

SWIFT START® CALF FEEDING TRIAL UPDATE:

## How Heifers On The Crystal Creek® Swift Start® Calf & Heifer Program Perform When Entering The Milking Herd



By Teresa Marker, B.S.

The goal of any dairy calf raiser is to have a healthy, productive, replacement heifer that is a profitable addition to their milking line. The Crystal Creek® Swift Start® Calf & Heifer program consists of a line of milk replacers, texturized

calf feeds, calf pellets and mineral formulated with industry leading technology and manufactured with the highest quality ingredients available. University research has proven time and time again that the way calves are fed and raised during the pre-wean period will affect their performance later in life. In the "Swift Start® Calf Feeding Challenge" newsletter article published in April of 2017, Crystal Creek® provided documentation of superior performance results in pre-weaned calves that were on the Swift Start® Calf & Heifer program. This data showed higher body weight gains, improved feed conversion rates, improved nutrient digestibility, less veterinary intervention and smoother transitions into weaning. The calves on the Swift Start® calf feeding program not only outperformed the calves on the competitor's program but also saved the calf raiser money. This article will take topics highlighted in the initial trial a step further and evaluate the performance of heifer calves as they transition into post-weaned heifers and ultimately, progress into the lactating herd.

### Calf Performance

An on-farm calf trial was conducted during the winter of 2017-2018; comparing the Crystal Creek® Swift Start® Calf & Heifer program to a competitor's feed program.



The trial was performed on a 400-cow conventional dairy, located in eastern Wisconsin. The calf raiser and their employees collected all the information, compiled it into a spreadsheet and then submitted the data to Crystal Creek®. Both groups of calves were weighed at birth and weaning. Milk replacer powder was weighed with a scale prior to mixing. Calf feed fed was weighed and refusals of the calf feed were also weighed to verify amounts of calf feed consumed. Treatments, and their associated costs, were recorded.

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# Swift Start® Calf Feeding Trial Update

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Tables 1, 2 and 3 show the trial results of the calves on the Swift Start® calf feeding program compared to calves on the competitor’s feed program. The calves on the Swift Start® calf feeding program had notably higher average daily gains, less treatments per calf and significantly less death loss.

Table 1	TRIAL SUMMARY				
	Average Birth Weight	Average Wean Weight	Average Days On Milk	Average Daily Gain	Average Cost To Raise
Swift Start® Program	100.56 lb.	185.6 lb.	56.1	1.52 lb.	\$188.66
Competitor Program	100.51 lb.	151.9 lb.	54.5	0.935 lb.	\$204.02
Swift Start® Advantage	Similar	+33.7 lb.	Similar	+0.59 lb.	\$15.36 less/calf

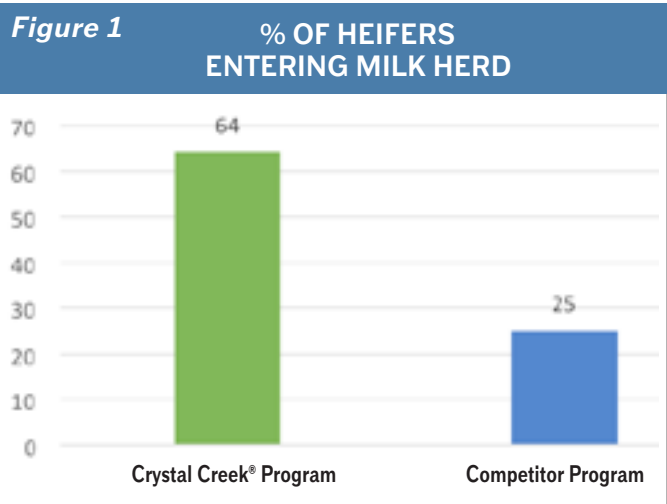
Birth weights were almost identical on each program but the Swift Start® calf group had a 0.59 lb. increase in average daily gain, which resulted in higher weaning weights and a decreased cost to raise.

Table 2	NUMBER OF TREATMENTS		
	Total Treatments	Total Calves	Total Treatments Per Calf
Swift Start® Program	23	24	0.96
Competitor Program	96	22	4.36

Calves on the Swift Start® calf feeding program had, on average, 3.4 less treatments per calf. Research has shown that calves receiving less treatments will have higher milk production once they enter the lactating herd.

Table 3	DEATH LOSS		
	Total Calves Started	Total Calves Weaned	% Death Loss
Swift Start® Program	24	24	0%
Competitor Program	24	11	54%

All the calves on the Swift Start® calf feeding program reached the weaning point while over half of the calves on the competitor’s feed program did not survive.



Data collected shows heifers raised on the Swift Start® calf feeding program had a 2.5x's greater chance of entering the milking herd.

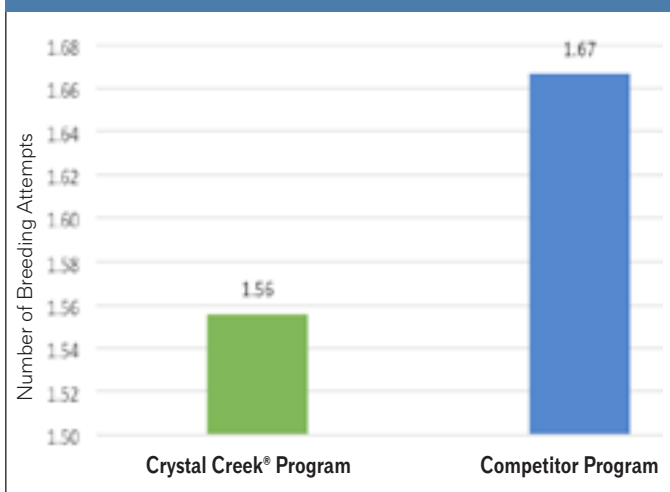
## Heifer Performance

Calves on the Swift Start® calf feeding program had more uniform body weights and a much smoother transition into weaning. Many of the heifers that were fed the competitor’s milk replacer and feed during the pre-wean period, did not survive to the time of breeding due to health issues. Animals in both groups were fed the same feed post-weaning. Heifers on the Swift Start® calf feeding program had significantly higher reproduction rates resulting in heifers reaching the milking herd sooner, meaning less time on feed and more milk profit.

