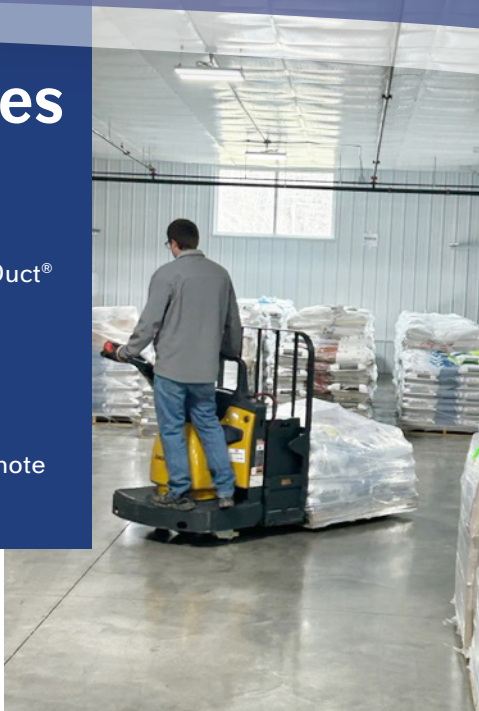


Behind the Scenes

(Clockwise)

1. Jordan Haskins prepares an order for shipment in Crystal Creek's warehouse.
2. Dr. Nele Leiterman explaining the Flap Duct® system at Central Plains Dairy Expo.
3. Dr. Ryan Leiterman speaks at the Annual Meeting of the Minnesota Junior Holstein Association.
4. Dr. Darren Zimmerman loses part of his note pad during a farm call.



Announcements:

Crystal Creek® is adding a 25/25 to its calf milk replacer line. Contact Crystal Creek® to learn more about the highest energy milk replacer in our lineup.

Crystal Creek® now has corresponding videos to the articles in this Newsletter. Check them out on YouTube or our website, www.crystalcreeknatural.com

Crystal Creek® is asking customers to sign for freight deliveries with "subject to inspection" in case of hidden damages that may occur during transit.



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Focus on Profits for Dairy Success



By Erik Brettingen, B.S.

When sitting down with current and prospective dairy clients, the conversation regularly revolves around farm goals and benchmarks. This is important to make sure the dairy is headed in the direction the owners are striving for. Different dairies

may have different goals, which is just one reason the dairy industry is so amazing. It is not unusual though, to find that farms may be scope locked on milk production as a goal without other context to go along with it. Milk production is very easy to measure daily, it has long been a metric of success, and let's be honest, it is a lot of fun when cows are making a lot of milk. However, milk production alone does not equal profitability for the farm. Profitability, or at least income over feed cost, should be the focus on dairies and is what truly measures success. Profit is harder to measure and track but yields more positive results. Crystal Creek® works with clients to track profitability and comb through data to find opportunities for improvement. This includes tracking and monitoring feeding software programs, understanding of herd management software, DHIA report review and analysis, and diet evaluation to maximize profitability, not just milk production.

Increasing long term profitability and economic sustainability usually revolves around the big picture of the dairy. Seldom is the key to unlocking a dairy's potential hidden in an expensive ingredient added in the ration to get two more pounds of milk. Crystal Creek® helps producers look deeper into their operation to find larger bottlenecks like:

