CRYSTAL CREEK NEWSLETTER
APRIL 2019

What's New For 2019

Crystal Creek® Foundation Grain Mix

Crystal Creek® has added a new product to our nutrition line that is a high quality, multi-species, texturized grain mix of corn, oats, roasted soybeans and molasses. Crystal Creek® Foundation Grain Mix is for livestock owners in need of a base feed to deliver protein and energy to multiple species of livestock. The easy to handle 50 lb. bag makes the pairing of the Foundation Grain Mix with the appropriate Crystal Creek® mineral a quick and easy task to create a superior complete feed.

Crystal Meal

Crystal Meal is a new product that has all the benefits of a longtime customer favorite, Crystal Pellets™, but comes in a versatile meal form allowing for easy mixing into feedstuffs.

Favorite Newsletter Articles from the Past: *Over the last 20 years we have published a number of articles that are referred to by our customers as "favorites". In 2019 a select few of these timeless, most referenced articles will be re-appearing in our upcoming newsletters. If you have an article you would like to see re-printed, call or email us at info@crystalcreeknatural.com*

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Our new Facebook page: *www.facebook.com/CrystalCreekNatural/* will help us communicate with our customers by providing:

- Notices of current product promotions
- Announcements of upcoming events and media releases
- Links to our website for more detailed information
- A social circle of people sharing common experiences

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IN THIS ISSUE:

Interpreting The Value Of A Livestock Mineral

Customer Favorite *This article was originally published in the December 2012 Issue of the Crystal Creek® Newsletter*

By Dan Leiterman

The goal of this article is to offer insight in determining the value of a livestock mineral. The value can be determined by combining the information supplied on the label and visual observation of the mineral itself, along with some basic ingredient knowledge. A critical analysis will consider ingredient quality, nutrient bioavailability and possible negative, unintended consequences associated with poor ingredient quality or inappropriate formulation techniques. Much of the information needed to develop an accurate assessment of a product's value is not found on the label. With the information contained in this article, any dairy producer can become a more educated consumer with regards to livestock minerals and their value to the dairy. Understanding the value of a mineral supplement at a level deeper than the "price per bag" affords producers the opportunity to evaluate the mineral's value based on cost per head per day, as well as how it may support animal performance and the operation's overall profitability.

The information contained on a feed label is regulated by each state. However, most states use the Association of American Feed Control Officials (AAFCO) as a model for feed label design. For non-medicated feeds, AAFCO requires the following information on each product: brand name, product name, purpose statement, guaranteed analysis, list of ingredients, directions for use, warnings or cautions, name and address of the manufacturer and a quantity statement.

The List Of Ingredients

A basic assessment of a product's value begins with the list of ingredients. This list can give insight into the quality of the ingredients used to make the product, their bioavailability and reveal anything potentially harmful or unnecessary in the product. At first glance, some products list of ingredients may seem daunting to analyze. Often the list of ingredients is long. Some ingredients have scientific chemical names written in fine print. Use the tips below to help work your way through a mineral label to determine its true value.

> **Tip #1**: Industry standards suggest ingredients be listed in the order of the volume in which they occur in the formula, i.e. highest to lowest.

However, this recommendation is not always followed. Do not be fooled into believing that just because an ingredient is found in the first part of the ingredient list that it is a higher volume ingredient.

> **Tip #2**: Be cautious of products with extremely long lists of ingredients.

Some companies add low levels of multiple, unnecessary ingredients to create an ingredient list that gives the impression that the producer is receiving a high value product. Often these extra ingredients are added at levels so low they have little to no significant benefit. Companies will also add unneeded ingredients solely to complicate the label and confuse the consumer. It is important to note that mono-gastric animals, such as swine, poultry and equine, typically require a greater number of ingredients to balance their nutritional requirements when compared to ruminants.

Categories Of Ingredients

Every livestock mineral is composed of ingredients that fall into one of the following categories: macro-minerals, trace minerals, vitamins, high function additives, fillers, flavoring agents, non-essential extra ingredients and ingredients that can be counter-productive.

Macro-minerals

Macro-minerals are minerals required by the animal in higher volumes. Ingredients such as monocalcium phosphorus, dicalcium phosphorus, calcium carbonate, magnesium oxide or sulfate, potassium chloride, potassium carbonate and sodium chloride are examples of ingredients that are intended to provide key macro-minerals such as phosphorus, calcium, magnesium, potassium and sodium.

> **Tip #3**: Review the ingredient list for highly bioavailable forms of macro and trace minerals. The Crystal Creek® line of livestock minerals are built on a sound foundation of high quality phosphorous sources.

Monocalcium and dicalcium are typical sources of both phosphorus and calcium in livestock mineral, but there can be a wide range of quality.

Trace Minerals

Trace minerals are minerals required in lower volumes in the animal's diet. There are many trace minerals in livestock nutrition, but the most commonly supplemented are zinc, manganese, copper and selenium. There are several categories of trace mineral sources available and each type has a different level of bioavailability to the animal (**Figure 1**).

