

A New Generation Of Mycotoxin Technology



By Dan Leiterman

In my April, 2016 newsletter article *“Managing Mycotoxins In Feedstuffs: Mycotoxin Binder Strategies”*, I explained the significant negative effects mycotoxins have on livestock health and production.

That article pointed out the previous challenges of inaccurate lab analysis of mycotoxins, how to interpret a lab analysis to determine a management plan for a given level of exposure and the subsequent limitations of strategies available at the time. This article can be found on our website under the “Articles” tab, under the sub-category of “Inoculant.”

Improved Laboratory Analysis For Mycotoxins

There has been a considerable amount of advancement in the testing technology for mycotoxins in the last year. With the advent of the LC/MS/MS analysis, the industry now has access to a more accurate lab analysis that is sensitive to a broader range of mycotoxins. Mycotoxins are known to attach to carbohydrates in the feedstuffs and can be more difficult to find with a typical ELISA lab analysis. However, with the new LC/MS/MS lab analysis, mycotoxins are separated from the carbohydrate substrate making them more detectable, which significantly improves the accuracy of this testing procedure in more feedstuffs and on a wider range of mycotoxins.

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A New Generation Of Mycotoxin Technology

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Figure 1 RECOMMENDED FEEDSTUFF TESTING METHODS (Lab Specific)

	Aflatoxin	Vomitoxin (DON)	Zearalenone	T2/HT2	Fumonisin	Ochratoxin	All Other Mycotoxins
Corn Grain	ELISA	ELISA	ELISA	ELISA	ELISA	ELISA	LC/MS/MS
Corn Silage	ELISA	ELISA	ELISA	LC/MS/MS	ELISA	LC/MS/MS	LC/MS/MS
Haylage	LC/MS/MS	ELISA	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS
TMR	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS	LC/MS/MS

Information Sourced from: www.dairylandlabs.com

The LC/MS/MS lab analysis from Dairyland Labs will test for 17 of the more prevalent mycotoxins. This more accurate test can be run for a cost of \$250 per sample and has a turnaround time of 5 to 10 days. While the ELISA test is faster, with a 5 to 7 day turnaround and a cost of \$160 per sample, it will only test for 5 mycotoxins.

Deciding which lab analysis to choose can also depend on the feedstuff being tested. Dairyland Lab suggests specific lab analysis for these common feed ingredients and/or TMR samples.¹ (Figure 1)

Considering the seriousness of mycotoxin exposure, many producers are doing the LC/MS/MS and getting a more complete report. Having more accurate information about the level of mycotoxin exposure will be a tremendous advantage to helping make good management decisions to improve livestock performance and producer profits.

Assessing Mycotoxin Risk

It is important to keep in mind the synergistic nature of mycotoxins. For example, if a test comes back with one mycotoxin and it is below tolerance levels a mycotoxin binder is probably not needed. However, if two or more mycotoxins are found, even if they are each below tolerance level, the impact on the animal could be the same as though there is a high level of one mycotoxin. In that case an effective mycotoxin binder like Fuse 207™ would be needed in the feed.

Use of a mycotoxin binder would be indicated if:

- 1) Any one mycotoxin is at, or above tolerance level listed for that mycotoxin.
- 2) Mycotoxin test results range from 100 to 500 ppb when added together. If this occurs, a moderate level of toxin binder should be put into the feed.

- 3) Mycotoxins are over 500 ppb when added together. In this case, a toxin binder should be put into the feed and higher toxin binder levels may be needed.

Species Specific Mycotoxin Binders

New enzyme technology is being applied to mycotoxin binders, where enzymes are being used to make mycotoxins more susceptible to the binding agents. Some non-polarized mycotoxins like Vomitoxin are very difficult to bind up unless exposed to an appropriate enzyme that will open up the binding sights on the mycotoxin molecule allowing the toxin binder to more easily attach to the mycotoxin itself.

Each livestock species has a different digestive environment and a different pH level. Because the enzymes are organic compounds, they need to be designed to work within a specific pH range and in a specific digestive environment. Consequently, excellent mycotoxin binding performance can be achieved if the enzyme is properly matched to work in the specific digestive system of the targeted livestock species, i.e. ruminant, swine or poultry. The next generation of Fuse 207™ will have an advanced, proprietary enzyme plus a binder formulation that will be specific for feeding to ruminants only. In the past, Fuse 207™ could be used across all livestock species, but it did not have species specific enzyme technology. Now Fuse 207™ is super charged with new ruminant focus technology. Other key species like poultry and swine will also have a mycotoxin binder specific to their digestive system (UltraSorb P and UltraSorb S respectively) as explained in Figure 2 and 3.

