CRYSTAL CREEK NEWSLETTER
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Articles at a Glance

Understanding Milk Pricing- If That's Even Possible: Part 1
I've never understood how milk is priced. In an effort to remedy my ignorance, I started researching how the Federal Milk Marketing Order (FMMO) works. It is a complicated process but I will explain the basic principles as I have learned them. Keep reading on page 2.

Exploring the Development of the Gastrointestinal Tract in Calves
We delve into the stages of gastrointestinal tract development in calves, focusing on the critical role of the rumen and abomasum, to optimize calf health and performance. Keep reading on page 6.

Ask the Vet- "Why Aren't My Cows Cleaning?"
In the United States dairy industry 7.8% of cows experience a retained placenta. Exhaustion and milk fever are common causes. Behaviors like a decrease in appetite, activity or milk production can be indicators that help is needed. Keep reading on page 8.

Evaluating Hay for Equine
Before purchasing or feeding hay, owners first need to establish the nutritional requirements for the horse that is being fed. These requirements are based off of several factors including: body condition, activity level and age. Establishing nutritional requirements gives direction on what type and quality of forage should be considered. Keep reading on page 10.

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Understanding Milk Pricing- If That's Even Possible: Part 1

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

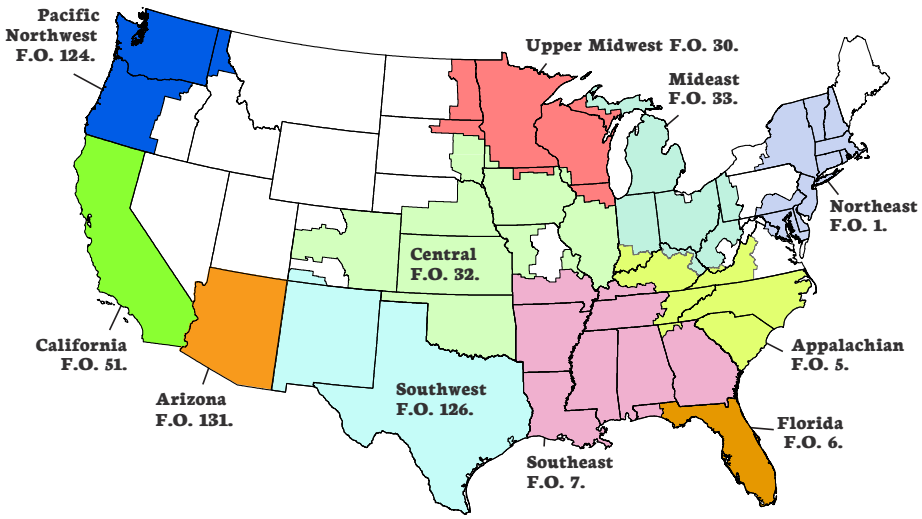
There is an old saying in the dairy industry that there are two people who understand how milk is priced, and that one of them is dead and the other is retired. I've never understood how milk is priced. In an effort to remedy my ignorance, I started researching how the Federal Milk Marketing Order (FMMO) works. It is a complicated process but below I will explain the basic principles as I have learned them. This is part one of a two part series.

A Brief History

In 1933 the federal government created the Agricultural Adjustment Act, which sought to address some of the challenges facing milk production, such as its inherent perishability, uneven production levels throughout the year and general lack of milk handlers/buyers when compared to all the small farmers of the time. The law was further refined in 1937 with the Agricultural Marketing Agreement Act. At its peak in 1962, the United States was broken up into 83 different regions or milk marketing orders. In 2000, what we know today as the Federal Milk Marketing Order (FMMO) was created. Due to consolidation, the number of milk marketing order regions shrank and there are now 11 regions that make up the current FMMO.

Figure 1

11 Federal Milk Marketing Order Areas



Source: USDA, https://www.ams.usda.gov/sites/default/files/media/Federal%20Milk%20Marketing%20Orders%20Map.pdf

Understanding the "Three C's" of FMMO Pricing

The easiest way to understand milk pricing in the United States is that the current commodity pricing of cheese, butter, dry whey and nonfat dry milk go into equations that calculate the value of the components within the milk (protein, fat, other solids, etc). The calculated values of the components within the milk then go into a separate set of equations to create the class price for class

1-4 milk. Confused yet? **See the flowchart below** for a visual representation of how the Commodity, Component and Class pricing all interrelate.