Oxide trace minerals are low in bioavailability and can be reactive with other nutrients in the diet. Many oxide trace minerals are anywhere from 0-20% bioavailable to the animal. When oxides are fed at high levels they can compromise digestive efficiency and may act as free radicals in the body. Mineral products containing oxide forms of trace minerals are suggestive of a poor quality mineral source.

Sulfate trace minerals have a moderate level of bioavailability, but can still be reactive to other nutrients in the diet. Sulfate trace minerals have anywhere from 0-50% bioavailability. The level of reactivity can vary depending on the density of other reactive nutrients, formulation style and ambient humidity.

> **Tip #4**: Oxide and sulfate trace minerals can kill rumen bacteria.

Review your mineral label and see if there is zinc oxide or copper sulfate in the ingredient list. Copper sulfate is commonly used in foot baths to kill bacteria that are responsible for hairy heel warts. Although the levels of copper sulfate used in typical mineral formulas is low, it reveals that the company manufacturing that product is more concerned about using low cost, low quality ingredients and is not focused on including ingredients that support optimum rumen function or promotion of digestive micro-flora.

Chelated trace minerals are typically much higher in bioavailability. Chelation means that the trace mineral metal ion (zinc, copper or manganese) has been combined with two other non-metal nutrient compounds to reduce unwanted reactivity and improve bioavailability. There are several forms of chelated trace minerals.

Figure 1

Relative BioAvailability For Various Categories Of Trace Minerals In Livestock Feeds

Trace Mineral Category	*Relative BioAvailability Range To The Animal*
Polysaccharide Chelate Complex	> Net 95% (80% by-passes to the animal plus 20% utilized by the rumen microbes which are then digested by the animal, results in a net delivery to the animal of >95%)
Metal Amino Acid Chelate	> 95% (by-passes directly to the animal)
Proteinated Chelates	10 to 95% (by-passes directly to the animal with minimal rumen microbe utilization)
Sulfates	0 to 50%
Oxides	0 to 20%

1. Metal Amino Acid Chelates: use an amino acid (like methionine) to attach to a trace mineral ion like zinc, manganese or copper and are virtually 100% bioavailable to the animal. However, they are generally not available to rumen microbes. Consequently, it is not advised to use 100% trace mineral supplementation with just metal amino acid chelates for ruminant mineral supplements. Many mineral products contain a ratio of 25 to 30% metal amino acid chelates with the rest being oxides and/or sulfates. A discerning consumer will realize that this ratio is not specified on the product label and should ask their supplier to confirm the ratio of metal amino acid chelates to sulfates/oxides.
2. Proteinated Trace Minerals: are chelated trace minerals that use a larger protein molecule to attach to trace mineral ions (zinc, manganese or copper) to accomplish a similar result as the metal amino acid chelates. Note the range of bioavailability on (**Figure 1**).

(Continued on Page 4)

(Continued From Page 3)

3. Polysaccharide Trace Minerals: are chelated trace minerals that attach a carbohydrate molecule to a trace mineral ion (zinc, manganese or copper). The polysaccharide chelated trace minerals have the benefits of chelation protection while at the same time are available for rumen microbe use. The rumen microbes utilize the trace minerals for their own growth and reproduction. When the microbes pass down the digestive tract the ruminant can obtain the trace minerals when the microbes are digested. This results in a high net bioavailability to the ruminant, excellent rumen microbe support and an efficient form of trace mineral delivery to the animal (**Figure 2**).

Tip #5: There is no need to have low quality oxide and sulfate trace minerals when adequate levels of polysaccharide chelated complexes of zinc, manganese or copper are the sole source of supplemental trace minerals. The highest quality mineral supplements will have 100% of the trace minerals in the form of polysaccharide complexes (with the exception of cobalt sulfate).

Vitamins

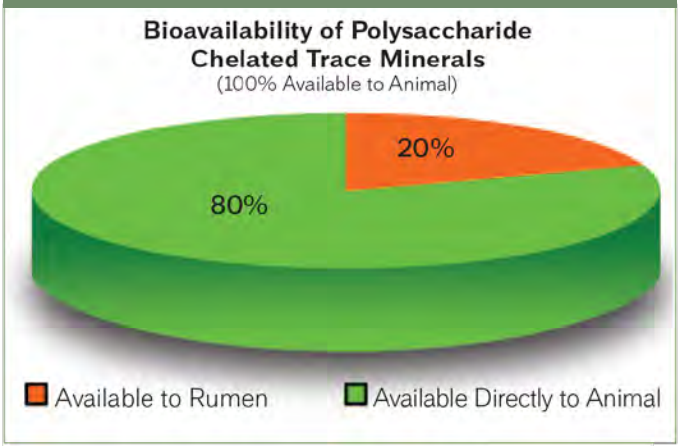
Tip #6: Of the three main supplemental vitamins, A, D, and E; vitamin E is the most expensive. A low quality mineral will often include excessively high levels of vitamins A and/or D to distract from a lower, possibly inadequate level of vitamin E.