## Cow Performance

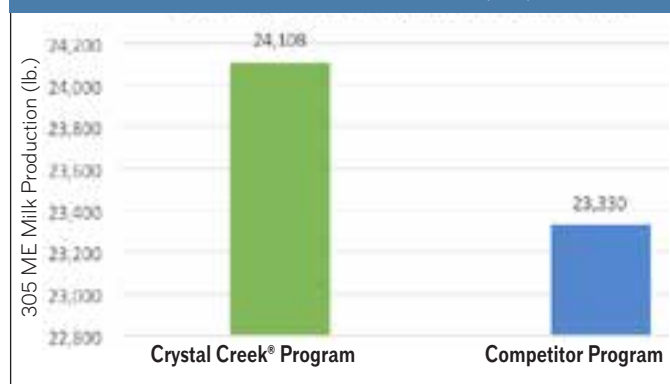
The animals in the Swift Start® group had a higher percentage of cows entering the milking herd, who experienced earlier calving, (between 22-25 months of age), produced an increased amount of milk, possessed better reproduction rates and demonstrated less cull rates vs. cows from the competitor feed program.

**Figure 2 AVERAGE TIMES BRED WHILE IN MILKING HERD**



This data shows the cows that entered the milking herd who had almost completed their first lactation. Cows that were raised on the Swift Start® calf feeding program required 7% less breeding attempts to conceive.

**Figure 3 AVERAGE 305 ME MILK PRODUCTION (lb.)**



Cows raised on the Swift Start® calf feeding program had 778 lb. more in milk production, resulting in higher milk income when compared to those raised on the competitor's program.

## Economics

Figures 4 & 5 show the economical differences between the two programs and the associated pounds of milk and milk revenue. The Swift Start® calf feeding program saved the producer \$15.36 per calf on the cost of rearing during the pre-weaned phase. Those same calves went on to produce 778 more pounds of milk (on average) during their first lactation when compared to the calves fed the competitor's pre-weaned feed program.

**Figure 4 COST OF RAISING CALVES**

	Swift Start® Calf Feeding Program	Competitor Calf Feeding Program	Swift Start® Cost Savings/ Calf
Pre-weaned rearing costs	\$188.66	\$204.02	\$15.36

*These costs took into consideration the cost of milk replacer, calf feed, supplements given and treatment costs. Calves raised on the Swift Start® feeding program were more economical to raise.*

**Figure 5 INCREASED MILK VOLUME AND REVENUE**

	Swift Start® Calf Feeding Program	Competitor Calf Feeding Program	Swift Start® Advantage
305 ME Milk Production (lb.)	24,108	23,330	778
Milk Revenue (\$) Assuming \$18/cwt	\$4,339.44	\$4,199.40	+\$140.04

*A comparison of calves raised on the Swift Start® calf feeding program and calves raised on the competitor feed program showed calves in the Swift Start® group had higher milk production and subsequent higher milk revenue.*

The data collected with this trial consistently shows the Swift Start® calf feeding program continues to outperform others while delivering an increase in total profit to the producer. Call Crystal Creek® today to improve your herd profitability by feeding your calves with the Crystal Creek® Swift Start® Calf & Heifer Program. We are confident you will be glad you called.

# Nutrition For Whitetail Does: The Key To Larger Bucks



By Erik Brettingen, B.S.

Whitetail deer hunters across the nation are becoming keyed into the nutritional needs of their local deer population with hopes of producing larger, healthier bucks on their hunting properties. While mineral licks and food plots are popular suggested

techniques for supporting antler development, there is little proof of their effectiveness. Recent University research has expanded on an exciting new approach to growing bigger bucks and contrary to conventional methods, it has nothing to do with the bucks at all. The secret involves one word: epigenetics.

## What Is Epigenetics?

Epigenetics is a biological phenomenon where certain environmental conditions experienced during pregnancy can switch genes on or off in a growing fetus.<sup>1</sup> Once these fetal genes are turned on or off in-utero, that condition stays with the animal for the rest of its life. The concept is simple: if a doe is provided with exceptional nutrition during the winter months

when she is pregnant, her offspring will have the potential to exhibit superior physical traits (such as larger antler and body size) later in life.

Epigenetics can be thought of like the action of turning a light switch on or off. When pregnant does meet their nutritional requirements during pregnancy, they are then able to turn on the “switch” (genes) for antler growth, increased body size and improved fertility within their growing fetus (Figure 1). Unfortunately, winter conditions and decreased feed availability coincide with the most critical time of fetal gestation and development. If the pregnant doe does not meet her nutritional requirements during this critical time, her fawn will be born with its “switches” (genes) turned off.

## EXAMPLES “A” AND “B” GIVE TWO SCENARIOS OF HOW EPIGENETICS CAN AFFECT DEER GROWTH AND DEVELOPMENT

### Example A

Doe A is pregnant during a harsh winter (Figure 2). Cold temperatures and deep snow place an increased caloric demand on her and food is scarce. She cannot maintain her bodyweight and is slowly starving. The hormone profile circulating in her bloodstream is

**Figure 1** PREGNANT DOE MEETING NUTRITIONAL REQUIREMENTS. GENE “SWITCHES ON”





**Figure 2****DOE A**

altered to send signals to her growing fetus that the environment it is going to be born into is harsh and unforgiving. There is little food to support growth and development, signaling to the fetus that it will have the best chance of survival if it maintains a small body size; where less calories are needed to maintain its weight. If the fetus is a buck fawn, it will be advantageous for it to have smaller antlers because they require less energy to grow. If it is a doe fawn, it will be advantageous for it to have a reduced fertility potential because gestation and lactation are energy intensive. As a result, the pregnant doe's circulating hormones will turn off the fawn's genes for developing larger body size, bigger antlers and increased fertility. Even if this fawn is born into an ideal environment and has abundant food its whole life, the genes (or "switches") for body size, antler growth and fertility have been turned off. As a result, this deer will develop into an adult that is smaller in stature, with reduced antler size and a poor fertility potential.