Figure 2

ULTRASORB P INCLUSION RATES (Poultry Only)

	Diets	Total Mycotoxin Load < 500 ppb lb./ton Complete Feed	Total Mycotoxin Load > 500 ppb lb./ton Complete Feed
Broiler Chickens	Starter	2.2	4.4
	Grower	2.2	4.4
	Finisher	1.1	2.2
Breeders, Layers	Pullet (starter, grower, developer)	2.2	4.4
	Pre-layer	2.2	4.4
	Layer, Breeder	1.1	2.2
Ducks, Turkeys, Geese	All	2.2	4.4

Figure 3

ULTRASORB S INCLUSION RATES (Swine Only)

	Diets	Total Mycotoxin Load < 500 ppb lb./ton Complete Feed	Total Mycotoxin Load > 500 ppb lb./ton Complete Feed
Sows	Dry, Gestating, Lactating	2.2	4.4
Boars	Developing, Mature	1.1	2.2
Piglets	Pre-Starter, Starter	2.2	4.4
Grower, Finisher	Grower, Finisher	1.1	2.2

Figure 4

FUSE 207™ INCLUSION RATES (Ruminants Only)

	Diets	Total Mycotoxin Load < 500 ppb Grams/Head/Day	Total Mycotoxin Load > 500 ppb Grams/Head/Day
Calves	Pre-wean to 400 lb.	5	10
Heifers	400 to 1200 lb.	5 to 15	10 to 30
Cows	Dry Cows, Lactating	15 to 20	20 to 30

The New Fuse 207™ Is A Mycotoxin Binder For Use In Ruminant Feeds

The Crystal Creek® mycotoxin binder, Fuse 207™, is being super charged with a next generation formulation that incorporates many new, innovative and exciting technologies to increase effectiveness and reduce cost to the producer at the same time.

The new proprietary formula for Fuse 207™ will now be for ruminant use only. The typical recommended Fuse 207™ inclusion rates will be 20 grams per head

per day for mature dairy and beef cattle. The feeding range is 15 grams to 30 grams per head per day depending on need. (Figure 4)

Having a good understanding of the challenges mycotoxins present to livestock is key to developing a sound strategy for dealing with them in an effective manner. Protecting livestock from mycotoxins with the advanced technology supplied by Crystal Creek® Fuse 207™, UltraSorb P and UltraSorb S, will improve your bottom-line. Call Crystal Creek® today to develop a mycotoxin strategy that is best for your operation.

¹ Dairyland Labs, Inc. Arcadia Wisconsin, 1-608-323-2123 or www.dairylandlabs.com

Milk Or Profit: A Case Study



By Erik Brettingen, B.S.

Rolling herd average or milk production per cow are numbers commonly referred to when discussing the success of a dairy farm. Milk production is an easy number to identify but the actual profitability of an operation is a much more complex topic. A dairy

herd's income is simple to see by reading the milk check. Determining the real profit of the herd cannot be so easily evaluated as it takes time to assess the expenses involved in making the milk and running the operation.

Income-Expense=Profit

The goal of a properly executed nutrition program factors in all aspects of making milk. Feed costs, vet bills, death loss, cull rates, breeding statistics and the ability to supply replacement animals are just a few factors that need to be taken into consideration when discussing the true profitability of a farm. At Crystal Creek®, we know that cows need to produce milk for the farm to make money, but when the money being spent to make that milk begins to outweigh the money coming in, profitability is lost. Crystal Creek® focuses on increasing client profitability, not just milk production. Farmers with high producing herds often boast about their pounds of milk per cow while many times choosing to downplay other problem areas that are bleeding profit away from their operation.

When Crystal Creek® works with a farmer, we use a herd review to evaluate profitability and progress. An annual herd review showing data trends helps remove the emotional aspect about the direction the herd is moving. This year, Crystal Creek® conducted a herd review for a farm that produced slightly less milk, but made more money, than the year prior when they were on an alternative nutrition program. This herd is a classic example of illustrating the point that more milk does not always equate to increased profit.

The herd in review is located in Wisconsin and milks approximately 60 Holstein and Holstein cross cows. This herd started with Crystal Creek® in November of 2017. The data collected up until February of 2019, has been put into graphs and charts to illustrate milk production, component values and ration costs.

Milk production remained consistent with the Crystal Creek® nutrition program compared to the previous nutrition program with the exception of July, August, September, and October 2018. This period accounted for the decreased overall yearly production, yet annual profit was still increased. Feed costs were significantly less by relying heavily on home grown forages and removing unnecessary ingredients. When a diet increases the amount of quality, home grown forages, the cow's milk components generally respond positively as seen in Figure 2. This increase in components is a visual, tangible measurement of rumen function and fiber utilization. Even with the slight decrease

Figure 1 AVERAGE MILK PRODUCTION (DHIA)

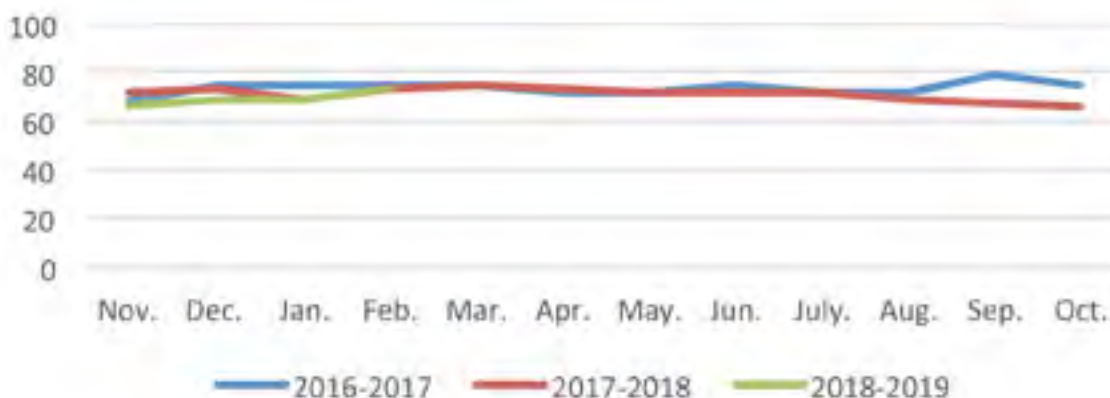


Figure 2

BUTTER FAT PERCENTAGE (DHIA)