Commodity: defined as food items, like butter and cheese.

Component: defined as the parts that make up the milk, like protein and fat.

Class: defined as how the fluid milk is used for the further manufacture of food products.

Milk is sold and broken down into four classes, depending on how it is used in the further manufacture of products.

Class 1: Fluid milk

Class 2: "Soft" products like cottage cheese, yogurt, sour cream, etc.

Class 3: "Hard" cheese and ice cream

Class 4: Butter

How is milk pricing different from other industries?

In short, the answer is simple: end-product pricing vs. margin pricing.

Think of it like this: margin pricing moves forward, taking input costs and desired profit margins and adding them together to arrive at a price that an item will be sold for. The majority of commerce done around the world is done on some variation of a margin pricing system.

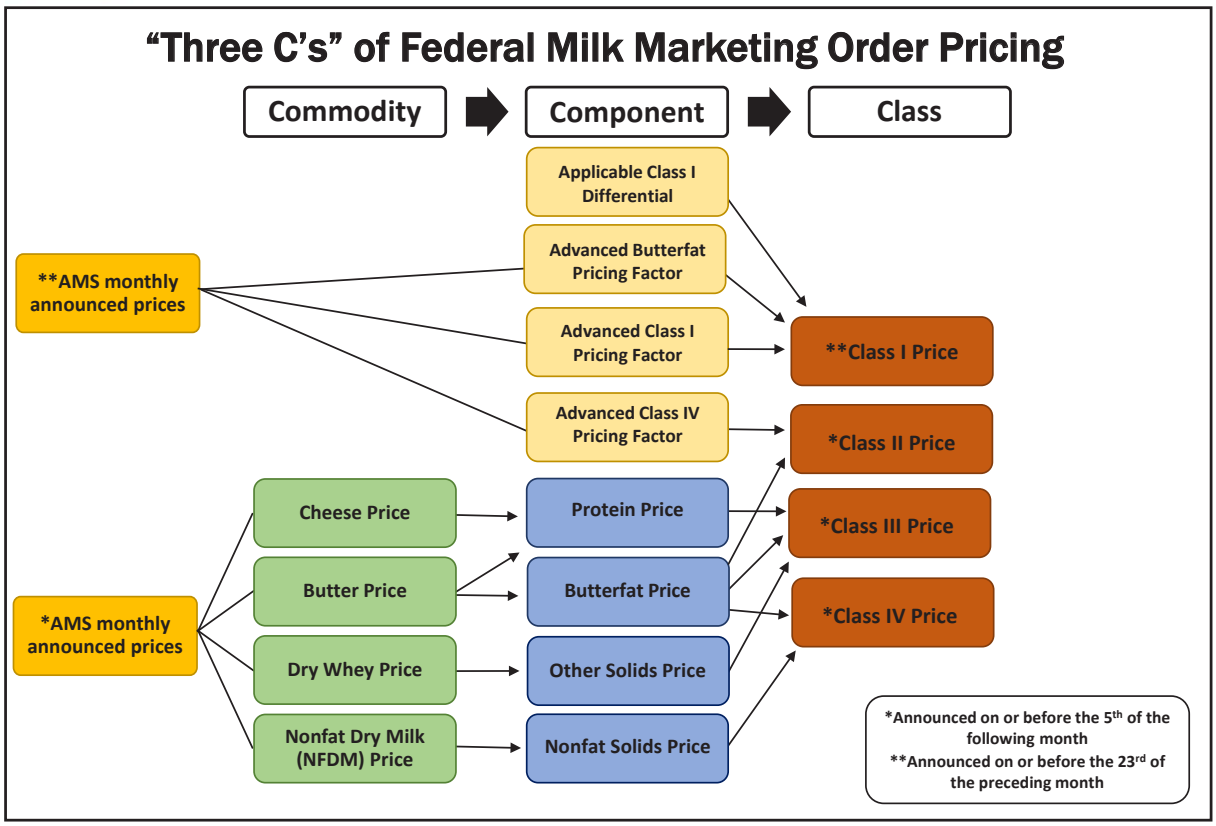
End-product pricing moves backwards, taking the desired end (retail) price for something like cheese or butter, and then subtracting all the production costs, thus arriving at the maximum price one can pay for the milk that is used to make the cheese or butter.