### Example B

Doe B is pregnant during the same severe winter as doe A, but feed for doe B is plentiful (Figure 3). This doe's caloric needs are always met and she is able to maintain her bodyweight during gestation. The hormone profile circulating in her bloodstream sends signals to her growing fetus that the environment it is going to be born into provides ample food for growth and development. Doe B's fawn will have to compete with other deer once

**Figure 3****DOE B**

it is mature so having a large body size, big antlers and increased fertility potential will ensure its genes are passed onto the next generation. As a result, the pregnant doe's circulating hormones will turn on the fawn's genes for larger body size, bigger antlers and increased fertility. If this fawn is born into an environment where food is plentiful, its activated genes will allow it to develop into an adult that is larger in stature, with increased antler size and better fertility rates.

## The Mineral Lick Myth

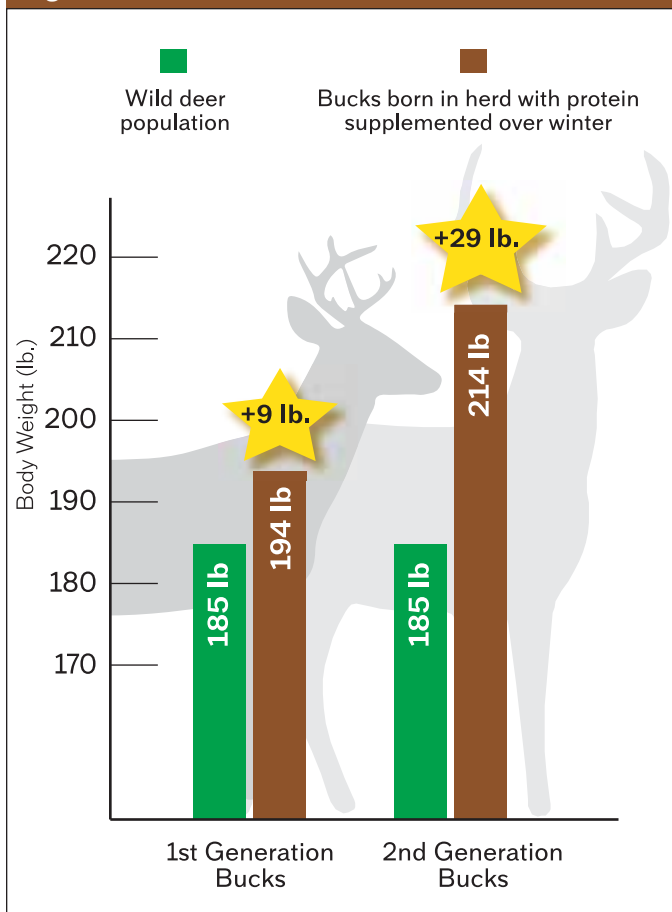
There are many myths surrounding deer nutrition in the hunting industry, with one of the most common being that mineral licks help grow bigger antlers. Studies have shown there is little to no scientific evidence that mineral licks produce bucks with bigger antlers. In fact, separate studies completed at Penn State and Auburn University indicate mineral supplementation had no effect on antler size. Both studies tracked two different groups of young bucks. One group of deer was fed a normal diet, while the second group of deer had their feed spiked with minerals. Researchers could find no discernible difference in antler growth between the groups from year to year. In a similar study at Mississippi State, bucks who were supplemented with minerals had an increase in body weight, but antler growth remained the same.<sup>2</sup>

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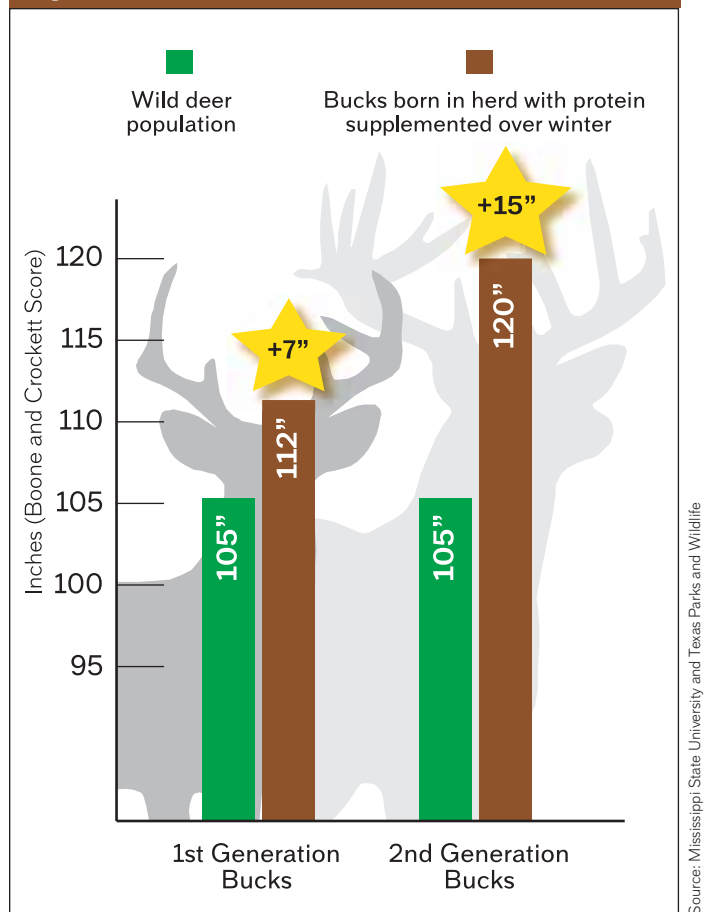
## Nutrition For Whitetail Does: The Key To Larger Bucks