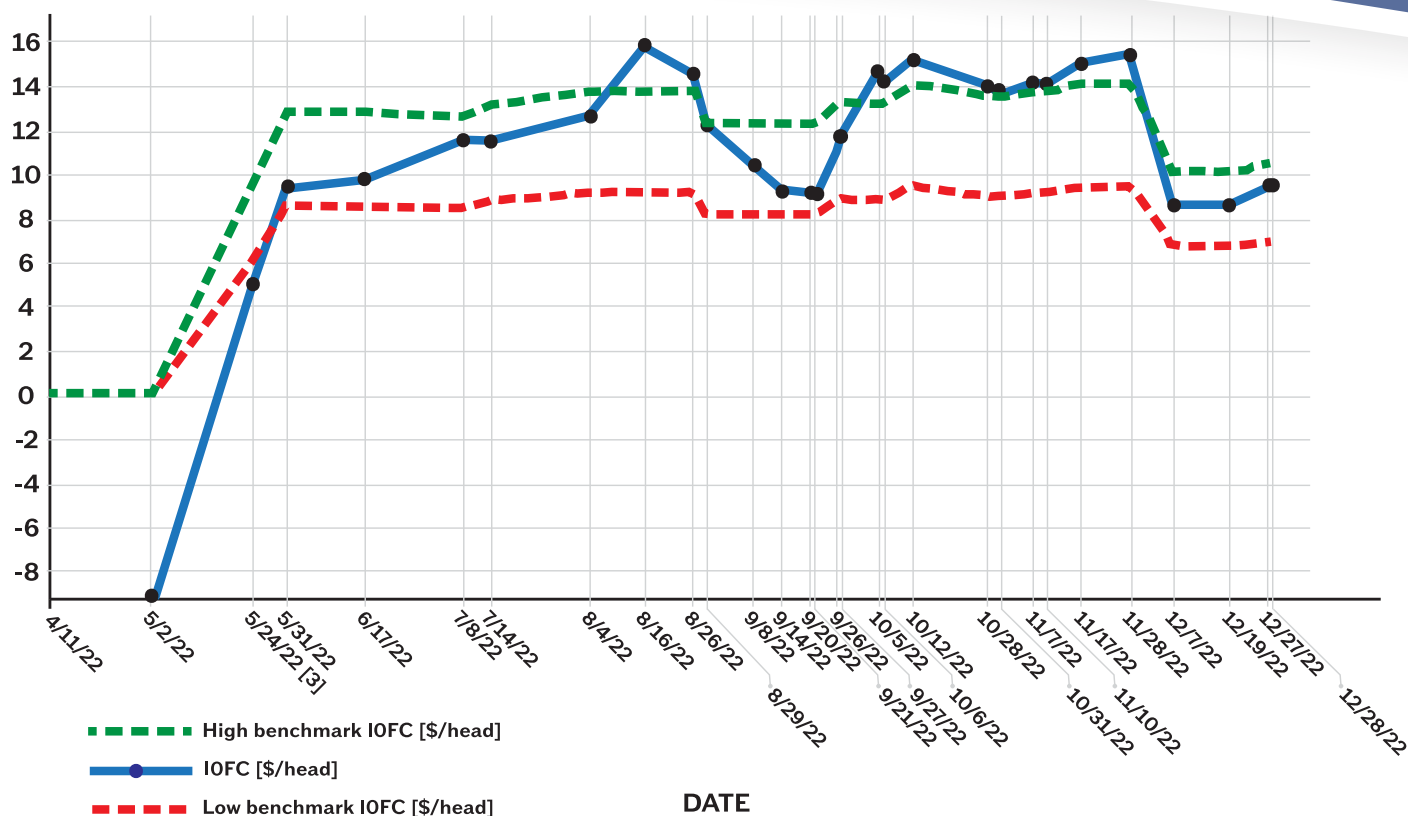
1. Heifer inventory as a percentage of the milking herd
2. Average herd age and demographics
3. Heifer performance compared to aged cows
4. Reproductive assessment
 - a. Which breeding methods are working, and which aren't?
 - b. Patterns in days of the week or by technician
 - c. Patterns by service number
 - d. Early embryonic death loss
 - e. How can we get more cows pregnant on natural heats?



5. Cull rate
 - a. Why are cows leaving?
6. Cow comfort and time budgets
 - a. Is cow comfort robbing you of production or health?
 - b. Are cows getting enough time to rest, eat, ruminate, and express normal behavior?
7. Forage quality assessment
 - a. What changes can be made to increase forage in the ration and maintain or increase cow performance and health?

Along with looking for bottleneck areas to make improvements, Crystal Creek® tracks economic data over time. This helps compare each dairy to itself and make sure the trend in profitability is increasing. This also points out times in the year or events which either improve or hinder profitability.

Figure 1 INCOME OVER FEED COST



Crystal Creek® uses NDS Professional ration balancing software which has impressive economic tracking features. Figure 1 is an example showing the Income Over Feed Cost with each ration tracked over time.