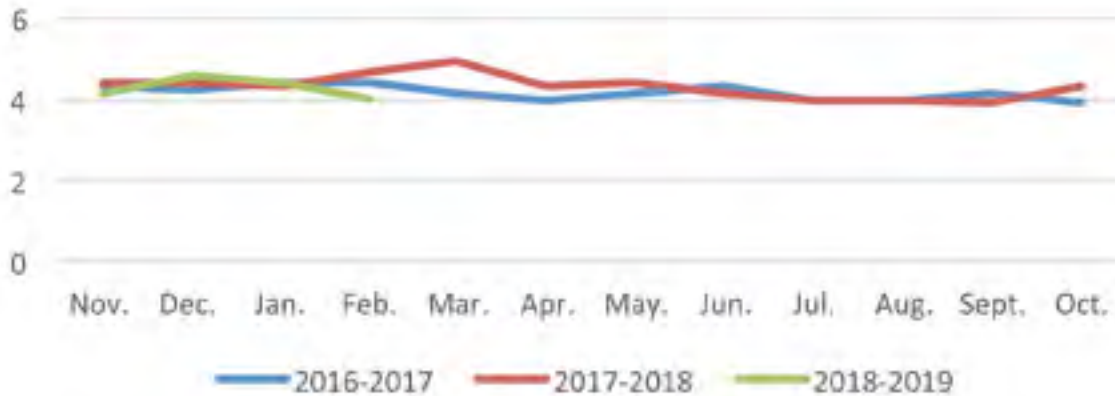


Figure 3

TOTAL RATION COST PER HEAD PER DAY



in production, the improved components and decreased feed cost led to increased overall herd profit. A herd's overall profit should be focused on more in the industry rather than production numbers, as a herd's real value is based on its ability to generate a profit.

Increased Opportunities

Looking at this review gave proof of the efficacy of the Crystal Creek® Dairy Nutrition Model. Dedicating time to discuss these values during a herd review allowed the opportunity to identify areas where changes could be made to maximize the herd's full potential. The information represented in this article shows a visualization of three areas: milk production, milk components, and ration costs.

Crystal Creek® herd reviews also consider vet bills, breeding statistics, cull rates and much more in order to make solid recommendations to positively influence a herd's nutrition program and complete performance.

At Crystal Creek® we work diligently to build relationships with farmers and establish clear lines of communication. The trust and communication we have established with this farmer is evident by the success demonstrated in the various graphs. Increased production does not necessarily equal profit. Looking at annual herd reviews that take all aspects of a farm's progress into account can be an extremely powerful tool for auditing profitability and exploring areas of opportunity. To learn more about Crystal Creek's passion for helping our clients call 1-888-376-6777.

How To Determine The Value Of Whole Leaf Aloe Vera For Your Livestock



By Teresa Marker, B.S.

Stress is defined as a state of strain from adverse or demanding conditions. Livestock can be stressed by many different factors: weaning, pen movement, dehorning, vaccinating, shipping, lactation, weather, flies, etc. Some of these stressors can be reduced

by good management, but not all stressors can be eliminated. The immune system of an animal has the ability to resist infection or disease. However, when animals are stressed, they are more vulnerable to disease due to decreased immune function. **Figure 1** depicts the effect of cortisol on the immune system of a lactating dairy cow during freshening. Cortisol is a hormone that is released when animals are stressed. As the cortisol level increases, immune function decreases. Once a stressful event has occurred, cortisol levels will eventually come down but it can take 2-3 weeks for levels to return to normal. During this time, livestock are more vulnerable due to their decreased immune function. Some producers feed medicated feeds to their animals during this time to help prevent a disease outbreak. Treating with these medicated feeds can be expensive, counterproductive to rumen function, and now requires a prescription due to the Veterinary Feed

Directive (VFD). Crystal Creek® formulates products that contain natural ingredients and are proven to support livestock during these stress events.

Crystal Pellets™ and Crystal Creek® Whole Leaf Aloe Vera Juice are two products that contain aloe vera for a flavoring agent. The natural ingredients in these products have been scientifically proven to decrease inflammation, stimulate the immune system along the gastrointestinal tract, promote nutrient absorption in the lower gastrointestinal tract and promote antioxidant regeneration. The complete polysaccharide profile found in the Crystal Pellets™ and Crystal Creek® Whole Leaf Aloe Vera Juice are made up of small, medium, and large molecular weight molecules. The polysaccharide's molecular weight is very important and helps to determine what body system the polysaccharide supports. **Figure 2** shows the breakdown of Aloe Vera's polysaccharides according to their molecular weight and the area of effect each molecular weight molecule has on the animal's immune system.