Harmful Or Counterproductive Ingredients

These are ingredients that may have minor beneficial function but also have larger unintended negative consequences associated with their use. Many times these counter-productive ingredients are highly reactive and tie-up a wide range of nutrients in the general diet such as macro minerals, trace minerals, vitamins, amino acids and carbohydrates.

Tip # 7: Livestock minerals containing the following ingredients should be avoided:

Figure 2



charcoal, humates, diatomaceous earth, raw sulfur, ferrous oxide (iron oxide), moderate to high levels of clays and high levels of oxide or sulfate trace minerals.

Tip #8: Visually inspect your current mineral product. Is it reddish in color?

If so, there is a likelihood that excessive levels of ferrous oxide (iron oxide) have been intentionally added to the formula. Iron oxide is a highly reactive compound that decreases nutrient bioavailability in the diet. So why is it added to many mineral products? Some feed companies add ferrous oxide to give their mineral a consistent reddish color in an effort to make it more visually appealing to the consumer. A company that sells a mineral with ferrous oxide added for color consistency is using it as a marketing tool, but has created a product with a blatant and insulting disregard to the animal's nutritional needs and the producer's profitability. Minerals formulated like this typically have a low price per bag but deliver poor nutritional value.

Fillers

Tip #9: Inspect the ingredient list for the term 'plant protein products'.

This is a general term used to cover up the addition of a wide range of extenders or fillers. The most commonly used plant protein filler is distillers grains.

The following chart (**Figure 3**) compares a typical lower cost Brand X livestock mineral to the Crystal Creek® 2:1 Dairy Mineral. Note the significant advantage the Crystal Creek® mineral has in bioavailability over the brand X. The Brand X mineral is $282.00/ton cheaper. However, when compared on nutrient delivery to the animal through higher quality, higher bioavailable ingredients it becomes obvious that the Crystal Creek® 2:1 is a better value.

In summary, evaluate your current livestock mineral using the 9 tips presented above and evaluate the label in an effort to critically determine the quality and value of that product. A high quality livestock mineral will not try to confuse you with a long list of excessive ingredients and complicated scientific names. Review the source of trace minerals and look for exclusively polysaccharide trace mineral fortification. Visually inspect the mineral and be suspicious of a reddish colored product that likely has raw ferrous oxide added. Critically evaluate the levels of vitamins A, D and E and look for the presence of cheap plant protein based fillers. By using these 9 tips to evaluate your current livestock mineral, you have begun the process of better understanding how to properly evaluate your livestock mineral program beyond the common "price per bag" approach and focus more on comprehensive value.

If you have any questions or would like to discuss livestock mineral further, please feel free to call Crystal Creek® and talk with one of our nutritionists. Crystal Creek® livestock minerals are among the finest in the industry and give you the best value for your dollar. Your cows and your pocket book will agree!

Figure 3

Crystal Creek® 2:1 Dairy Mineral compared to a Brand X mineral

(both products are fed at 8 oz./hd/day and all numbers are based on 8 oz./hd/day intake)

	Brand X		Crystal Creek®		
Nutrient	Label mg/hd/day 8 oz./hd/day	Est. bio-avail. mg/hd/day per 8 oz.	Label mg/hd/day 8 oz./hd/day	Est. bio-avail. mg/hd/day per 8 oz.	Crystal Creek® Advantage To The Animal
Calcium	20%		20%		Even
Phosphorus	10%		10%		
Magnesium	3.00%		4.75%		158%
Copper	296	74	170	151	204%
Manganese	Not Listed		454	431	
Zinc	1520	380	644	611	161%
Selenium	6.12	1.53	6.35	6.1	399%
Vitamin A, IU/hd/day	175,000		200,000		14%
Vitamin D, IU/hd/day	22,500		42,500		89%
Vitamin E, IU/hd/day	500		550		10%
High Quality Phosphorus Source	???	???	Yes		Significant
Undesirable Ingredients	Yes sulphur, copper sulfate		No		Significant

** Note: To convert ppm to mg, divide ppm by 2.2. To convert mg to ppm, multiple by 2.2.*

Grass Founder

By Stephanie Hutsko, PhD

As the cold winter months give way to the sunshine of spring, horse owners have one thing on their mind: grass. The return of lush, green pastures means that our equine friends can once again graze the day away, but this fresh grass poses a potentially life-threatening problem: grass founder.