NDS easily generates gross revenue reports of total farm economics and profitability using revenue numbers from the lactating groups and then subtracting all feed costs including the costs of feeding youngstock. This

can be extremely helpful for meeting with banks and identifying potential problem groups of the dairy.

It is not uncommon when looking at competitive feed companies' rations to see a laundry list of ingredients, some being very expensive. The producer may not know why the product was added in the first place, what the actual cost is, and if it is paying for itself. Crystal Creek® looks extensively at the cost of additives and

(Continued on page 4)

Figure 2

SUMMARY OF HERD'S ECONOMICS: DEMO FARM

Pens	Feeding costs & IOFC				Single head				Pen or Herd/day			
	Heads	Heads	Current recipes	DHI	\$/lb DM	Total per head	IOFC	\$/lb DM	Purchased per head	IOFC	Costs	Total IOFC
Decimals places	Total	Milked										
Lactating Ration	300	300	Demo Farm Example Lactating Ration		\$7.5457	0.1545	8.8889	11.2766	0.0809	4.7105	15.4541	2,666.4000
Dry Cow Ration	40		Demo Farm Dry Cow Ration		29.7954	0.1323	3.9412		0.0882	2.6277		157.6480
Bred Heifers	85		Demo Farm Bred Heifer Ration		24.4978	0.0987	2.4175		0.0179	0.4386		265.4875
Pre Breeding Heifers	135		Demo Farm Pre Breeding Heifer Ration		14.6196	0.1224	1.7893		0.0492	0.7187		241.5355
Weaned Calves	25		Demo Farm Weaned Heifer Ration		8.0000	0.2567	2.6532		0.2567	2.6532		51.3300
Baby Calves	25		Demo Farm Milk Calf Ration		3.9311	1.1590	4.5569		1.1590	4.5569		113.9000
Lactating	300		88.2% Adult cows		\$7.5457	0.1545	8.8889	11.2766	0.0809	4.7105	15.4541	2,666.4000
Dry	40		11.8% Adult cows		29.7954	0.1323	3.9412		0.0882	2.6277		157.6480
Replacement heifers	270		44.3% All herd - 90.0% Lactation		16.1268	0.1406	2.2677		0.0688	1.1094		612.2750
All cows (Lactation and Dry)	340		55.7% All herd		\$4.2810	0.1530	8.3669	9.4862	0.0823	4.4655	13.3268	2,824.6480
All herd (Cows and Heifers)	610				\$7.3931	0.1507	5.6333	4.2037	0.0797	3.9800	6.9379	3,436.3210
Overall efficiency of the herd												
Milk from Forage	b/lb		39.3 Milk Efficiency	lb				1.477				
Concentrate per cow (as fed)	b/lb		21.4 ECM efficiency	lb				1.596				
Concentrate per lb of milk	lb		9.252 Energy conversion efficiency	Mcal				0.682				
Margin over Concentrate	\$/lb		15.45 Feed cost	\$/cwt				10.456				
Milk yield breakeven	lb		37.5 Purchased cost	\$/cwt				5.542				
			IOFC	\$/cwt				13.267				
			IOFC per lb	\$/cwt				18.181				
			IOFC Butterfat	\$/lb				3.236				
			IOFC Protein	\$/lb				4.065				

Focus on Profits for Dairy Success

(Continued from page 3)

what cow performance changes are needed to make sure the diet change was profitable. Below are two scenarios. In **scenario 1**, cows are making 85 pounds of milk with 4.1% butterfat and 3.1% protein. The purchased cost of the ration is \$4.37 per cow per day. Income over purchased feed cost is \$15.45 per cow per day. This example then compares with **scenario 2** in which methionine, an amino acid, was added to the ration. This increased the purchased cost of the ration to \$4.71, adding 34 cents per head per day. Adding methionine routinely leads to an increase in milk protein and often butterfat. Because NDS takes current class III component milk pricing into account, it can quickly be determined how much of response is needed to increase income over feed cost. In this case, a milk protein increase from 3.1 to 3.26 with no butterfat increase and no milk volume increase

would pay for the addition of the methionine. This is a very realistic response to expect. Going through this process helps minimize risk for the producer and establishes the needed response to watch for in the cows. This increases profitability, empowers producers to make informed decisions about what is in their rations, and eliminates ingredients that are not making the farmer money.