Not All Aloe Products Are The Same

Unfortunately, some companies are marketing aloe with a confusing lab test called the Methanol Precipitable Solids (MPS) test. The MPS test measures total precipitable solids and sugars within a product. The

Figure 1

CORTISOL'S EFFECT ON IMMUNE FUNCTION

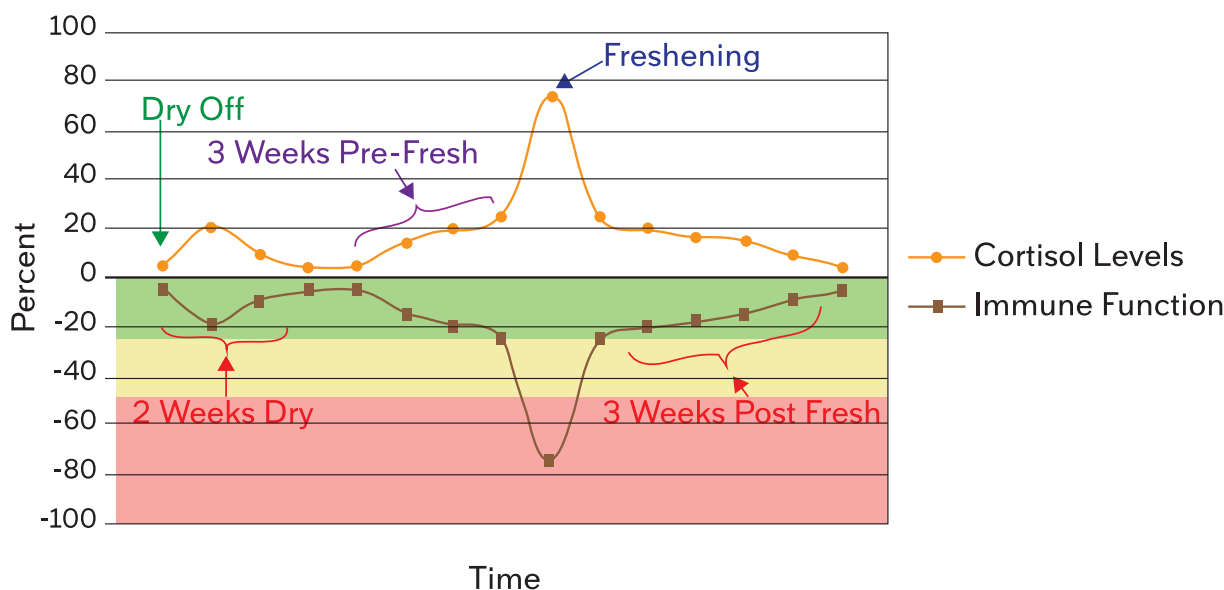
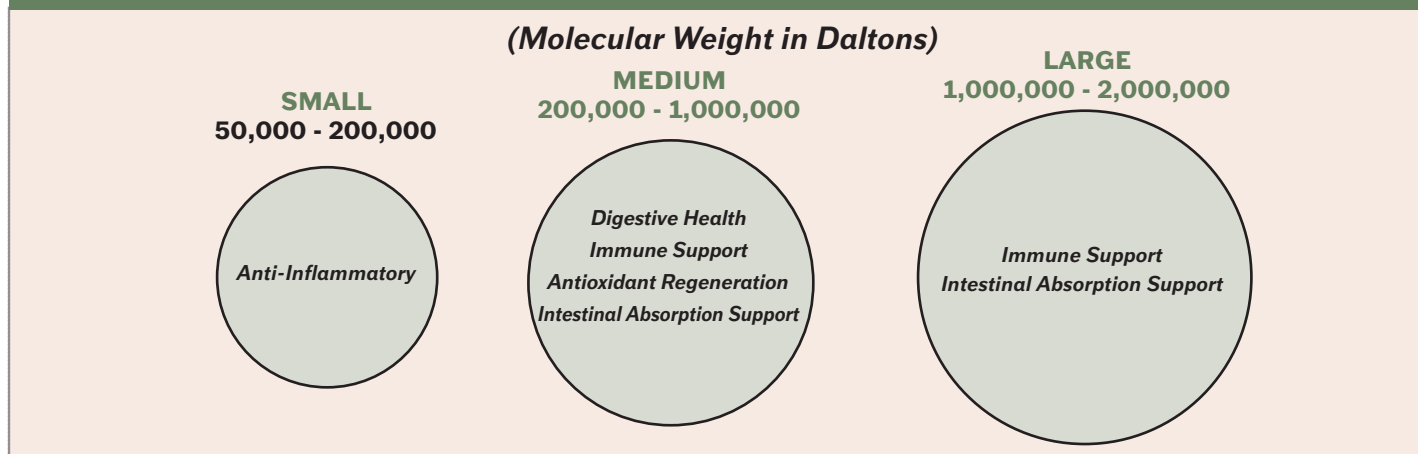


Figure 2

ALOE VERA POLYSACCHARIDE PROFILE



MPS test does not accurately distinguish between the active polysaccharides contained in an aloe product. That is to say that a product can have a high MPS test but have low amounts of active aloe polysaccharides, resulting in poor overall function.