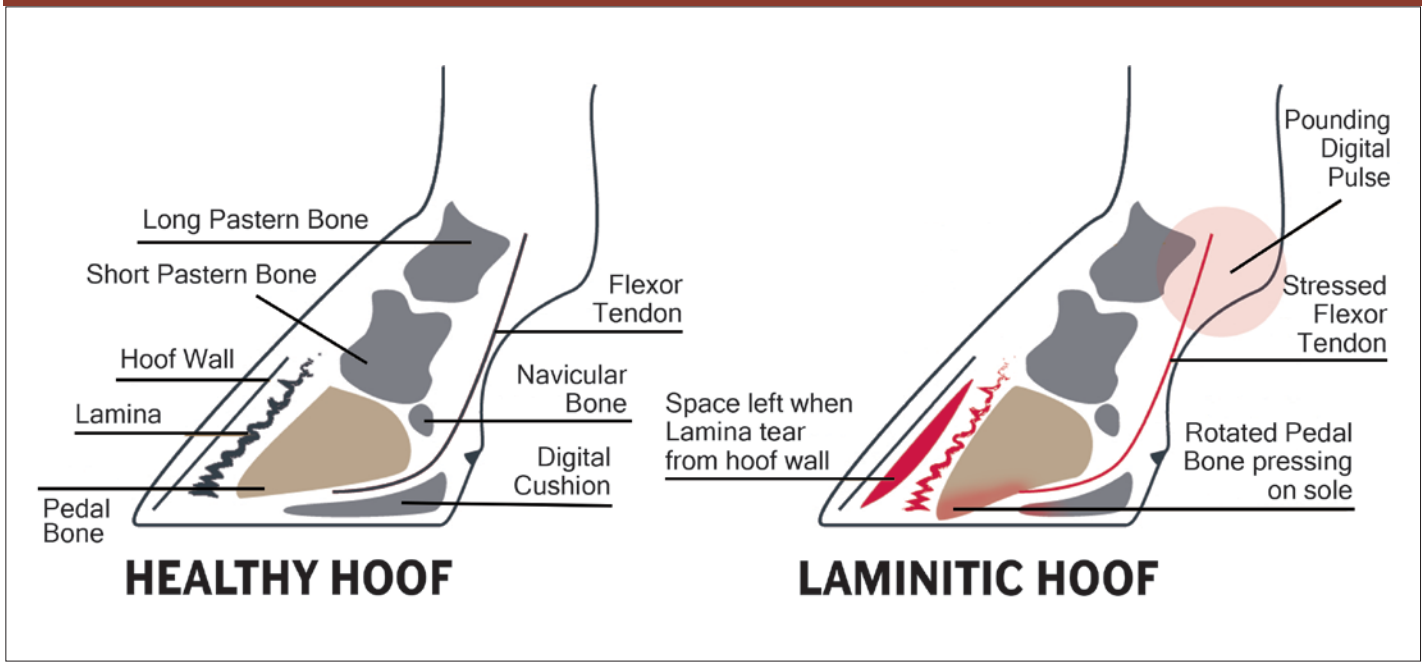
What Is Grass Founder?

Grass founder is commonly seen during the spring months when the days are sunny and warm, the nights are cool and the grass is growing rapidly. Simply put, founder occurs when there is a disruption of blood flow to the hoof and/or toxic endotoxins flow to the laminae of the hoof. Laminae are the structures that secure the hoof wall to the coffin bone. When the laminae are exposed to endotoxins, as seen with grass founder, or there is a disruption of blood flow, as seen with laminitis, they become inflamed. Inflammation leads to a weakened laminae and eventual tearing of the support structure necessary to keep the coffin bone in place (**Figure 1**). When this happens, the coffin bone rotates downward, causing pain and, in severe cases, can even puncture the sole of the hoof. If a puncture occurs, the prognosis is poor and the horse is almost always euthanized.

What Is In The Grass That Leads To Founder?

Rapidly growing, new grass has highly soluble carbohydrates, particularly fructans. Grasses store energy in the form of fructan in the stems, leaves and seed heads, especially during the spring when the days are warm and sunny and the plant gets more energy than it can use. This stored fructan is then used on cloudy days or at night to continue growth. Therefore, the amount of fructan found in grass is usually lowest just before dawn and peaks around noon.

Figure 1 *Illustration Of A Healthy Hoof Versus A Laminitic, Inflamed Hoof*



When horses ingest large quantities of fructan, it can stimulate an overgrowth of bacteria in the large intestine. These bacteria then produce toxins, or endotoxins, that wind up in the bloodstream, eventually reaching the laminae of the hoof and causing inflammation.

How To Treat And Prevent Founder?

Unfortunately, there is no cure for founder. Supportive therapies include the use of anti-inflammatories and pain medications combined with mechanical hoof support (wedges or sole inserts) and stall rest. A horse that has foundered in the past is particularly susceptible to founder again, so preventative measures should be implemented.

Pasture management is key to preventing founder, as the threat is found in lush, growing pastures. Avoid turning horses out on pasture that has been grazed very short during the winter, as these grasses experience rapid growth and high levels of fructan once the weather warms and days lengthen. It is best to keep easy keepers completely off of first spring pastures until growth has slowed and the grass has produced seed heads. It is recommended to introduce horses to spring pasture gradually. Letting your horse fill up on hay before turnout or even putting a grazing muzzle on your horse are some ways to minimize the amount of pasture consumed. The key is to limit fresh pasture consumption until the grass growth has begun to slow down.