Milk is priced with an end-product pricing scheme. The inherent problem with any end-product pricing is

(Continued on page 4)

Figure 2

USDA United States Department of Agriculture



Source: USDA, https://www.ams.usda.gov/sites/default/files/media/ThreeCsVisual.pdf

*updated June 2019 based on changes within the 2018 Farm Bill

(Continued from page 3)

that it leaves the base commodity originator, in this case the milk producer/dairy farmer, with no way to pass along any production cost increases or desired profit margin to the end consumer.

How does the government get data to implement end-product pricing?

Every week the United States Department of Agriculture (USDA) collects and oversees mandatory commodity sales surveys. Take cheese for example. Each week the government collects and compiles data on what cheese manufacturers sold their cheese for. That data from the commodity sales surveys sets the value of cheese for the week.

Then the USDA works backwards, knowing the price of cheese (the Commodity), to determine how much the protein and fat (the Components) within the milk, are worth.

Next, the USDA subtracts the make allowance for the milk handler and from there they back-calculate the value of the milk (according to the Class).

For example, the calculation of Class 1 Fluid Milk follows the three equations below (**See Figure 3**).

For the equations that determine the price of the other classes of milk, please visit the USDA's Agricultural Marketing Service website at https://www.ams.usda.gov/resources/price-formulas.

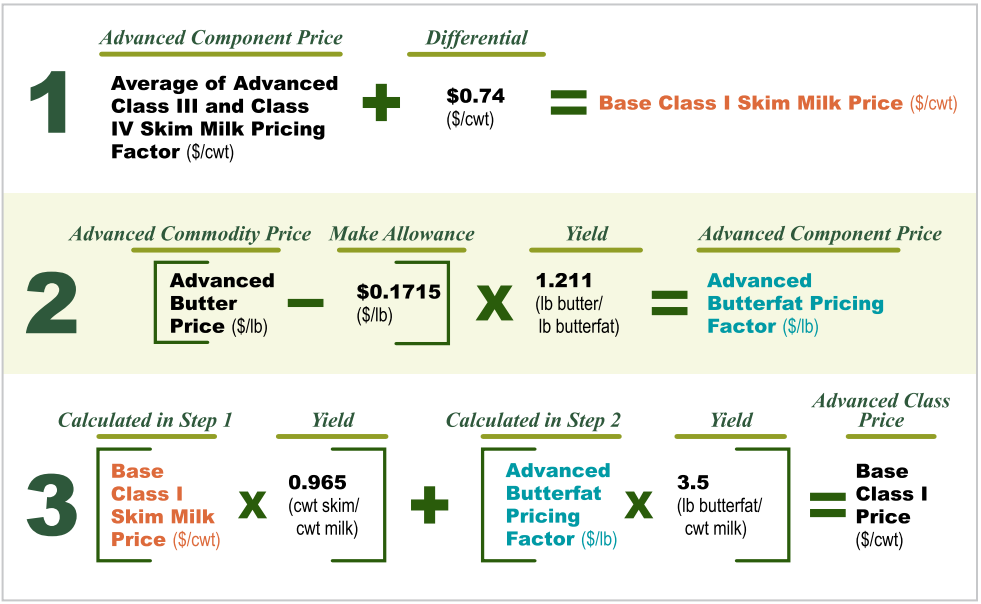
When looking at the equations below, you might wonder what is the "Make Allowance"? Stay tuned for our next newsletter because the Make Allowance and understanding PPD's will be the topic of Part II of this article.

References available upon request.