Crystal Creek® takes a total farm approach to analyzing and maximizing profitability, looking at more than just milk in the tank when balancing rations. Crystal Creek® has the experience and ability to monitor farm data, track economic performance, and build rations with profitability as the primary goal. Contact a Crystal Creek® nutritionist today to look into the economic performance of your dairy and find opportunity.

SCENARIO 1

Days in milk	160.0	ECM lb	90.85	BCS c.	3.00
Milk production lb	85.00	BW lb	1,455.0	BCS t.	3.00
Milk Fat % w/w	4.10		2.54	days	100
Milk Protein % w/w	3.26		3.10		

NCPS	Milk quality	Well-being risks	Fiber adequacy
	Supply	Balance	% Req. %
ME Mcal/day	66.66	+0.33	100.5
MP g/day	2,785.0	+119.7	104.5
NH3-N g		82.3	138.4
Urea (CPE) g			93 g RDtrueP/lb fCHO
peNDF lb	12.66	1.74	116.0
uNDF30 lb			22.04 %DM
Met g	60.2	-4.9	92.5
Lys g	189.0	3.3	101.8
Lys:Met		3.14:1	2.16 %MP

Costs	Production efficiency	Milk price	Total	Purchased
Cost at last save	\$/head		8.549	4.371
Cost/head	\$/head		8.549	4.371
Cost/lb DM	\$		0.149	0.076
Cost/lb milk	\$		0.101	0.051

Costs	Production efficiency	Milk price
Milk gross income	19.819 \$/head	
IOFC	11.271 \$/head	
IOpurFC	15.448 \$/head	
IOFC Butterfat	3.234 \$/lb	
Milk efficiency	1.479 lb	
ECM efficiency	1.581 lb	

SCENARIO 2 (Methionine Added)

Days in milk	160.0	ECM lb	91.82	BCS c.	3.00
Milk production lb	85.00	BW lb	1,455.0	BCS t.	3.00
Milk Fat % w/w	4.10		2.54	days	100
Milk Protein % w/w	3.43		3.26		

NCPS	Milk quality	Well-being risks	Fiber adequacy
	Supply	Balance	% Req. %
ME Mcal/day	66.74	-0.05	99.9
MP g/day	2,803.3	+45.4	101.6
NH3-N g		84.1	139.3
Urea (CPE) g			94 g RDtrueP/lb fCHO
peNDF lb	12.66	1.73	115.8
uNDF30 lb			22.00 %DM
Met g	77.8	10.2	115.1
Lys g	189.0	-3.5	98.2
Lys:Met		2.43:1	2.78 %MP

Costs	Production efficiency	Milk price	Total	Purchased
Cost at last save	\$/head		8.549	4.371
Cost/head	\$/head		8.888	4.711
Cost/lb DM	\$		0.154	0.082
Cost/lb milk	\$		0.105	0.055

Costs	Production efficiency	Milk price
Milk gross income	20.164 \$/head	20.142 \$/head
IOFC	11.276 \$/head	11.254 \$/head
IOpurFC	15.454 \$/head	15.432 \$/head
IOFC Butterfat	3.236 \$/lb	
Milk efficiency	1.477 lb	1.475 lb
ECM efficiency	1.596 lb	1.594 lb



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- BRIGHT START™
- SUPER BOOST™ CALF CAPSULES AND BULK POWDER
- CHECK™ CALF CAPSULES AND BULK POWDER
- POWER POWDER™ CALF CAPSULES AND BULK POWDER

Dairy Goats: A Growing Industry



By Alex Austin, B.S.

The dairy goat industry in the U.S. has grown significantly in the past 20 years. Between the growing trend of homesteading and producers looking to expand into more diverse markets, many are seeing the benefits goats bring with their smaller, easy-to-manage size. More

consumers are also discovering the diverse products dairy goats produce such as their milk, cheese, lotion and more.

Although we have seen the number of dairy farms shrinking in Wisconsin and other states, the number of dairy goats has been on the rise. According to the U.S. Department of Agriculture's last census done in 2017, dairy goat herds have increased in all 48 states, with the number of operations more than doubling. The number rose 61 percent between 2007 and 2017. Out of all the states, Wisconsin had the largest increase with 47,000 animals.