Crystal Creek® has tested a competitive aloe from a manufacturer marketing their product with the MPS test. Crystal Creek® used an independent third-party lab with the approved testing method of high performance liquid chromatography (HPLC) on the competitive aloe sample. HPLC testing can separate the polysaccharide molecules to tell what sugars come from the aloe plant and provide the quantity of each polysaccharide present. The HPLC test results of the competitive aloe product showed that over 50% sugars present in the product were not of aloe origin. That means sugars were added to the product from an outside source. The addition of sugars to a solution will increase the MPS test value.

The International Aloe Science Council (IASC) is an international committee that is comprised of scientists from around the world that specialize in aloe science. The IASC has formally rejected the MPS test and has issued the following statements to consumers to protect them from companies using the MPS test to market their product:

- “The IASC does not endorse the MPS and is discouraging the use of the test as the basis for a label claim.”
- “The Ethics and Science & Technology Committees of the IASC, together with the Board of Directors of the IASC is working together with regulatory agencies

and law enforcement officials to protect the public from such fraudulent activities. Until these efforts are completely successful, a detailed knowledge of the scientific and technical aspects of aloe polysaccharides is the best protection against fraud and misrepresentation.”

Manufacturing techniques can vary and can significantly impact molecular weight distribution and retention, thus impacting performance of products. Crystal Creek® prides itself on thoroughly testing our aloe products with methods approved of by the IASC.

All Crystal Creek® Aloe Sources Are:

- Compliant with the International Aloe Science Council’s standards
- Subject to quality control testing with HPLC analysis (both from the manufacturer and our own internal quality control testing protocol)
- Tested for a confirmed molecular profile and the amount of each active polysaccharide compound
- Certified organic

Choosing the right aloe is more than just buying on price. Purchasing an aloe product that is backed by recommended IASC scientific testing will assure your animals are receiving a quality, proven nutritional support. Crystal Pellets™ and Crystal Creek® Whole Leaf Aloe Vera Juice are designed to be used for strategic situations, meaning that they should be used for specialized, short-term nutrition to support animals during times of specific challenges. To learn more about these products and how they can be used on your farm, call Crystal Creek® today.

Heat Stress In Poultry

By Stephanie Hutsko, PhD

What Is Heat Stress?

Simply put, heat stress occurs when a bird's core temperature is higher than its thermoneutral zone (Figure 1). A thermoneutral zone is a temperature range in which an animal does not use any additional energy to maintain its normal core body temperature. Heat stress is a result of a negative balance between the energy transfer from the bird's body to its environment and the amount of heat energy produced by the bird. This imbalance can be caused by multiple factors such as ambient temperature, humidity, air movement, metabolism rate and thermal irradiation. Effects can range from mild distress to death.

Modern poultry breeds may produce more body heat due to increased metabolic activity and as a result are more susceptible to heat stress. To give some perspective, an average adult male human produces 1/7th of the heat per kg of body weight that a modern broiler produces. Birds are not able to combat heat through perspiration on the skin and only lose about 40% of heat that they produce to the surrounding air. Birds do, however, have a unique heat abatement method involving air sacs. Air sacs promote air circulation,

which in turn increases the evaporative loss of heat from the respiratory system. The physical manifestation of this process is panting (Figure 2).

How To Tell If Birds Are Heat Stressed

As mentioned above, panting is a solid indicator that birds are experiencing heat stress, but there are other signs to look for, too. One of the first signs commonly noticed is a decrease in feed intake paired with an increase in water intake. Birds that are heat stressed may spread their wings to increase air flow and are often more sedentary.

When dealing with laying hens, egg production will decrease along with egg quality parameters, such as egg shell thickness, egg weights and Haugh unit measurements¹. If the hens produce brown eggs, the shell color will become paler. Broilers will show a decrease in body weight gain and feed conversion. Birds that have experienced heat stress have lower meat quality when processed, showing lower percent protein and higher inclusion of fat in the breast muscle, as well as a decrease in overall breast muscle weight.