Figure 3 **CALCULATING CLASS 1 FLUID MILK PRICE**

Formula Details

1 To calculate the Base Class I Skim Milk Price, both the Class III and IV Advanced Skim Milk Pricing Factors must be calculated. These calculations are identical to those used to compute the Class III and IV Skim Milk Prices announced on or before the 5th of the following month, except for the time series of data used. The average of the Advanced Class III and IV Skim Milk Pricing Factors, plus $0.74, determines the Advanced Base Class I Skim Milk Price.



2 **$0.1715 =** Manufacturing cost to produce 1 pound of butter, excluding cost of raw milk ($/lb).

1.211 = Factor representing pounds of butter that can be made from 1 pound of butterfat (lb butter/lb butterfat).

To calculate the Advanced Butterfat Pricing Factor, use the Butter Price from the Advanced Prices and Pricing Factors series released on or before the 23rd of the preceding month. This price series uses the most recent two weeks of price data available at that time.

3 **0.965 =** 96.5 pounds of skim in 100 pounds of milk (cwt skim/cwt milk).

3.5 = 3.5 pounds of butterfat in 100 pounds of milk (lb butterfat/cwt milk).

Source: USDA, https://www.ams.usda.gov/sites/default/files/media/Classlworksheetfinal.pdf

Monthly Promotions

August 2024

VETERINARY DAIRY LINIMENT™

Save 10% *IN ADDITION TO*

Normal Volume Discounts

September 2024

CALF SHIELD®

Save 10% *IN ADDITION TO*

Normal Volume Discounts

October 2024

HARVEST APPRECIATION

For Every $150 Of Product Purchased
Get 1 FREE Cow Pie Candy Bar
(Limit 5 Per Order)

November 2024

PIVOT FL™

1-3 boxes: **$10/box discount**

4-9 boxes: **$18/box discount** ($10/box discount + $8 per box existing volume discount)

10+ boxes: **$23/box discount** ($10/box discount + $13 per box existing volume discount)

Pail: **$2/pail discount**

HEIFER PRIDE™ **$10/bag discount** & **$2/pail discount**

December 2024

CALF PRODUCTS

10% OFF The Following Calf Products
(Normal Volume Discounts Apply)

- CALF SHIELD®
- CALF 180®
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- REPLENA-LYTES®
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- GENESIS PLUS™
- CALF MILK MATE™
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- SUPER BOOST™ CALF CAPSULES AND BULK POWDER
- CHECK™ CALF CAPSULES AND BULK POWDER
- POWER POWDER™ CALF CAPSULES AND BULK POWDER

Exploring the Development of the Gastrointestinal Tract in Calves

By Nele Leiterman, D.V.M.

Calves are the future of the dairy industry. Central to their early development is the maturation of their gastrointestinal tract (GIT), a process that lays the foundation for their ability to digest and utilize nutrients efficiently. In this article, we delve into the stages of gastrointestinal tract development in calves, focusing on the critical role of the rumen and abomasum, to optimize calf health and performance.

Neonatal Phases: Nurturing the Foundation

Upon birth, the GIT of the calf is still in its infancy, lacking the maturity of the rumen for forage fermentation and digestion. This neonatal period becomes pivotal as the calf transitions from being a functional monogastric animal (like pigs and poultry), with a diet primarily composed of milk, to a ruminant that primarily digests solid feeds and forages.

For the first three to four weeks of life, the enzyme profile that aids in digestion is largely composed of proteases (to digest milk proteins), lipases (to digest milk fat) and lactase (to digest the milk sugar, lactose). Another enzyme, rennin, helps to curdle the milk in the abomasum, allowing the milk to stay in the stomach longer for a more complete digestion. In the first few weeks of life, the GIT of a calf contains low amounts of amylase. This digestive enzyme aids in the digestion of complex carbohydrates like those found in grains. As a result, Crystal Creek® recommends meeting calorie needs with milk feedings alone for the first two weeks of a calf's life. After the calf is two weeks old, and the amount of amylase increases, grain feeding becomes beneficial because the calf's GIT becomes more efficient at digesting the grain.