As new producers get into raising dairy goats and others expand their current herd size, Crystal Creek® is here to help with our ration balancing services and wide range of nutrition and animal health products.

Ration Balancing Services

Crystal Creek® provides ration balancing and consulting services to producers. We utilize goat specific ration balancing software that considers many factors that influence a goat's overall performance. By doing so, we can better predict dairy goat production and producer profitability.

With the ration balancing software, nutritionists select between animal specifications and environmental factors. Some animal specs include goat breed, age, and body. As you can see in Figure 1, milk production and components are also entered in. The environmental factors that are considered are temperature and wind speed, as well as the activity level. All this information is important in order to properly balance a ration to meet requirements and production goals.

Once the animal specifications and environmental factors are entered, nutritionists balance diets to ensure all nutrient requirements are met. The software also predicts if production goals will potentially be met or exceeded based off metabolizable energy and protein. By utilizing software that considers all the factors that impact the health and production of a dairy goat, Crystal Creek® can better predict and influence performance.

Figure 1

Breed Type		Dairy	
Primary Breed		Alpine	100%
Secondary Breed			
Lactation Number	n	2.00	
Age (actual average)	months	36.00	
Mean FBW	lb.	105.8	
Standard Reference Weight at BCS 2.5	lb.	114.6	
Weeks of Lactation	n	6.00	
Days Pregnant	days	0	
Daily Milk Production	lb.	5.51	liters
Milk Fat	% w/w	3.50	% w/v
Milk Total Protein	% w/w	3.10	% w/v
Milk True Protein	% w/w	2.85	% w/v
Milk Urea	mg/dl	25.00	MUN mg/dl
BCS (0-5)		2.50	
Target BCS (or expected)		3.00	
Days to Reach Target BCS (or expected)	days	100	
Kids Birth weight	lb.	7.72	
ADG	lb./day	-0.01	

Feeding dairy goats like they are small cows is an outdated and ineffective approach to goat ration balancing. Crystal Creek's ration balancing software helps guide the decision-making process for nutritionists, however it is also very important to spend more time looking at the goats and seeing how they respond to the diet. This allows us to offer producers the most effective and profitable approach to dairy goat nutrition.

Nutrition Products

Along with our ration balancing services, Crystal Creek® offers producers a quality nutrition line for their goats. The Crystal Creek® 37% Goat Pellet is a superior protein pellet that offers a flexible feeding rate. Crystal Creek® also offers a highly fortified 2:1 goat mineral for all stages. Both are excellent options for goat producers, regardless of their operation size. The pelleted and the granular mineral are formulated with ingredients that are high quality and bioavailable to the animal.

100% Polysaccharide Chelate Trace Minerals:

Key trace mineral formulation is done solely with chelated polysaccharide trace minerals. Chelated trace minerals are highly bioavailable to the animal with absorption rates over 90%. This is in comparison to cheaper options used by other companies like oxides and sulfates. These cheaper sources are generally 10% to 50% bioavailable to the animal. This is significantly lower than the chelated trace mineral options. Research shows many benefits to the animals when chelated minerals are used, such as improved ADG, feed efficiency, and immune function.

100% Selenium Yeast Fortification:

Selenium Yeast is another highly bioavailable ingredient whereas other common selenium sources like sodium selenite are less than 25% bioavailable. Selenium is important for immune function, muscle growth, the prevention of white muscle disease, and feed efficiency. Formulating with 100% Selenium Yeast is consistent with Crystal Creek's strategy to fully support optimum performance with excellent nutrition.

Strong Vitamin Fortification:

The Crystal Creek® Goat Nutrition line is fortified with significant levels of vitamins A, D and E to meet requirements. These levels will support a dairy goat's high production demand. Strong vitamin levels also support optimum immune function and help reduce the risk of challenges such as mastitis or respiratory issues.

Health Products

Crystal Creek® offers a variety of supplements and topical products that can be used daily or used strategically depending on needs. Below are a few products out of several that are available.