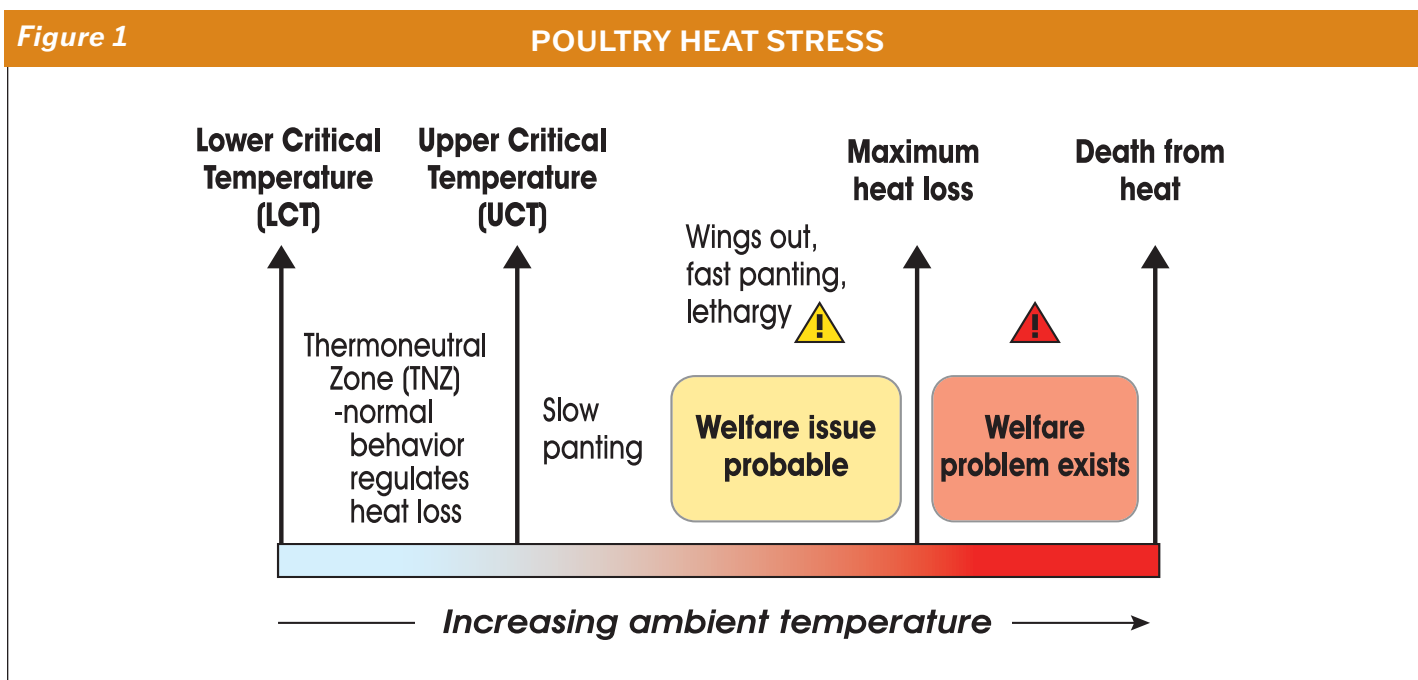


Figure 2



Source: www.livestockking.net/keep-chickens-cool-hot-weather-summer

The physiological effects on the birds are sometimes hidden, but are just as detrimental to performance and health. During any time of stress, the hormone cortisol is elevated to help the body cope initially, but as time passes and the cortisol levels remain high, the hormone will start to have negative effects on immune and digestive function. Antibody production and response become significantly depressed, making birds more susceptible to illness². In addition to an impaired immune system, birds experiencing heat stress will also face a compromised gastrointestinal system. Birds subjected to heat stress have been shown to have decreased dietary digestibility and decreased plasma protein and calcium levels^{3,4}. When birds pant, there is a subsequent increase in carbon dioxide and blood pH, which in turn decreases the blood bicarbonate that is available for egg shell formation.

What Can Be Done To Alleviate Heat Stress?

Heat stress leads to annual economic losses of \$128 to \$165 million in the poultry industry⁵. Providing proper ventilation and using cooling pads can help alleviate heat stress in the birds' housing environment. During hot weather, adequate air speeds can be accomplished through the use of fans and tunnel ventilation. It is important that humidity levels are kept low. If humidity

reaches a high enough level it can become detrimental to the birds' ability to regulate their body temperature. For every 10% increase in relative humidity, a bird's thermoneutral zone decreases by one to two degrees Celsius. During times of extreme heat, misters and cooling fans may also be beneficial to promote evaporative cooling.

There are two effective nutritional strategies that can be used to lessen the effects of heat stress in birds. They include increasing the nutrient density of the diet and focusing on immune support. The nutrient density of the diet may be increased to offset the decreased intake that occurs during hot weather. Birds need to be provided with adequate amounts of antioxidants, vitamins and trace minerals regardless of stress status. Minerals and vitamins can become more critical in times of stress as the immune system has a high requirement for them to function properly. Immune supportive feed additives can also be included in the diet to combat the negative effects of heat stress. Crystal Creek® developed Crystal Meal™ specifically for this purpose. This aloe-based feed additive allows the immune system and gastrointestinal tract to function at normal capacity even in the presence of stress hormones. This allows the birds to maintain production and meat/egg quality.

Overall, modern-day chickens are more susceptible to heat stress than their jungle fowl ancestors. Genetic selection and housing have drastically changed the way birds are raised and managed. Therefore, measures need to be taken to ensure that they are provided with adequate heat abatement practices, such as effective ventilation and air flow, immune supportive therapies and proper nutrition. Crystal Creek® employs experts that are available to help with any questions or concerns you may have about heat stress in poultry. Give us a call today.

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Maximizing Your Cover Crop Potential



By Alex Austin, B.S.

There are many benefits of incorporating a cover crop into crop rotations. Clearly identifying crop needs and goals will aid in proper plant species selection. This article will discuss four basic goals of cover crops; protecting soil from erosion, grazing and harvesting of forage, improving soil health and weed suppression.