(Continued From Page 5)

**Figure 4 MATURE BUCK BODY WEIGHT**



**Figure 5 MATURE BUCK ANTLER SCORE**



### Research Studies Show How To Grow Bigger Bucks: Applying Epigenetics

The protein demands of wild pregnant does are often not met during the winter months. Mississippi State University explored the hypothesis that providing a protein supplemented diet to wild deer who lived in low-quality forage areas could eventually create harder, larger, animals in subsequent generations. When protein was supplemented to the gestating does diet, it was shown that their first-generation offspring were up to nine pounds heavier and had an increase in antler size of approximately 6% at three years of age (Figure 4). By the time the second generation of offspring reached three years of age, they averaged up to 29 pounds heavier in body weight than their wild, un-supplemented counterparts and had an increase in antler size of up to 32% (Figure 5).

In a Texas Parks & Wildlife study, wild whitetail bucks were broken into two groups and supplemented over the winter. One group was supplemented with corn and the other group was supplemented with a 16% protein pellet. The 16% protein pellet supplemented herd generated bucks that grew antlers upwards of twice as heavy as the bucks who came from the corn supplemented group (corn only has an 8% protein level). These studies prove that feeding corn and/or minerals alone will not produce larger antler size.<sup>3</sup>

### The “Light Bulb” Moment

The research by Mississippi State University and Texas Parks and Wildlife has turned conventional deer herd management on its head. Up to this point, landowners and hunters have tried to grow bigger bucks by focusing on the bucks themselves with mineral licks and food plots; yielding little to no identifiable results. Epigenetics are what sets the stage for a deer’s potential in life, not the mineral lick or food plot it eats as a mature deer.

**If landowners and hunters want to grow bigger bucks, they need to focus on the nutritional needs of the pregnant does.**

## *The Solution*

Crystal Creek® has combined the research done by Mississippi State University and Texas Parks & Wildlife to develop an innovative approach to maximize the genetics of local deer populations. By concentrating on the nutritional requirements of the gestating does during the late fall and winter months, benefits such as improved body condition (including body and antler size) and decreased starve out numbers can be seen. The key is to focus on the fetus (baby buck), growing in-utero. This is what led Crystal Creek® to the product name of Baby Buck®, a supplemental product designed to be fed to the gestating doe to support the baby (buck) growing inside her.

Baby Buck® is a pelleted protein supplement formulated to provide high quality protein, vitamins and minerals to gestating does (and subsequently the baby bucks in-utero) during the winter months when nutrition can be scarce.

The Baby Buck® program increases the hardiness of local deer populations by offering this high caliber protein supplement to does and fawns when available forage does not meet their nutritional needs. Implementing a winter protein supplement program can improve nutrition for

pregnant does and ensure that genes for antler growth, body size and fertility are activated for the next generation of fawns. Baby Buck® helps meet the dietary requirements of gestating does during critical time periods (in utero and during growth phases) to encourage a healthier, more robust deer population that can not only survive the demands of strenuous weather seasons but continue to produce consistently bigger bucks from year to year.

This protein and mineral/vitamin supplement is available in an easy to feed pellet at a recommended feeding rate of ½ to 1 lb. per head per day and can be fed off the ground or through a feeding station (Figure 6). Typical feeder densities used are one feeder for every 100 acres of land being managed. Be sure to comply with all state and federal regulations regarding the feeding of wildlife in your area.

Baby Buck® uses what science knows about epigenetics to give landowners a novel, effective way to provide a long-term management plan for producing larger, healthier bucks and a more vigorous deer population. If you are looking for a proven, science-based method aimed to increase antler size and herd health within your local deer population, contact Crystal Creek® to learn more about this unique approach.

### SOURCES:

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**Figure 6**

### FEEDING STATION OPTIONS



**Homemade Feed Stand**



**Gravity Feeder**



**Mechanical Broadcast Feeder**

# Calfhood Pneumonia: When Is It Related To Ventilation And When Is It Something Different?



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

Calfhood pneumonia can be frustrating to deal with. Understanding where the problem originates is the first step in creating a plan to combat it. Most cases of calfhood pneumonia can be placed into one of two broad categories: environmental causes vs. contagious

causes. Another way to look at these categories would be: pneumonia cases caused by poor air quality vs. pneumonia cases caused by something other than air quality/ventilation.

Calfhood pneumonia is a complex, multifactorial disease that is rarely ever attributed to one factor. In the same way that spokes help a wheel keep its round shape when under a stress load, calves have six main “spokes” that help keep them healthy when subjected to stress. Those spokes are:

1. Colostrum
2. Calories
3. Bedding
4. Air Quality/Ventilation
5. Vaccination
6. Sanitation

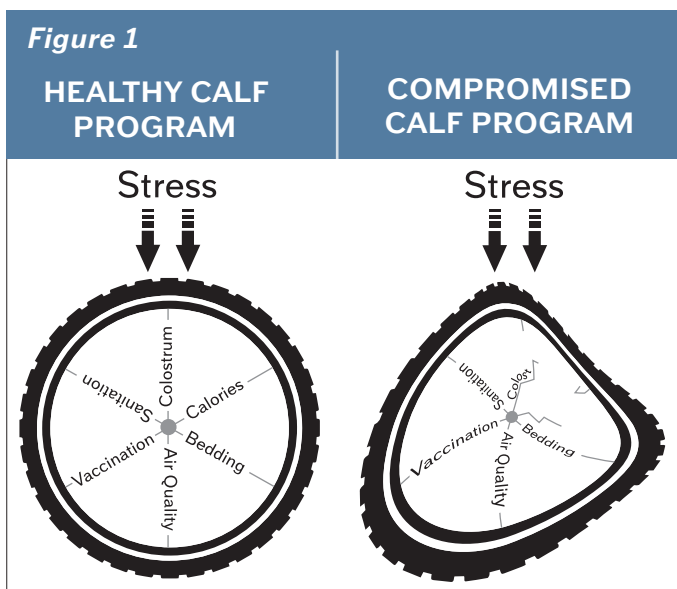
Each of the six “spokes” listed in Figure 1 are intertwined in a complex manner that helps keep calves healthy. Although ventilation and air quality are commonly implicated when discussing calfhood pneumonia, it is important to remember there are other factors that impact a calf’s respiratory health.