As the calf matures, the enzyme profile within its GIT continues to undergo significant changes. The digestive enzymes gradually shift from a profile designed to digest milk (high in milk fat and protein digestion enzymes) to one more suited for complex carbohydrate and plant-based feed digestion.

The rumen, a critical component of the digestive system, undergoes rapid development during the neonatal phase. Initially undeveloped, it starts to transform within days after birth, spurred by the intake of colostrum rich in essential nutrients and growth factors. Another enzyme to pay attention to is pepsin which aids in the digestion of proteins and increases over time in the GIT. This allows the calf to become capable of utilizing non-milk sources of protein. This enzymatic shift, combined with the maturation of the rumen, facilitates the transition from a milk-based diet to a solid diet.

At birth the rumen is mostly inactive and vacant of the microbiota that ferment and digest solid feeds. One of the main ingredients in rumen development is butyric acid, a product of microbial digestion of starches, that is a direct source of energy for ruminal growth. Since the calf is not able to successfully digest starches in the first weeks of its life, the ruminal growth can be accelerated by adding sodium butyrate, the salt of butyric acid, to milk replacer. Research has shown that this leads to an earlier development of the rumen and increased daily weight gains in the pre-weaned phase. For this reason, three varieties of Crystal Creek's Swift Start™ Milk Replacer contain sodium butyrate.

Pre-ruminant to Ruminant Transition: A Time of Transformation

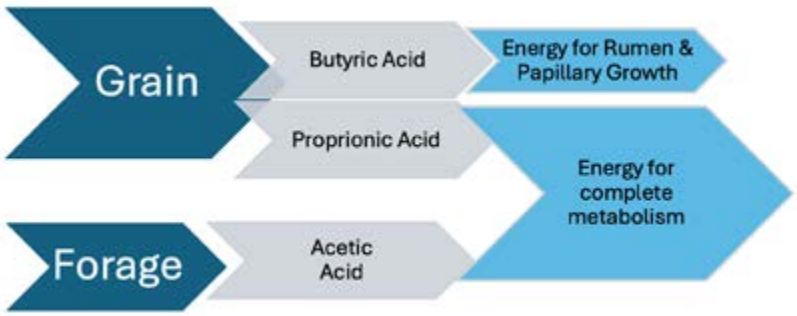
The transition from a pre-ruminant to a ruminant marks a significant milestone in the calf's gastrointestinal tract development. As the calf matures, the rumen undergoes a series of structural and functional changes.

First, the rumen has to grow in size to accommodate the primarily forage-based diet of a ruminant. Offering fresh water to calves from three days of age helps stretch out the rumen and creates an ideal environment for anaerobic bacteria to grow. Offering calves hay as a non fermented forage, also helps the

rumen increase in size and stimulates the musculature of the rumen to start contracting and training its strength.

On the inside of the rumen there are the rumen papillae. These little, microscopic finger-like structures absorb the volatile fatty acids (VFA) produced by the fermentation process of the microbiota, the energy "currency" of the rumen. In a newborn calf these papillae are short and undeveloped. Their development and growth is directly linked to the calf's diet during the first few weeks.

Butyric acid, as mentioned earlier, is one of these VFAs. The microbial digestion of grains creates butyric and propionic acids in the rumen. The digestion of forages yields in the production of acetic acids. While propionic and acetic acids get absorbed and provide energy to the metabolism of the calf, butyric acid aids directly to the growth of the rumen and its papillae. Penn State released a study that looked at the differences in rumen development with different rations. In the picture below, you can see that in the calf that was fed milk and hay, the papillae did not grow as much as they did in the calf that was fed milk, hay, and grain. The darker color of the membrane indicates a much better vascularization in the calf fed a ration with grain.