Udder Care

Udder Fancy™ - A beeswax-based salve containing healing plant oils that provides a moisture barrier and promotes healthy tissue when teats become chapped or cracked. A great product to have on hand, especially during cold, dry winter months.

Veterinary Dairy Liniment™ - Uses contrast therapy to help reduce pain and inflammation. The natural wintergreen in this liniment initially warms the tissue increasing circulation and blood flow, while the menthol and camphor components cool and assist the lymphatic system with drainage.

Stress

Aloe products (available in pellet, meal and liquid form) - These products contain natural ingredients that are proven to decrease inflammation, stimulate immune function and promote nutrient absorption. Utilizing any of these products during difficult events, such as birth or mastitis cases, can have a positive impact on recovery and overall production.

Transition and Post-partum

Cow Quench™ - An oral drench given to does experiencing pregnancy toxemia. This product contains glycerin which has been proven to help provide energy. It also contains electrolytes to rehydrate and natural plant extracts to support appetite.

Fresh-N-Drink™ - This product has flexible feeding rates and is designed to be given to the doe after kidding to help promote a smoother transition into production. The ingredients in this product provide energy and calcium needed by does that have just given birth.

Crystal Creek® is here to offer dairy goat producers the tools and knowledge they need to be successful in this fast-growing industry. High quality nutrition and products paired with effective strategies will help producers to be profitable and sustainable. Give Crystal Creek® a call today to learn more.

References available upon request.



Ask the Vet

Protocols for Weaning Beef Calves ~ By Darren Zimmerman, D.V.M.



Weaning calves takes planning. There is a lot to consider. Every farm is different with their facilities, management, type of cattle, diseases, and climate. As a veterinarian and beef producer, I understand some of the challenges beef raisers face. Below is a summary of how I wean my beef calves. It is not the only way to do things, but it is what works for our operation.

When to Wean

Knowing when to wean your calves has more to do with their weight than the calendar. Over 10% of beef heifers will enter puberty before they reach half of their mature bodyweight. This means it is important to separate the bulls and heifers in a timely manner to prevent any early breeding. In some cases, weaning calves at 500-600 pounds could be too late to remove the heifers from the herd bull or bull calves.

Dr. Darren Tip: Weaning calves goes better with extra help. Invite friends or family over to help with the process. Making it fun and providing food makes sure they come back every year!

Processing Protocols

Vaccines: Work with your veterinarian to develop a vaccine protocol that is customized to your farm. The vaccines I use on my cattle are:

Intranasal - IBR, PI3, BRSV with or without Pasteurella and Mannheimia

MLV 5-way - IBR, PI3, BRSV, BVD types 1 and 2

Bacteria pneumonia - Pasteurella and Mannheimia

Clostridial 8-way - Black leg, Enterotoxemia, Red Water and others

Other Vaccines used sometimes:

Reproductive - Leptospirosis, Brucellosis -only on females and depending on source of animals.

Tetanus - used when banding a bull or set of horns.

Pink eye - depending on time of year and stress load.

Processing

Dr. Darren Tip: Get all of your processing products and equipment together ahead of time and set up a table by the chute to lay them out on. Hooks and other ways to hang things can help with efficiency and cleanliness. It will make things go smoothly and reduce the time the animals spend in the chute or holding pen. A list of what needs to be done for each animal will help ensure a task is not forgotten. Put one person in charge of the list, and in charge.

Now is the time for castration, dehorning, implants (optional), branding and anything else that is needed. A check list for each animal can help keep everyone going without missing anything.

Double check that you have identified them as they go through the chute.

Internal and external parasites can be addressed at this time too. I have used many products over the years. Crystal Creek® has several products to offer in this area. Ask a Crystal Creek® representative for more information.

How to prepare them, what to feed them, and where to put them, all play a role in their level of stress.