## ***Environmental Pneumonia Cases ARE Typically Related To Air Quality And Ventilation***

Poor ventilation in calf housing is the main environmental risk factor predisposing calves to respiratory disease.<sup>1</sup> Cases of environmental pneumonia are by definition related to poor air quality and inadequate ventilation. Conventional wisdom would suggest that calves breathing in poor quality air would be inhaling large amounts of bacterial pathogens like *Pasteurella multocida*, *Mannheimia haemolytica* and *Histophilus somni*; and it’s the inhalation of these pathogens that cause disease. While this line of thinking logically makes sense, it is actually incorrect. The bacterial causes in most cases of environmental pneumonia do not actually come from the environment at all, they come from the calf itself.

Did you know that most healthy calves have *Pasteurella*, *Mannheimia* and *Histophilus* living in the upper part of their respiratory tract? According to Bradford Smith, “*Mannheimia haemolytica*, *Pasteurella multocida* and *Histophilus somni* are normal inhabitants of the nasal pharyngeal mucosa, but not the lung, and are considered “opportunistic pathogens.”<sup>2</sup> Healthy calves carry these pneumonia causing pathogens around in their nasopharynx (back of their throat) every day. While these bacteria may attempt to migrate down into the lung tissue, a healthy lung lining and strong immune system will keep these invaders at bay.

Poor air quality is defined as air that is high in contaminants such as: noxious gasses (ammonia), particulates (dust), humidity and microorganisms.





For calf barns, target ammonia levels less than 10 ppm and humidity levels between 50% and 80%.<sup>2</sup>

When these airborne contaminants are inhaled by calves in excessive levels, they act as an irritant to the lining of the respiratory system. Over time, exposure to these airborne irritants begins to damage the lining of the respiratory tract while simultaneously burdening the immune system. In the presence of poor air quality, normal flora like *Pasteurella*, *Mannheimia* and *Histophilus* can migrate down from the nasopharynx into the lung field that now has a compromised defense system, enabling pathogens to set up an infection and cause respiratory disease.

Calves housed in barns with individual pens can have a higher percentage of environmental pneumonia cases because many popular commercially available individual pens have solid plastic sides with mostly solid fronts and backs. While this style of penning reduces calf to calf contact which helps prevent contagious pathogen spread, it can restrict airflow inside the calf pen itself.

Environmental pneumonia cases can occur as a result of poor or inadequate ventilation and usually follow the pattern outlined in **Figure 2**.

**Figure 2**

## HOW ENVIRONMENTAL CAUSES OF PNEUMONIA CAN CAUSE RESPIRATORY DISEASE IN CALVES

### Inadequate ventilation

- ➔ Buildup of airborne contaminants such as noxious gasses, particulate and microorganisms
- ➔ Over time these airborne contaminants irritate and damage the lining of the lung while simultaneously compromising the immune system
- ➔ Normal flora such as *Pasteurella*, *Mannheimia* and *Histophilus* migrate unchecked into a damaged lung field
- ➔ **Respiratory disease occurs**

If your farm is routinely dealing with calfhood pneumonia cases caused by *Pasteurella*, *Mannheimia* or *Histophilus*, revisit the 6 major spokes that make up the calf wheel of health paying particular attention to the air quality and ventilation system evaluation. A simple fogging test can tell you a lot about airflow throughout the barn (**Figure 3**).

(Continued on Page 10)

**Figure 3**

## SIMPLE FOGGING TEST SHOWS AIRFLOW THROUGHOUT BARN



## Calfhood Pneumonia: When Is It Related To Ventilation And When Is It Something Different?

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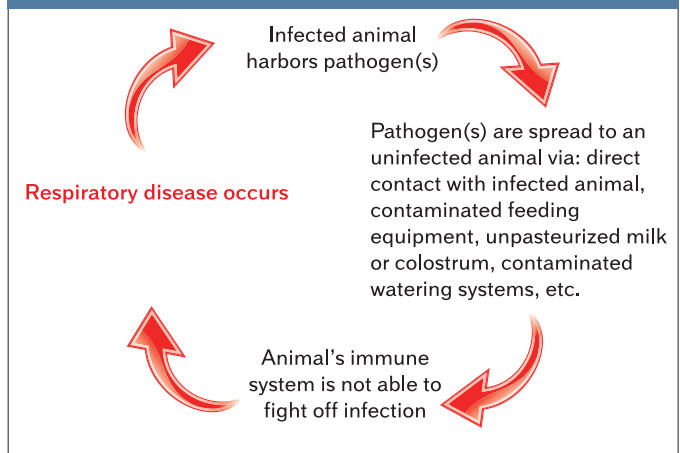
Introducing fog next to the intake of an outside fan will demonstrate the path outside air takes once it enters the barn. Producers can also introduce fog in the center of a barn to see where it exhausts and how quickly it disperses. To estimate your barn's air exchange rate, fill the barn with smoke and then time how long it takes for the smoke to disperse. Then take 60 divided by the time it takes for the smoke to clear (in minutes) and that will give you the number of air changes in an hour. For example, a barn that takes 10 minutes to clear the smoke would be  $60 \div 10 = 6$  air exchanges per hour. This smoke test can also help identify areas of still air, known as dead spots.