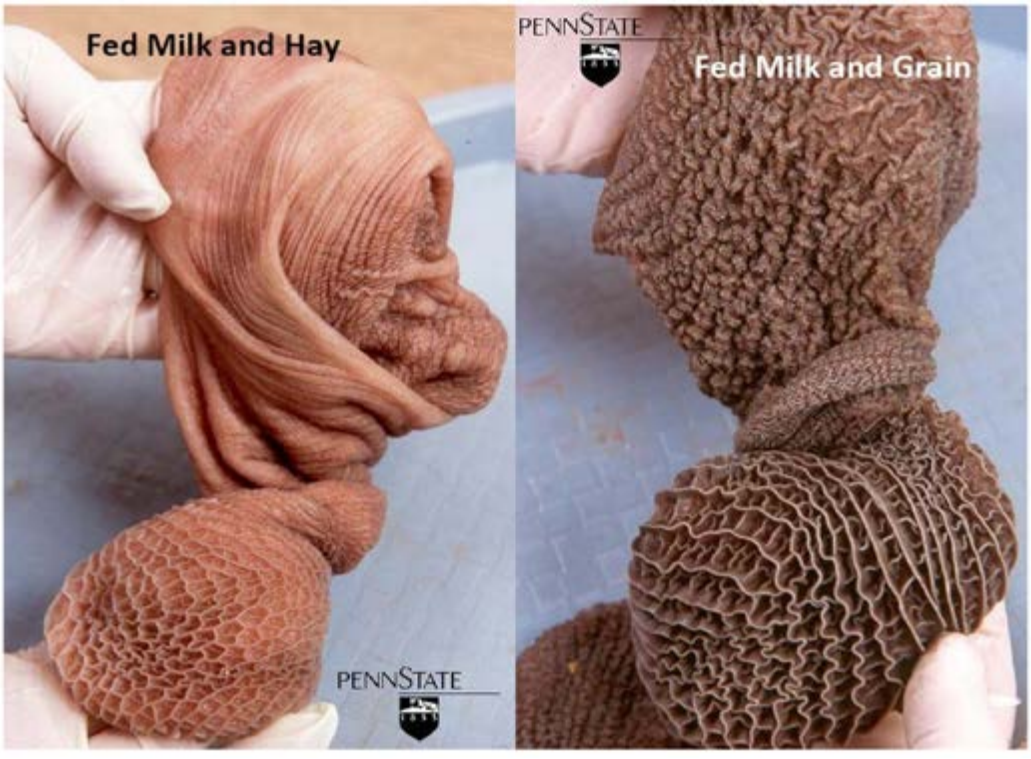


Photo used with permission

Conclusion: Nurturing Future Generations

The development of the gastrointestinal tract in calves is a multifaceted process that requires careful attention and management. From the neonatal stage to weaning and beyond, each phase plays a crucial role in shaping the calf's ability to thrive in its environment. Dairy farmers and nutritionists serve as stewards of this development, employing proactive strategies to support rumen maturation and optimize calf health and performance. Calves fed higher levels of milk or milk replacer and a properly formulated calf starter will gain weight more rapidly and achieve better rumen maturation. Healthy calves grow to be productive cows. To learn more about how Crystal Creek® can help your calves, call 1-888-376-6777 and ask to speak to one of our knowledgeable team members.

Ask the Vet

"Why aren't my cows cleaning, Doc? And what can I do when cows don't clean properly?"

Retained Placentas and What To Do About Them

~ By Darren Zimmerman, D.V.M.

Retained Placentas: The Basics

First, let's define what is normal.

Expulsion of the placenta normally happens within 12 hours of the calf being born. The same uterine contractions that helped push out the calf, will also help expel the placenta. After the calf is born, the connections between the uterus and the placenta detach. With each contraction the uterus gets smaller and more of the placenta exits through the cervix.

If after 12 hours, the placenta is still in the uterus, it is considered retained. A retained placenta can happen when the uterus stops contracting, the placenta doesn't detach properly, or a combination of the two. In the United States dairy industry, 7.8% of cows experience a retained placenta.

If the uterus stops contracting, the placenta will not be expulsed. Exhaustion and milk fever are the most common causes. Milk fever is a decrease in blood calcium levels. This causes weak muscles, including the uterus. Crystal Creek® carries a variety of calcium products, including Fresh-N-Easy™, Saf-Cal™ and Fresh-N-Drink™ to help cows with low blood calcium. Exhaustion can follow a difficult birth or multiple births. In these cases, the placenta may have detached from the uterus and may be found just sitting inside the flaccid uterus. Be careful though, a flaccid uterus is also at a high risk of prolapse.