Protecting Soil From Erosion

In some situations, producers are not expecting to gain forage from planting a cover crop. The cover crop is planted strictly to protect soil from erosion until the main production crop is planted. This tactic can be used when planting corn or soybeans on erodible soils. After harvesting the main crop, a cover crop such as winter wheat (or other quick to establish plants) can be seeded to decrease soil erosion. Crops to consider:

- Cereal Grains killed by frost
- Annual Clover (nitrogen credits) and Grasses

Grazing And Harvesting For Forage

Grazing and harvesting a cover crop field can provide additional forage in late spring and early fall when grass quality is starting to dwindle. Allow enough time for the cover crop to have sufficient growth before grazing or harvesting. This may present a challenge in regions with a shorter growing season. Meadow Fescue is one crop that has been gaining in popularity because it does not have the negative endophytes that tall fescue has and still can withstand drought, freezing temperatures and grazing pressure very well. Planting the right mix will provide a high quality and high yielding forage. Crops to consider:

- Cereal Grains (winter wheat or winter rye for spring grazing)
- Meadow Fescue
- Festulolium



Improving Soil Health

Over time, cover crops can help build up the organic matter level of the soil. Building organic matter can lead to an increase in nutrient and moisture holding capacity of the soil. Increasing nutrient holding capacity will help crops utilize fertilizers applied to fields by holding the nutrients in the root zone and preventing them from leaching. Planting legumes can fix nitrogen, increasing nitrogen credits for the next crop. Planting turnips and radishes can help to break up soil compaction and build soil structure on heavy clay soils. Crops to consider:

- Legumes: Clover, Peas
- Turnips
- Radishes



When selecting a cover crop, make sure to check what crops are best suited for the area and remember it is important to soil test before planting. A cover crop can greatly benefit soil health, soil structure and provide fertilizer credits, but the soil must first be able to support the growth of the cover crop. A basic soil test from Midwest Labs or Dairyland Labs can show the value of phosphorous and potassium in the field, as well as pH and soil type. This information can then be used to determine what cover crop to plant and if fertilizer is needed.

Consider time and field history before planting a cover crop. Every season is different and sometimes weather can affect when it is possible to get into fields. Not being able to get crops off the fields at ideal times can impact what cover crops can be used. Always ensure the cover crop will have enough time to establish and grow to meet crop goals and that there is enough time to terminate the cover crop before planting the main crop. Look at field history. If herbicides have been used on the field, make sure to check that there is no carryover that will negatively impact the desired cover crop.

There are programs available for incorporating cover crops into your crop rotation. Working with a local extension agent can help you select the right cover crop to take advantage of these incentive-based programs. Always keep your nutritionist and agronomist informed of pending decisions as they can provide guidance for cover crop selection. To start a discussion about utilizing cover crops on your operation call a Crystal Creek® nutritionist today.

Sources:

¹www.nrcs.usda.gov/wps/portal/hrcs/detail/ny/technical/?cid=nrcs144p2_027252

²Nickel, Raylene. "7 Ways Cover Crops Help Fight Weeds." Successful Farming, March 20, 2018. www.agriculture.com/crops/cover-crops/7-ways-cover-crops-help-fight-weeds

Weed Suppression

Cover crops can provide weed suppression. When planted at high rates cover crops can crowd out weeds and canopy over any exposed soil. Cereals are a good choice for this. Certain cover crops like rye, produce chemicals that inhibit the growth of weeds. This process called allelopathy, occurs when the cover crop is killed and the plant material is decomposing. The decomposing plant material acts like a pre-emergent herbicide, reducing the likelihood that weed seeds will germinate. Allow two weeks after cover crop kill before planting the next crop.² Crops to consider:

- Rye
- Brassica
- Cereals Grains planted at a high rate

Rethinking Drafts And Calves



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

Drafts and pre-weaned calves: Rarely is a topic so misunderstood. Many calf raisers are uncomfortable with the topic of drafts on calves, regardless of the outside temperature. Most people believe that drafts are to be avoided at all

costs. I once heard of a veterinarian who would spark a lighter in a calf pen and if the flame flickered, even the slightest bit, would declare the presence of a dangerous draft.

Contrary to popular belief, however, drafts on pre-weaned calves are not always a bad thing. In fact, in certain situations, they can even be beneficial.

Drafts Defined:

What defines a draft? If you can feel air movement on your face does that make it a draft on the calf? Is a draft always bad for calf health? These are simple questions but the answers can be more complex.

Webster's dictionary defines a draft simply as "a current of air...". This definition implies that it is neither good or bad.

A paper published in 1986 by the American Society of Agricultural and Biological Engineers titled "*Design of Ventilation Systems for Poultry and Livestock Shelters*" defined a draft as "air speeds in excess of 29.5-59 feet per minute". A definition with this level of precision makes nice lecture material for freshman veterinary students but leaves calf raisers looking for something more tangible. Most ventilation professionals today have universally accepted 60 feet per minute as a draft threshold for pre-weaned calves during times of cold weather.