We offer the calves the same feed before and after weaning. The less change they see through this process the better. The last 4 weeks before weaning they get the same hay and grain mix. This feed is balanced. It contains all the vitamins and minerals at the right levels to support the calf through these changes. Crystal Creek® offers ROI® Beef Mineral, a specific-to-beef vitamin and mineral pack, or ROI® Beef Pellet, a pelleted protein, vitamin, and mineral mix. I have used both in different situations to take care of my animals. It is also at this time



that I add either Crystal Pellets™ or Crystal Meal™ to their grain mix. These products are aloe based and help boost the immune system. Crystal Creek® also has a liquid aloe that could be added to water for the same effect. For more information on both chelated minerals and the benefits of aloe, please see Dr. Darren Zimmerman's article *Mineral Nutrition: Advancements Over Time* and Dr. Ryan Leiterman's article *The Science behind Aloe's Use in Livestock*, both in the April 2023 newsletter.

Breaking up the processing into two times, a month apart, can reduce stress and provide time for the immune system to respond to the vaccines. After the first round we put them back with their mothers. After the second round we move them to their new home. Nose inserts for weaning or fence line weaning are two things we don't do but might help you depending on your management style.

Once the calves are weaned and removed from their mothers, our work is not done. When I bring the group to their new home, I am sure to introduce them to all the amenities. I bring feed to them at this time and this lets them see where the feeders are. The feed is not different than before, but the bunks and location might be. The same goes for water. I will drain the water and let the waterer refill so they can hear it. The water traveling away from the waterer will often draw attention. I usually have fresh bedding ready to go as they come out of the chute after their last time through. It is easy to look for problems in fresh bedding.

The next two weeks are often the worst for problems. Shipping fever or pneumonia at about a week can be a problem. Knowing if the problem is a virus or bacteria will affect your treatment options. Also watch for diarrhea. Any animal not watching you as you go through the pen is a suspect for problems.

Weaning is a stressful event for cattle. The more we can do to help them the better. A good vaccination and parasite program tailored to your farm's needs goes a long way. Vaccine programs and dewormers work best when calves are on a high plain of nutrition. Time waiting and time in the chute add to the stress. Staying organized and having extra help can minimize this. Don't forget to have fun.



Please submit your animal health or nutrition questions in writing to:

Crystal Creek®

Ask the Vet/Nutritionist

1600 Roundhouse Road

Spooner, WI 54801

OR

askthetvet@crystalcreeknatural.com

Eggshell Quality Problems in Layer Flocks



By Nele Leiterman, D.V.M.

The purpose of any layer flock is to produce one of America's favorite protein sources: eggs.

Eggs are a unique food in the fact that they go from farm to the consumer's table largely unaltered. Therefore, any egg with visible imperfections of the eggshell needs to be

sorted out and cannot be sold as is. Producers keep a close eye on the appearance of their eggs. While many deformities might look scary and immediately raise the concern of a serious issue like diseases, they very often have benign or easy to fix causes.

The main factors that affect eggs are most often nutrition, maturity of the bird, management factors like lighting, and stress. Infectious diseases are a rarer cause of eggshell deformities.

This article will help you to identify the kind of deformity, the cause, and offer problem solving strategies.

Benign Deformities

While eggs tend to look all the same in the grocery store, there is quite a large natural variety of egg sizes and shapes that are still very normal. Eggs can naturally vary in size from very small (peewee) to very large (jumbo). Peewee eggs sometimes come without a yolk, this is called a fairy egg. Jumbo eggs can contain two yolks, called a double-yolker. Young pullets that just started laying will produce these eggs more frequently, due to their reproductive tract still getting into the rhythm of egg production. Wind, or Fairy Eggs, are eggs which have a very thin or no eggshell, and are also commonly seen with young hens. Older hens, which are about to reach the end of their production commonly produce pale or soft-shelled eggs. Eggs with cracks or body-check marks are more frequently produced by older hens.

Nutritional Deficits

The main component of a chicken's eggshell is calcium. The majority of the 2g of calcium in each shell is coming directly from the feed. An unbalanced diet can lead quickly to shell deformities. Calcium is

the nutrient most often considered when shell quality issues occur, although deficiencies of vitamin D₃ and phosphorus can also result in weaker shells. The three nutrients of calcium, vitamin D₃, and phosphorus stand in close relation in a bird's metabolism. Vitamin D₃ is needed to absorb calcium, and phosphorus and calcium need to be balanced during excretion.

Excess calcium will lead to bumpy and rough shells due to extra calcium deposits. White or brown speckled eggs are another presentation of too much calcium in the diet. Another indicator for excess calcium intake is wet bedding and soiled feathers in the vent area, as the extra calcium puts stress on the kidneys and makes the birds drink more to flush it out. This leads to more fluid in the droppings.

