One of the most important tools to have available is a safe, effective fly repellent. There are many fly repellent options on the market, making it difficult to decipher which repellent is the best choice. Crystal Creek® Fly Repellent is a proven, effective choice that can be used in multiple types of applications.

The efficacy of Crystal Creek® Fly Repellent was tested in a trial by an independent laboratory that specializes in performing insect repellent efficacy trials. Both the Crystal Creek® Water and Oil base Fly Repellent formulas were tested. Stable flies were used in this trial as they are one of the most aggressive fly species and, as previously discussed, cause the most economic damage. Figure 2 is a summary of the study and its results.

Crystal Creek[®] is proud to offer customers a safe, effective fly repellent option that does not rely on chemicals. Crystal Creek[®] Fly Repellent Oil and Water base formulas are convenient to use, easy to mix and can be used as a spray-on, wipe-on or in oilers. Both formulas are clean, non-sticky and pleasant smelling. Crystal Creek[®] Fly Repellent is a proven, musthave tool for your fly control plan.

References available upon request.

TEST INSECTS: Stable flies, Stomoxys calcitrans, < 3-day old adults.

EXPERIMENTAL DESIGN: Approximately twenty to twenty-five (20-25) non-blood-fed adult Stable flies were used in each experiment iteration. An artificial blood agar host consisting of a 10 cm Petri dish bottom containing approximately five warm blood-soaked cotton balls, covered with fine nylon mesh stretched to cover the Petri dish were used. This is similar to the procedure used to rear Stable flies in the laboratory, so the use of blood-soaked cotton balls as a nutritional source is well documented. The nylon mesh of the artificial host was treated with the test substance and each host was treated with approximately 1-2 g of each of the test substances and dilution rates. The treated nylon mesh was allowed to dry for approximately 15 minutes before being placed on the host and introduced into the test cages. Untreated "hosts" or mineral oil treated hosts were used as control replicates. This laboratory testing method is considered industry standard and in accordance with best practice testing methods.

The blood agar hosts were immediately placed in individual test cages after being treated and filled with warmed blood as either a treated replicate or an untreated replicate, with a total of 5 replicates in each test group. The number of Stable fly landings with intent to bite (LIB's) and blood feeding (BF) for each host were recorded.

RESULTS AND DISCUSSION: The adult Stable flies in the untreated control group fed well on this artificial host bioassay system with an average of 24.2 flies feeding or attempting to feed. Both control groups demonstrated feeding rates well above what was observed in the Crystal Creek[®] Fly Repellent treated groups. Data for the 5 replicates were pooled for each test group and the percent repellency determined. A modification of Abbotts formula was used to determine percent repellency:

A - B ÷ A x 100 = % Repellency	A = Average Control Value
	B = Average Treatment Value

Results of the repellency efficacy from 5 separate testing iterations:

Crystal Creek® Oil Base Fly Repellent 3:1	= 96.7% Repellency
Crystal Creek [®] Water Base Fly Repellent 3:1	= 77.7 % Repellency

CONCLUSION: Both the water-based and the oil-based formulations of Crystal Creek[®] Fly Repellent provided a high degree of repellency against adult Stable flies.



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