Why won't the placenta detach? The separation of the placenta from the uterus is a complex process. The placenta must be old enough. Placental maturity happens 2-5 days before the end of an average gestation. Early calving due to twins, abortion, or induction, will often lead to a retained placenta.

Blood flow to the uterus and placenta needs to decrease after birth. Cesarean sections and difficult calvings commonly lead to retained placentas because the birthing process does not happen normally; thus preventing the normal sequence of events that reduce blood flow and promote placental detachment from the uterus.

The immune system also plays an important role in the placental detachment process.

Once the calf has been born, the white blood cells of the immune system act like little PacMan, "chewing" away at the connections between the placenta and the uterus, thus freeing the placenta. If the immune system is compromised, this process is significantly reduced, and the placenta remains attached.

Nutritional deficiencies can be one cause of immunosuppression in fresh cows. The immune system needs appropriate levels of calories, Vitamin E and Selenium to function optimally. The growing fetus becomes quite a draw on the maternal system in the last trimester; especially the last couple weeks prior to calving. If the cow does not consume enough calories, vitamins and minerals, the immune system will become compromised. The cow will divert nutrients to the growing fetus and sacrifice her own systems. Other feed related issues such as moldy feed or mycotoxins reduce immune function and increase the risk of a retained placenta.

Stress also reduces immune function. Things like livestock interactions, weather, competition for feed, water, or space could all have a negative effect on the immune system. There are also genetic factors that affect the immune system, and the industry is just beginning to understand those interactions. You may already know that certain cow family lines on your farm have fewer health problems. Or perhaps, certain bulls don't work

well in your herd. Work with your breeder to develop a mating program and try to prevent inbreeding or certain genetic pairs that are known problems. This kind of information is more available than ever before. You and your veterinarian may also consider genetic testing for health traits.

What To Do When a Cow Has a Retained Placenta

If the cow is eating, drinking, and making milk normally, then no treatment is warranted. A retained placenta may resolve itself within a week to 10 days. It would be good to have your veterinarian check during the next visit to make sure the uterus is clean and returning to normal.

However, resolution on its own is usually not the case. The cow will likely need to be monitored closely over the next few days. Decreases in appetite, activity or milk production can be indicators that help is needed. Cows may or may not have a fever with a retained placenta. An increase in the cow's water intake or a foul odor are other indicators that treatment is necessary.

Premature births, multiple births, dystocia, induction, etc. are likely going to have problems with retained placenta. Supportive care afterwards is most important. This includes a balanced diet, and time and space to rest and heal. Anti-inflammatories like aloe and NSAIDS can provide some help in these situations. Antibiotics may also be necessary. A Crystal Creek® consultant or veterinarian can help advise you on the products that will best help you and your animals.

In conclusion, retained placentas happen for a wide variety of reasons and are not uncommon among cows. Focusing on things like the cow's nutrition plan during late gestation is important. The ingredients in the diet or ration must be digestible and available. Basing the diet on digestibility of the forage and availability of vitamins and minerals is necessary to get the best performance. Minimizing stressful events around calving will also help reduce retained placentas. If you are concerned about the number of retained placentas in your herd, work with the Crystal Creek® nutritionists and veterinarians to develop a plan for your herd. Give us a call; we're here to help.

Evaluating Hay for Equine

By Alex Austin, B.S.

Forage is a very important staple in a horse's ration. This is usually met with either pasture or hay. Since pasture is not always available, hay is the forage that is often fed. When selecting one to feed, the different options can be confusing. This article will discuss what to look for and consider when evaluating hay for equine rations.