Contagious pneumonia cases are NOT typically related to air quality and ventilation. Pathogens such as *Salmonella*, *Mycoplasma* and Bovine Respiratory Syncytial Virus (BRSV) are not considered normal flora in healthy calves and are generally not associated with an airborne route of infection. These pathogens are found in infected animals and can be spread to uninfected animals through a variety of routes. The most common infection routes include exposure to an infected animal, infected colostrum or milk, contaminated feeding equipment and shared watering systems. Once a contagious cause of pneumonia, like *Salmonella* or *Mycoplasma* is introduced into a facility it can be difficult to eradicate because the existing population of calves act as a safe harbor for the pathogen; creating a situation where infected animals can pass disease along to uninfected incoming animals. Group housed calves that use a continuous flow management style are at a higher risk of contagious disease transmission when compared to the "all in/all out" management method.

In 2011, Fiona Maunsell stated, "Once established in a multiage facility, *Mycoplasma bovis* is very difficult to eradicate, suggesting ongoing transmission from older to incoming calves...Transmission of *Mycoplasma bovis* in respiratory secretions is considered important in the epidemiology of infection."<sup>3</sup>

Calves housed in barns with comingled group penning can have a higher percentage of contagious pneumonia cases. This is most likely explained because of the significant contact calves have with each other. While this style of housing generally

**Figure 4 HOW CONTAGIOUS CAUSES OF PNEUMONIA CAUSE RESPIRATORY DISEASE IN CALVES**



allows for a more open pen style that promotes easier ventilation and improved air quality, things like nose to nose contact, shared feeding equipment and group waterers facilitate the spread of contagious pathogens throughout the group.

Contagious pneumonia cases occur as a result of exposure to infected animals or fomites transmitting infectious pathogens and follow the pattern outlined in Figure 4.

If your farm is routinely dealing with calfhood pneumonia cases caused by *Salmonella*, *Mycoplasma* and Bovine Respiratory Syncytial Virus (BRSV), revisit the 6 major spokes that make up the calf wheel of health with particular attention to sanitation protocols, colostrum management and vaccination evaluation.

There are countless sanitation products and protocols when it comes to keeping calf equipment clean. Regardless of the approach used, an effective cleaning and disinfection protocol should reduce pathogen buildup and remove biofilm from calf feeding equipment and penning. Execute the established cleaning and disinfection protocol, then use an ATP meter or surface protein swab to test what is being left behind. ATP meter readings of 200 RLU or less are the goal for calf feeding equipment and penning after they have been cleaned and disinfected.

Validate proper colostrum collection and storage by periodically performing colostrum cultures to evaluate bacteria levels. Consider additional culturing for *Salmonella* and *Mycoplasma* if there is a history of issues with these pathogens on your dairy. Confirm calves are utilizing the colostrum given and receiving the protection they need from it by routinely testing blood serum total proteins. Colostrum management practices are considered successful if 80 percent of calves tested are at or over a total protein level of 5.5 grams per deciliter.

Vaccine recommendations can vary due to regional and operational differences. There is no such thing as a one-size-fits-all vaccination protocol; therefore, it is best to consult with your veterinarian when designing a protocol for your operation. A judicious, effective vaccination protocol will limit vaccine use to those vaccines with proven efficacy.

Remember that few things in life are black and white. Calfhood pneumonia cases are often complex with

multiple confounding factors. Addressing a calfhood respiratory disease problem is more complex than just saying “We need better ventilation in this barn.” Investing in a better ventilation system will payback dividends when struggling with an environmental pneumonia problem, but will do little to reduce respiratory disease rates when the cause is contagious in nature. Before spending money on changing the ventilation system, be sure that poor air quality is really the issue at hand.

*This article was originally published with the Progressive Dairy Magazine at: <https://www.progressivedairy.com/topics/calves-heifers/calfhood-pneumonia-when-is-it-related-to-ventilation-and-when-is-it-something-different>*

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## Customer Testimonial: *Owen and Treva Yoder*



Crystal Creek® has had the privilege of serving many wonderful customers over the last two decades. Today we would like to highlight an example of one of many happy customers who has had success while on the Crystal Creek® Dairy Nutrition Program.

Owen and Treva Yoder were married in 1980 in southern Iowa. They started farming during the 1980's which was a very difficult time in the dairy industry. They moved to Wisconsin in 1998 to farm 180 acres. The Yoder family consists of 3 sons, 6 daughters and 33 grandchildren who all live in the Bonduel, Wisconsin area. The Yoder's son Steven and his wife Rosanna currently live on the farm and are in the process of transitioning to help take over the daily farm work. The Yoder operation has been certified organic since 2006. They milk 36 to 40 Holstein cows and raise all their own young stock and corn.

Owen states “We were always looking for a good mineral company. We discovered Crystal Creek®

twelve years ago and have been with them ever since. We really appreciate their products and services. I would recommend Crystal Creek® for whatever livestock you are feeding. They are only a phone call away and their products can be shipped direct to your farm.” When asked what makes Crystal Creek® different than other livestock companies, Owen replied, “They always have time to answer our tough questions. We have seen big improvements in the health of the cows, milk components, and SCC. You can't beat their calf products. Our experience with Crystal Creek® has been fun and enjoyable. We wish we could have done business with them in our farming operation sooner.”

Crystal Creek® values the relationships created with our customers and appreciates hearing their experiences. We strive to deliver exceptional customer service to each and every one of our customers and we wish the Yoder family many more years of continued success.

# Maximizing Equine Reproductive Performance: The Impact Of Nutrition



By Alex Austin, B.S.