Overall, the easiest way to treat founder is to prevent it from happening in the first place. Providing a well-balanced diet year-round gives your horse a better foundation and will support them if/when they face a challenge. Crystal Creek® is here to help you design customized diets to fit your horse's individual needs. We have Foundation Feed that gives your horse quality protein and, when mixed with the appropriate Crystal Advantage® Equine Mineral and hay, provides your equine counterpart with a complete and tailored ration. Give our knowledgeable and friendly staff a call today to discuss how we can optimize your horse's nutrition plan.

Crystal Creek® Foundation Grain Mix: Innovative Nutrition For All Livestock

By Alex Austin, B.S.

Crystal Creek® is excited to offer an innovative approach to providing quality nutrition to your livestock. Crystal Creek® Foundation Grain Mix is a new product offering high grade grains resulting in excellent performance nutrition. Pairing Crystal Creek® Foundation Grain Mix with the appropriate Crystal Creek® mineral will provide a superior quality complete feed.

Formulated using corn, oats and roasted soybeans, Crystal Creek® Foundation Grain Mix delivers a high amino acid profile with balanced levels of protein and energy to meet the performance requirements of animals. Available in easy to handle 50 lb. bags, Crystal Creek® Foundation Grain Mix is ideal for producers who are not equipped to handle bulk quantities of feed. Molasses and soy oil are used at low levels to increase palatability while decreasing fines and dust. All ingredients are designed to maintain feed integrity and quality throughout the shelf life

Figure 1 **SAMPLE DIETS USING CRYSTAL CREEK® FOUNDATION GRAIN MIX**

	EQUINE			
	Equine Diet for 1,100 lb. Horse with Moderate Work Load	Equine Diet for 1,100 lb. Horse with High Work Load	Equine Diet for 1,100 lb. Horse with Moderate Work Load	Equine Diet for 1,100 lb. Horse with High Work Load
	Using Pelleted Mineral		Using Granular Mineral	
Foundation Grain Mix 12% (Amount in lb.)	0.25 lb.	1.6 lb.	0.25 lb.	1.6 lb.
Foundation Grain Mix 16% (Amount in lb.)				
Crystal Creek® Mineral/Supplement	Crystal Advantage® **Pelleted** Mineral 8.0 oz.	Crystal Advantage® **Pelleted** Mineral 9.0 oz.	Crystal Advantage® **Granular** Mineral 2.0 oz.	Crystal Advantage® **Granular** Mineral 2.0 oz.
Grass Hay (13% Protein)	27.75 lb.	29.4 lb.	28.0 lb.	29.75 lb.
Grass Mix Hay (16% Protein)				
Calcium Carbonate				
Salt		0.2 oz	0.3 oz	0.8 oz

of the feed. Crystal Creek® Foundation Grain Mix also contains a mycotoxin binder, which acts as insurance against the negative impacts of mycotoxins that could be present in the diet.

Crystal Creek® does not believe in a "one size fits all" nutrition approach for animals. Nutritional needs vary with life stage, breed, work level and performance expectations. The sample diets below illustrate how Crystal Creek® Foundation Grain Mix can fit into your feeding program. Crystal Creek® Foundation Grain Mix serves as a quality base grain mix with the ability to add the required amount of Crystal Creek® mineral livestock need. This ability to customize the diet results in better feed utilization and increased feed efficiency creating an economically sound nutrition program.

Crystal Creek® has experienced staff dedicated to understanding your expectations and helping you achieve your goals. We provide professional ration balancing and consulting with the purchase of our mineral. To learn more about Crystal Creek® Foundation Grain Mix and other products and services Crystal Creek® provides, call 1-888-376-6777.

BEEF		SMALL RUMINANTS		SWINE	
Finishing Steer Diet for 700 lb. Steer with 2.5 lb. average daily gain	**Grower Steer Diet for 300 lb. Calf with 1.5 lb. average daily gain**	**Lactating Goat Diet for 135 lb. Dairy Goat in Early Lactation**	**Finishing Sheep Diet for 60 lb. Lamb with .65 lb. average daily gain**	**Grower Swine Diet for 110 lb. Hog with 1.75 lb. average daily gain**	**Finisher Swine Diet for 175 lb. Hog with 1.9 lb. average daily gain**
15.25 lb.	3.25 lb.	3.0 lb.			3.8 lb.
			1.75 lb.	5.5 lb.	3.8 lb.
Crystal Creek® 37% Beef Pellet 1.0 lb.	Crystal Creek® Swift Start® Calf Pellet 1.5 lb.	Crystal Creek® 37% Goat Pellet 0.75 lb.	Crystal Creek® Sheep Mineral 1.0 oz.	Crystal Creek® Paladin™ Swine Mineral 1.75 oz	Crystal Creek® Paladin™ Swine Mineral 1.75 oz
5.25 lb.	5.0 lb.	4.0 lb.	1.5 lb.		
				0.2 oz	0.2 oz
				0.3 oz	0.3 oz

Understanding Biofilms In Agriculture

Customer Favorite *This article was originally published in the April 2017 Issue of the Crystal Creek® Newsletter*

By Jessica Getschel, B.S.