Low levels of calcium will lead to the birds laying soft-shelled or shell-less eggs. Unfortunately, these two deformities are not only seen with low calcium levels but could also indicate other nutritional imbalances like a lack of phosphorus, trace mineral, and/or vitamins.

When reading your feed tag, it is important to not only pay attention to the total amounts of minerals, but to also pay attention to the type of mineral source being used. Some sources are much more available to the bird's metabolism than others. This means that a high inclusion factor of a low available mineral source actually supplies less usable mineral for the bird than an equal or even lower amount of better bioavailable mineral source. A good example of trace minerals that have a high bioavailability are the chelated trace minerals Crystal Creek® uses in its poultry feed. Polysaccharide chelated zinc for example has up to 90% bioavailability, while the commonly used zinc oxide has only values around 20-30%. Therefore, the same inclusion in the diet will lead to 3 - 4.5 times the available zinc in the Crystal Creek® diet.

Management and Stress

Eggshell deformities that are commonly seen with stress are often related to the structure of the shell. Slab-sided, body-checked, broken, misshaped, or white banded eggs are typical examples. Often the stress causes one egg to slow down in the oviduct and the following egg "catching up" with the slowed down one. When the two eggs get in contact in the duct both shells are compromised.

Many management factors and outside stressors can cause a disruption to the sensitive process of eggshell production. The effects on the egg are less uniform as ones described above, therefore it sometimes can be hard to determine the cause behind a deformity caused by stress. What makes this even harder is that stress effects can mimic any deformity usually caused by a different factor.

Common stressors for birds are overcrowding, predators in or around the bird’s enclosure, changes in the flock like sudden introduction of new birds or changes in their light regime, and/or feeding. Like most livestock, chickens like consistency above anything else and any change should be carefully timed and if possible, introduced gradually.

Disease

Unfortunately, some eggshell deformities are a sign of a serious infectious disease in a flock. Viral diseases like New Castle Disease, Infectious Bronchitis, and Egg-Drop Syndrome ‘76 would be the most important to note here.

New Castle Disease has a significant impact on the poultry industry due to its high contagiousness and mortality rate. Early signs of an infection can be soft shelled or shell-less eggs, often followed by respiratory signs and a complete stop of laying activity.

Infectious Bronchitis is a disease caused by a coronavirus that comes in 3 different forms: a respiratory, reproductive and kidney form. There is

a drop in egg-production with all forms, paired with deformities like shell-less and corrugated eggs.

Egg Drop Syndrome ‘76 is a viral disease than can cause extreme loss in commercial egg production. When the virus infects a flock, the first sign of disease is the production of pale-shelled eggs, quickly followed by thin-shelled, soft-shelled, or shell-less eggs. The thin-shelled and shell-less eggs are fragile, and the birds tend to eat them; these eggs also may be trampled into litter and may be overlooked unless a careful examination is made. Other than the effects on the eggs the disease does not cause a clinical illness.

Figure 1 gives a summarized overview of the clinical symptoms of the three diseases mentioned in this article. When symptoms like the above occur, it is important to let a vet take samples and determine if and what viral disease has infected the flock as they cannot be distinguished by symptoms alone.

Eggshell deformities come in many shapes and forms, and it is very hard to diagnose from the appearance of the shell alone what the cause of it is. As a rule of thumb, it is advisable to inspect your eggs daily and take note of any deformities. When the same deformity is seen suddenly, with a high frequency and quantity, further steps like consulting with our team of experienced nutritionists at Crystal Creek® should be considered. You can call the Crystal Creek® office at 888-376-6777 or reach out via email to info@crystalcreeknatural.com.

References available upon request.

CLINICAL SYMPTOMS OF THREE POULTRY DISEASES						
	Egg Production	Rough Egg Shell	Shell-less Eggs	Mortality	Respiratory Signs	Neurological Signs
New Castle Disease	↓	↑	↑	↑	↑	↑
Infectious Bronchitis	↓	↑	↑	↑	↑	
Egg-Drop Syndrome			↑			



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