A successful equine reproduction program depends on many factors. Supplying high quality nutrition is one major area where horse owners can provide effective solutions to optimize reproductive performance. The average foaling rate of a hand-bred

mare is only 60%<sup>1</sup>. This means there is much work to be done to ensure that a mare becomes pregnant and then carries that pregnancy to term. This article will discuss the important roles that body condition and nutrition play in reproductive performance.

## Body Condition

According to USDA Extension sources, the most universal system for assessing body condition; The Henneke Horse Body Condition Scoring System, was developed by researchers at Texas A&M University in the early 1980's<sup>2</sup>. This system is based on a scoring scale of 1 to 9, with 1 being extremely thin and 9 being obese. Body condition refers to the amount of fat on a horse's body. This fat cover can be visibly assessed in specific locations as shown in Figure 1. More information on equine body condition scoring, along with visual descriptions, can be found online at <https://www.extension.iastate.edu/equine/body-condition-score><sup>2</sup>.

Stallions are recommended to have a BCS (body condition score) of 5 to 6 prior to breeding, with a visual appearance of being moderate to fleshy, depending on the specific horse and the amount of condition lost during the breeding season<sup>2</sup>. While obesity in stallions can affect their libido and lower fertility rates, the demands of the breeding season can change their body condition very rapidly, making the feeding of additional calories, protein, vitamins and minerals necessary to maintain performance.

Mares ideally should have a BCS of 6-7 and be fed to keep this BCS through early gestation to increase their chance of maintaining a successful pregnancy. Mares with a BCS of less than 5 have lower

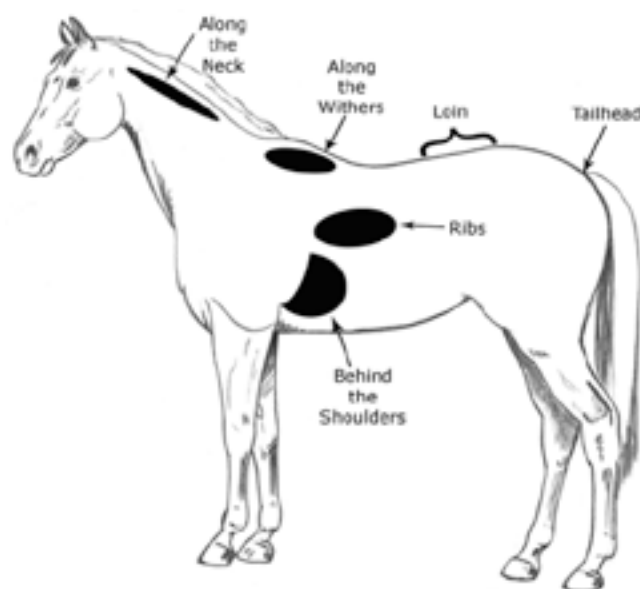
pregnancy rates, increased chances of embryo loss, fewer heat cycles, later heat cycles and poor milk production when the pregnancy is brought to term<sup>2</sup>.

## Nutrition

There are many different feeds and supplements to choose from in the equine industry. Finding the appropriate product that delivers the correct number of calories, while providing high quality, bioavailable vitamins and minerals, is key. Many feeds have feeding rates that deliver excessive calories, which are not needed and can even attribute to weight gain issues. Unfortunately, feeding a lesser amount of the feed would not supply adequate values of vitamins and minerals; resulting in nutrient requirements not being met. Typically, a good quality hay paired with a high-quality mineral supplement will fulfill the needs of most horses for calories, protein, minerals and vitamins. The quality of the mineral supplement being used in a horse's diet is especially important. Two critical questions should be asked when choosing a mineral:

1. Does the mineral meet the horse's nutritional requirements?
2. Is the mineral source easily absorbed and utilized?

**Figure 1** EQUINE BODY CONDITION SCORING AREAS



Source: USDA Extension, <https://horses.extension.org/body-condition-and-reproductive-performance-of-hoodmares/>



**Figure 2** DAILY EQUINE VITAMIN & MINERAL REQUIREMENTS (Based on 1,100 lb. Body Weight)

	Calcium	Phosphorus	Zinc	Selenium	Vitamin A	Vitamin E
<b>Stallion</b>						
Non-Breeding	20 g	14 g	400 mg	1 mg	15,000 IU	500 IU
Breeding	30 g	18 g	400 mg	1 mg	22,500 IU	800 IU
<b>Mare</b>						
Maintenance	20 g	14 g	400 mg	1 mg	15,000 IU	500 IU
Light Work (Breeding)	30 g	18 g	400 mg	1 mg	22,500 IU	800 IU
Gestating (10 months)	36 g	26.3 g	400 mg	1 mg	30,000 IU	800 IU
Early Lactation	59.1 g	38.3 g	500 mg	1.25 mg	30,000 IU	1000 IU

\*NRC, Nutrient Requirements of Horses Sixth Revised Edition<sup>3</sup>

## Meeting Requirements

Equine nutritional requirements are broken down into several categories. The first is based on an ideal, adult body weight and then broken down into the type of work the horse does and what stage of life it is in. Broodmares and stallions have an increased nutrient demand placed on them during the breeding season. Mares will experience additional demands during pregnancy and throughout lactation.

Figure 2 shows how some nutrient requirements increase during the periods of breeding, pregnancy and lactation. Nutrient requirements for stallions are broken down into categories for breeding and non-breeding. Although mares do not have categories that specify breeding, it is safe to assume they will have some increased nutritional needs during the breeding season due to elevated activity and stress levels.