Nutritional Requirements

Before purchasing or feeding hay, owners first need to establish the nutritional requirements for the horse that is being fed. These requirements are based off several factors, below is a list and some examples:

- body condition – underweight or overweight, gaining muscle and topline
- activity level - hours of work as well as intensity
- age - growing foal or senior
- physiological status - pregnant, lactating, breeding
- overall health - coat and hoof quality, digestive sensitivity

Establishing nutritional requirements gives direction on which type and quality of forage should be considered for the ration. The goal should be to find hay that best fits the energy and protein needs of the horse. Typically, a horse should be able to consume 2% to 2.5% of it's bodyweight per day of hay without becoming over conditioned or needing to consume large amounts of grain to maintain body condition. For example, an early cut alfalfa mix hay might be a good fit for an early lactating mare's diet but might cause undesired weight gain for a middle-aged Quarter Horse that is not worked.

Once the right hay is selected for a horse, it is important that a quality mineral is fed in addition to the hay. Dry hay can meet energy and protein needs but does not meet the needs for micro minerals and vitamins. Feeding either a granular or pelleted mineral such as the Crystal Advantage® mineral line offered by Crystal Creek®, will ensure that all nutritional requirements for a horse are met.

To read more about nutritional requirements, with a focus on reproductive needs, read 'Maximizing Equine Reproductive Performance: The Impact of Nutrition' from the Crystal Creek® August 2020 Newsletter.

Sampling

Contrary to popular belief, buying hay because it is a 2nd or 3rd cut is not a reliable way to guarantee high quality. Many factors play a role in the nutritional value of hay, such as time of cut and harvesting management. The best way to know the nutritional value is by taking a forage sample. Sampling allows owners to select the best hay and to find any gaps in the nutritional requirements that may need to be filled with supplemental feeding. Test results can also give insight into other factors such as mold risk or poor harvest practices. For example, if the ash content is high, greater than 10%, this indicates cutting too low and/or poor merging or raking techniques. High ash content can lead to decreased palatability and increased mold risk.

Before purchasing, buyers should request a forage sample of the hay source. If feeding homegrown hay, a test is also advised. It is a great way to know what is being fed as well as an insight into agronomy, harvesting and storage practices. The results of a forage sample will only be as good as the technique and effort that went in to obtaining it. To learn how to take a sample read 'Forage Sampling' from the Crystal Creek® April 2018 Newsletter.

Other Things to Consider

Appearance

Visually evaluating hay is also very important. Make sure that the hay source is clean, free of mold and

dust. Mold and dust can not only cause poor intake, but also lead to respiratory issues such as recurrent airway obstruction. Good quality horse hay should be leafy and soft to the touch. The hay should be fine-stemmed and dry with no moldy or fermented smell.

Species and Location

It is important to know what species the grass and/or legume is, as well as where it comes from. Tall fescue is a good example of a grass species that can contain potential problems. Most tall fescues are endophyte-free, but there are still varieties that contain the endophyte fungus. This fungus increases the hardiness of the plant but can be harmful to horses. Mares consuming this grass can have reproductive issues such as abortions. They can also give birth to weak foals and fail to produce milk.

Blister beetles are an issue in southern states, infecting alfalfa hay. These beetles release a toxin called cantharidin. This happens when they are crushed during the harvesting process. If ingested some common symptoms include sores or blisters on the tongue and in the mouth, colic, straining, increased temperature, depression, and more.

Harvest and Storage

The goal should be to cut at an early enough maturity that the hay provides the protein and energy required while also maximizing tonnage per acre. The management during the baling and the storing process also have a big impact on the quality. For example, if the hay was too wet when baled (greater than 18-20% moisture), it will most likely mold and could be a fire hazard. If the hay becomes too dry before baling (less than 14% moisture), leaf shatter can occur, and the nutritional value will greatly decrease.

Knowing what to look for and how to evaluate hay can ensure that a quality hay and the best nutritional fit is being selected. The addition of a pelleted or granular mineral, such as the Crystal Advantage® Equine line from Crystal Creek®, can ensure that there are no gaps in a horse's nutrition. The nutritionists at Crystal Creek® are here to help with forage sampling questions and ration balancing services. Consult with a Crystal Creek® nutritionist today to guarantee your horses are receiving everything they need to perform at their best.

References available upon request.

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