Today, ventilation professionals have sensitive air speed meters that can be used to measure air



Picture 1: A hot wire style air speed meter is used to measure air speed and volume from a positive pressure tube.

speeds and volumes. The two most common air speed meters are the hot wire style (Picture 1) and the windmill style (Picture 2). Once a ventilation system is installed in a barn, walk around the barn and measure the air speeds at different points in the barn. Thoroughly checking air speeds may reveal drafty areas or dead spots in the barn. If the ventilation system has multiple settings, test the air speeds at the same points throughout the barn at each setting. By knowing the air speed at the calf level associated with different ventilation system settings, the calf manager can provide fast cooling airflow when the calves are under heat stress or draft free fresh air when the calves are experiencing cold stress.



Picture 2: A windmill style air speed meter is used to measure air speed.

Drafts And Thermoregulation:

Heat loss happens through three processes. They are:

1. Conduction
2. Convection
3. Radiation

A draft is a current of moving air that can increase heat removal rates through the convective process. If you burn your finger on a stove, you will probably blow on it. Why? Because we inherently know

that by increasing air speeds over a surface, we can cool the object faster. Moving air has the ability to strip heat off objects. This is the key to understanding drafts as they relate to calves, and all livestock for that matter. In the case of cold weather, drafts are to be avoided because they will exacerbate cold stress. But, in the case of hot weather, the convective properties of drafts can help calves stay cool.

Young calves have a thermoneutral zone (TNZ) of 50 to 78 degrees Fahrenheit (Wathes et al, 1983) where they burn no additional calories to maintain body temperature. This means that when temperatures dip below 50 degrees Fahrenheit calves begin to burn calories to stay warm and above 78 degrees Fahrenheit, they burn calories in metabolic cooling processes.

Simply put, when it is above 78 degrees Fahrenheit calves can benefit from a draft to assist in heat abatement. When it is below 50 degrees Fahrenheit calves should not be exposed to air speeds greater than 60 feet per minute in order to prevent excess convective heat loss. There is a grey area about how to ventilate for temperatures between 50- and 78-degrees Fahrenheit. Science has yet to pin down an ideal air speed vs ambient temperature relationship. Until that day comes, calf raisers are left to use their experience to guide their decision-making process.

Additional Benefits Of Properly Managed Drafts:

During hot summer weather, drafts on calves can have benefits beyond heat abatement. Some calf raisers have reported a 50 percent reduction in bedding during summer months when using a high-speed (drafty) ventilation system because the fast air helps keep the bedding dry for longer periods of time.

Fly pressure can also be reduced with drafty ventilation systems in the summer. Flies do not like to be in a draft. Experience has shown that if calves can reside in a stream of air that is moving

(Continued on Page 14)

Rethinking Drafts And Calves

(Continued From Page 13)

roughly 176 feet per minute (2 miles per hour) or greater, flies will often avoid the calf to avoid the associated draft.

The idea of regulating air speeds based on ambient temperature now leads to bigger questions. Does your calf barn ventilation system allow you to change the speed of air at the calf level with the changing of ambient air temperatures? Can it easily move back and forth between fast cooling air and slow, draft free air based on outside temperature; especially during times of seasonal transition like the spring and fall when days are hot and nights are cold?

In the future, before proclaiming that all drafts are bad for young calves remember that it is not the air speed, but rather the air speed in relation to the ambient air temperature that determines if it will have a helpful or harmful effect on calf

health. Ventilation systems that allow the calf raisers to adjust air speed at the calf level based on temperature will help calves remain healthy in the face of changing weather conditions.

Key Take-home Points:

- Although often misunderstood, drafts are not always detrimental for pre-weaned calves.
- When outside temps dip below 50 degrees Fahrenheit, prevent drafts on pre-weaned calves.
- When temps are over 78 degrees Fahrenheit, air speeds of 2 miles per hour or greater can have positive effects on calf health.
- During warm weather, drafts can assist with reducing fly pressure on the calves and help bedding stay drier.





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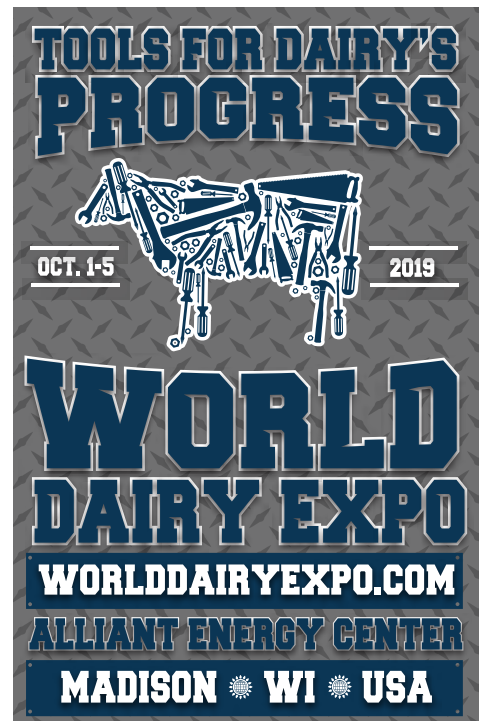
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