## Mineral Quality On Paper vs. Mineral Quality In The Body

According to the American Association of Equine Practitioners, "Bioavailability is the amount of a nutrient absorbed from the GI tract in a form the body can use." Which means a supplement or ration may look like it is meeting nutrient requirements on paper, but it may not be bioavailable to the body. Not all mineral forms are created equal. Minerals formulated using sulfates or oxides have

a reduced bioavailability and may even interfere or "tie up" other nutrients in the diet. Chelated trace minerals are typically much greater in bioavailability. Chelation is the chemical process by which a mineral (iron, cobalt, copper, zinc and manganese) is combined with a mixture of amino acids and peptides. Chelation makes the minerals more bioavailable. Studies in the equine industry comparing chelated minerals to sulfates and oxides have shown "a reduction in early embryonic death rate, an increased number of eggs produced per cycle and an improved foaling rate<sup>4</sup>. The entire line of Crystal Creek® livestock minerals are formulated using polysaccharide chelated mineral sources because they are more bioavailable to the animal. Figure 3 (on page 14) uses the micro mineral Zinc to demonstrate the extra steps the body must go through to utilize zinc in a sulfate form versus a readily bioavailable polysaccharide chelated zinc form.

When a mineral is attached to a polysaccharide chelate, it is not only available but also easily absorbed by the body. When it is attached to a sulfate or oxide, the body must take extra steps to make the mineral available and absorbable. When the body breaks the bond between the mineral and a sulfate or oxide, attempting to absorb the mineral, the loose sulfate or oxide then has the potential to tie up other minerals and/or vitamins, thus preventing absorption of those nutrients as well.

(Continued on Page 14)

**Figure 3**

## NUTRIENT ABSORPTION PROCESS IN THE INTESTINE

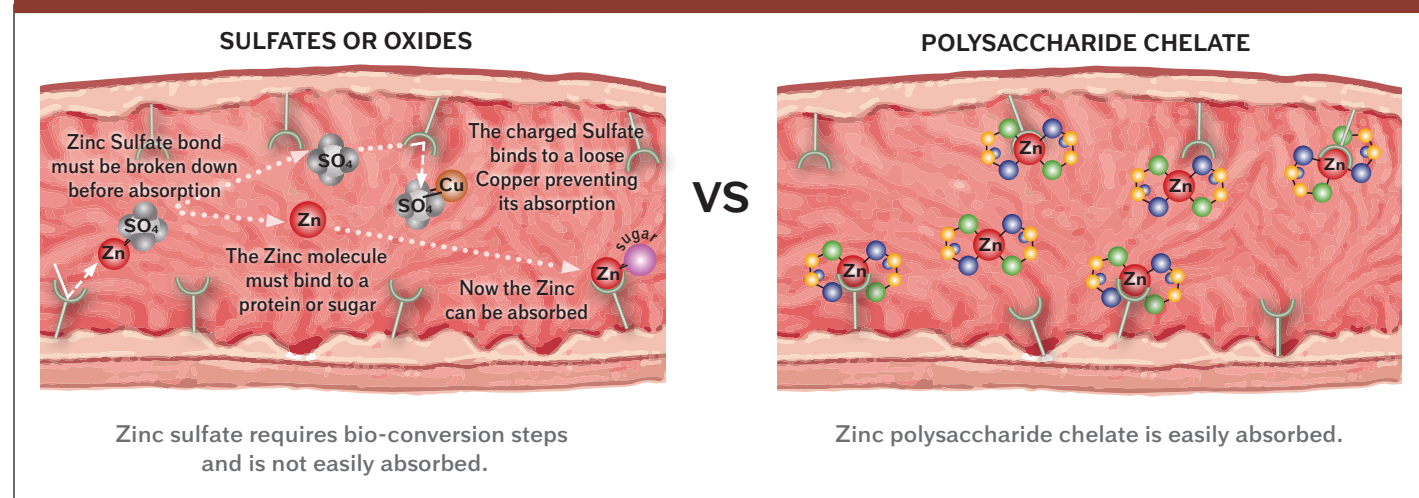


Figure 4 demonstrates the differences in the properties of the Crystal Creek® Crystal Advantage® Equine Pelleted Mineral vs. a competitor's brand of feed. Both products more than meet the minimum nutrient requirements on paper but the amount of nutrients that are available for the animal to use is quite different. It is estimated that sulfate mineral forms are absorbed at approximately 50% and polysaccharide chelates are absorbed at 95%<sup>5</sup>.

**Figure 4 ABSORPTION COMPARISON**

Brand X Texturized Horse Feed	Crystal Creek® Crystal Advantage® Equine Pelleted Mineral
77 mg/lb. of Copper Sulfate	836 mg/lb. of Copper Polysaccharide Chelate
5 lb. Feeding Rate	7 oz. Feeding Rate
77 mg x 5 lb. = 385 mg on paper	836 mg x (7/16 lb.) = 365.75 mg on paper
Brand X: 385 mg x 50% Absorption = <b>192.5 mg of Copper Delivered to the Horse</b>	Crystal Advantage®: 365.75 x 95% Absorption = <b>347.5 mg of Copper Delivered to the Horse</b>

Manufacturer Research

When bioavailability is considered, the amount of mineral absorbed by the horse is over 1.5x more with the Crystal Advantage® Mineral than with the Brand X feed. Another consideration with Brand

X is the high feeding rate required to meet mineral requirements. If fed a quality forage, most horses would not need this high feeding rate and extra calories. Unfortunately, decreasing the amount of Brand X feed being fed will also decrease the amount of minerals and vitamins delivered to the horse.

Taking the time to assess body condition and nutrition options prior to breeding can help ensure a successful pregnancy and increase the chances of producing a healthy foal. Crystal Creek® focuses on providing our producers with high quality, bioavailable nutrition products for their animals. Additional information on evaluating mineral sources and feed tags can be found in the April 2019, Crystal Creek® Newsletter article "Interpreting the Value of a Livestock Mineral," by Dan Leiterman. Contact Crystal Creek® today to learn more about how the Crystal Advantage® line of equine products can enhance your horse's reproduction program.

### SOURCES

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