In agriculture today, sanitation technique and protocol implementation have become more important than ever before. An increased awareness of health benefits gained from a clean environment has stimulated a higher standard of cleaning expectations. Many producers not only strive to remove organic matter from surfaces, but also microbial buildup; more accurately, biofilms.

What Are Biofilms?

Biofilms are simply defined as thin, slimy films of bacteria, protozoa and viruses adhered to a surface in a resistant matrix of cellular materials. Biofilm layers are found on many farm surfaces such as feeding equipment, animal housing and milking equipment. Roughly 90% of all bacteria on a farm are found in a biofilm layer. These biofilm layers are important because they are resistant to common cleaning and disinfection agents. To truly clean a surface, one must break down the biofilm layer to achieve not only a visually clean surface, but a surface that is also clean on a biological level.

How Do Biofilms Form?

In the past decade many researchers have investigated the process of biofilm formation. It has been well established that there are five major steps comprising the entire process: attachment, growth, maturation, detachment, and re-development. **Figure 1** illustrates the cycle of biofilm formation.

Why Are Biofilms Important?

Biofilms have potential to be detrimental in the agriculture industry because of the opportunity for cross-contamination. Equipment and pens that are visually clean may not be biologically clean. Biofilms limit the rate of cleaning and disinfecting agents to the interior cells while providing conditions for those same cells to thrive[1]. These cells can be disease-causing bacteria that can spontaneously break free from the biofilm and spread sickness to an animal. One example would be placing a newborn calf in a hutch that previously housed a weaned calf. Any bacteria harbored by the older calf could be contained in a biofilm and may not have been removed during the hutch cleaning process. In this scenario, the bacteria could break free from the biofilm and pose a serious health challenge to the newborn calf.

Figure 1 **Bacterial Biofilm Formation – 5 Stages:**

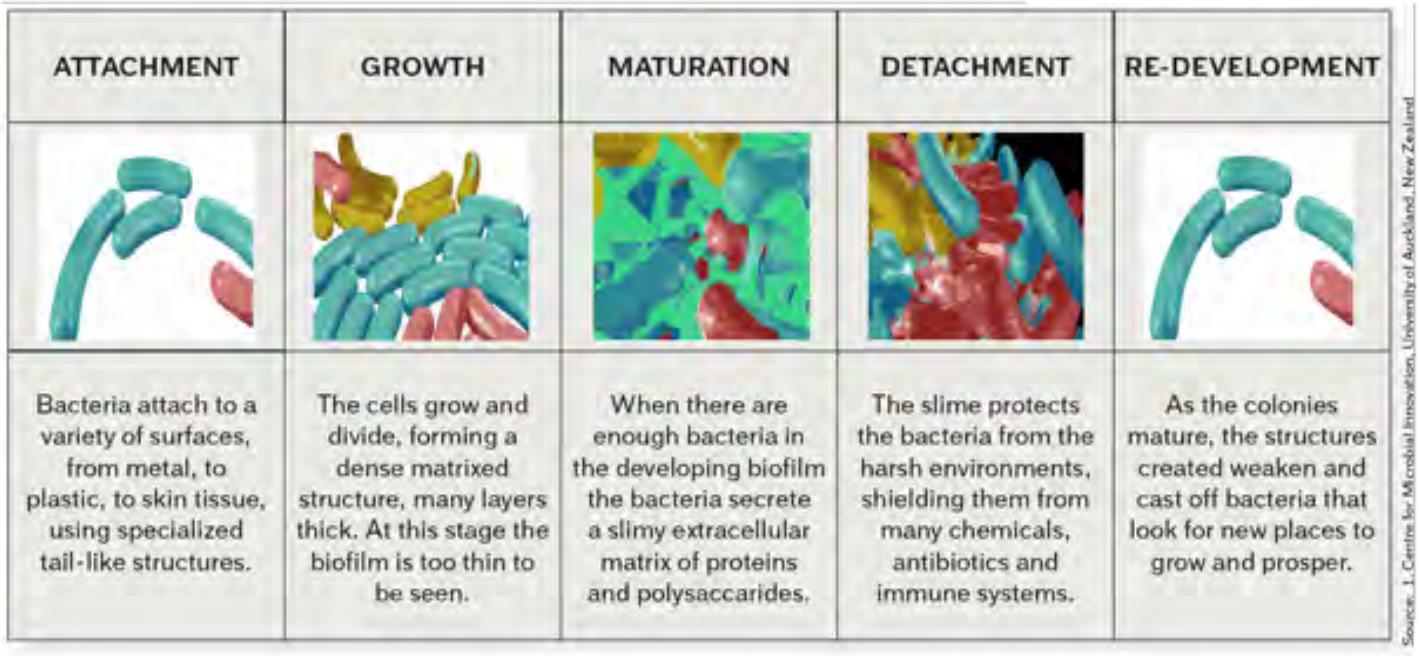


Figure 2

COMPARISON COMPONENT	OZONE (O^2)	HYDROGEN PEROXIDE (H_2O_2)	PERACETIC ACID (POA)	HYPOCHLOROUS ACID (HOCl)	SODIUM HYPOCHLORITE (NaClO)	CHLORINE (Cl_2)	CHLORINE DIOXIDE (ClO_2)	QUARTERNARY AMMONIA	PHENOLS	IODOPHOR
E. COLI	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
GIARDIA	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
CRYPTOSPORIDIUM SPP	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO
ROTAVIRUS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CORONAVIRUS	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO
PEDv	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO
BIOFILM REMOVAL	YES	VARIES	VARIES	NO	NO	NO	YES	NO	NO	NO
AFFECTED BY pH	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES
CORROSIVE	YES	YES	YES	YES	YES	YES	NO	VARIES	YES	YES
INACTIVATED BY ORGANICS	NO	YES	YES	YES	YES	YES	NO	NO	NO	YES
WATER SANITIZER / DISINFECTANT	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO
EPA APPROVED WATER SANITIZER	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO
USED WITH DETERGENTS	NO	NO	YES	NO	YES	NO	YES	YES	YES	YES
PRODUCED ON-SITE	YES	RARELY	RARELY	RARELY	NO	NO	YES	NO	NO	NO

How Are Biofilms Broken Down?

There are very few products proven to be effective against the tough buildup of biofilms. **Figure 2** demonstrates the efficacy of various products on biofilms, while comparing microbial diversity and environmental considerations.

The clear standout agent is chlorine dioxide. Chlorine dioxide has superior ability to break down the toughest microorganisms and biofilms, without corrosive action or negative impacts on the environment. Its efficacy is not impacted by the condition of the environment, most notably in regards to pH levels and presence of organic matter. Chlorine dioxide is effective against bacteria, protozoa, viruses and fungi on inanimate objects and is considered more effective against microbes than other chlorine solutions[2]. Unlike other cleaning products, chlorine dioxide starves and kills microorganisms by disrupting the transport of nutrients across their cell walls[2].

Chlorine dioxide is even effective against Cryptosporidium, a tough protozoan responsible for causing diarrhea in many different livestock, most notably calves. According to the CDC, this organism has an outer shell that allows it to survive without a host for long periods of time and makes it very tolerant to bleach disinfection.

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(Continued From Page 11)

Figure 3

DISINFECTANT EFFECTIVENESS ON CRYPTOSPORIDIUM PARVUM		
DISINFECTANT	**CONCENTRATION (PPM)**	**CONTACT TIME**
Ammonia	**50,000**	**18 hours**
Benzalkonium chloride (1%)	10,000	Not Effective
Chlorhexidine (2%)	20,000	Not Effective
Chlorine dioxide (ClO_2)	**100**	**< 1 minute**
Cresylic acid (5%)	50,000	Not Effective
Hydrogen Peroxide (6%)	60,000	4 minutes
Isoporpanol (70%)	700,000	Not Effective
Peracetic Acid	3,500	5 minutes
Sodium hydroxide	200	Not Effective
Sodium hypocholrite (6%)	60,000	Not Effective

As demonstrated by the chart above, chlorine dioxide is clearly the product of choice when dealing with cryptosporidium. With less than a minute of contact time, chlorine dioxide can incapacitate the microorganism at a much lower concentration compared to other products.

Why Not Use Household Bleach?

The efficacy of bleach is determined by the pH of the mixed solution. When mixed with water, bleach (sodium hypochlorite) breaks into two compounds: hypochlorous acid and hypochlorite ion. Hypochlorous acid has about 80 times the killing power of hypochlorite ion and is minimally present in solutions with a pH of 10 or greater. A 10% bleach solution has a pH of 10-11 and therefore has a greatly reduced ability to effectively perform as a sanitizing agent.[3]

How Can Biofilm Awareness Be Raised?

One way to locate the unseen biofilms is to test for them. An ATP meter can be used to identify areas of high microbial activity and can also be used to monitor and evaluate the effectiveness of a cleaning protocol. Swabs are taken from materials that are cleaned, such as nipples, buckets, panels or equipment. The ATP meter then provides a numerical readout that will reveal the efficacy of the cleaning protocol in place. If the meter readings indicate unacceptable levels of microbial activity, it is advised that the cleaning protocol be reevaluated.

Regardless of the operation (e.g., dairy, swine, poultry) all livestock producers can benefit from biofilm reduction. Reducing livestock exposure to pathogens will decrease mortality and sickness rates, thereby decreasing treatment costs and increasing profitability. Biofilm buildup is a serious issue that should be heavily considered when selecting a sanitizing agent. For ways to prevent biofilm buildup and to improve your cleaning protocol, see Erik Brettingen's article in the April 2017 Crystal Creek® Newsletter issue titled "*Hygiene Protocols For Succcessful Calf Raising*".

Sources:
1. Donlan, Rodney M. "Biofilm Formation: A Clinically Relevant Microbiological Process." Clinical Infectious Diseases 33.8 (2001): 1387-392. Web.

2. Valderrama, W. B., E. W. Mills, and C. N. Cutter. "Efficacy of Chlorine Dioxide against Listeria monocytogenes in Brine Chilling Solutions." Journal of Food Protection 72.11 (2009): 2272-277. Web.

3. Socket, Donald C. "6 Easy Steps to Properly Clean and Sanitize Calf Feeding Equipment" (2012). Web.

Crystal Creek® Welcomes Ben Hickerson

Ben Hickerson joined the Crystal Creek® team in January, 2019 as a Territory Business Manager for the Ohio and Indiana sales area. He graduated from Ohio State University with a Bachelor of Science degree in Animal Science and has 17 years of experience in the dairy and beef cattle artificial insemination industry. Ben has worked with cattle operations ranging from 30 to 20,000 head across the tri-state area of Ohio, Indiana, and Michigan, providing producers with reproductive solutions to better improve their herds.

Ben currently resides in Piqua, OH with his wife and two children. He spends his free time coaching his boys' football, soccer, basketball and baseball teams. Ben and his family enjoy hunting, fishing, camping, hiking and cheering on their beloved Buckeyes.

Ben is excited to be part of the Crystal Creek® team and is looking forward to working with dealers and producers in the Ohio and Indiana area to help them achieve their goals of healthy animals and increased profitability.

Ben Hickerson

CRYSTAL CREEK®
FOUNDATION GRAIN MIX

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.

- *12% or 16% Protein*
- *High quality ingredients, economically priced*
- *Flexibility for use in multiple species*
- *Promotes improved performance resulting in increased feed efficiency and greater return on investment*
- *Easy to mix*
- *Supports endurance and production during times of challenge*

We Can Help

By Teresa Marker, B.S.

Many customers are aware of the high quality products Crystal Creek® offers, but may not be aware of the consulting services that are available. Crystal Creek® prides itself on having a professional and experienced technical support staff that are able to consult on multiple species. This staff consists of a large animal veterinarian, Ph.D Nutritionists, livestock nutritionists, a certified veterinary technician, livestock specialists and ventilation specialists. Our staff members come with diverse backgrounds and years of experience and are continually researching new ideas and concepts to share with our customers.

Livestock Nutrition

Our nutritionists can help develop high quality feeding plans, balance rations or assist in trouble shooting problem areas on your operation for a multitude of animal species. These innovative ration balancing services are free with the purchase of Crystal Creek® livestock mineral.

Nutrition consulting also deals with assessing mold and mycotoxin exposure with the appropriate tests and remediation methods if toxins are detected. Livestock nutritionists are also knowledgeable about implementing a quality inoculant program to help the producer increase the quality of their farm raised feeds. Consistent feedback and communication is key in implementing a successful ration and feeding plan.

Animal Health Consultation

When you call Crystal Creek® with animal health questions, you can feel confident that you will be provided with clear, accurate information. A few common topics often discussed with customers include: Transition cow management, mastitis/ high somatic cell counts, reproduction issues and vaccination protocols.

Crystal Creek® specialty areas include:

Calf Program Consultation

Crystal Creek® offers consulting services on calf nutrition (milk replacer, calf feed, minerals and feed additives). We have technology available to help test colostrum quality and evaluate passive transfer to provide comprehensive colostrum program management. Our line of nutritional supplements for calves can help support your animals during stressful times. We can help determine methods to prevent scours and support the calves immune system to assist in overcoming challenges.

Ventilation Services

Crystal Creek® ventilation specialists develop customized systems for your specific barn layout whether it be an existing barn or new construction. Our team brings a special perspective to the table, not just focusing on ventilation concerns but creating a plan that addresses the goals of your entire calf program.

Dr. Ryan Leiterman holds degrees in both Veterinary Medicine and Agricultural Engineering and is the inventor of the FLIP DUCT and FLAP DUCT ventilation tube which has both domestic and foreign patents for its innovative design. Learn more about these services on our website under the “CALF BARN VENTILATION” tab.

Disinfectant Protocol Analysis

Disinfection products are now available at Crystal Creek®. Staff members are available to perform audits of cleaning and disinfecting protocols that are currently in place and then work with each farm to identify areas of opportunity and which product(s) and protocol(s) can be implemented to provide calves with a clean, safe environment.

The services listed in this article are just a select few ways Crystal Creek® can help you be more sustainable and profitable. The Crystal Creek® Newsletter, which is published three times a year, is a great resource solution to livestock problems. Newsletter articles are also available online at www.crystalcreeknatural.com. Crystal Creek’s committed staff is here to help. Contact us today to see what we can offer your livestock operation.

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Sustainable And Effective Livestock Nutrition Programs for Today's Progressive Producer!