



River Valley Veterinary Clinic

December 2017 Newsletter

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Colostrum Management

It is well known that colostrum -- the first secretion from a cow's udder after she gives birth -- is necessary for a newborn calf's health, but it's actually the only form of immune system a calf has for the first few weeks of her life! But the window of opportunity to get the colostrum to the calf is only a few hours, and within an hour is best, or the benefits will be lost.

Because the dam's immune system protects the calf prior to birth, the calf herself is born with a non-functional immune system that begins to develop only after birth as she is exposed to infectious organisms in her environment or through vaccines. It could take 4-6 weeks for the calf's immune system to get up and running, so in the meantime she uses antibodies absorbed from her dam's colostrum for passive protection.

These specific antibodies, called immunoglobulins, or IgG's for short, are already programmed to fight specific diseases and infections, based on what the cow has been exposed to naturally or through vaccinations during the dry period. As the cow begins producing milk prior to calving, the antibodies concentrate in the milk specifically to be passed to the calf. In the first 24 hours after birth, colostrum antibodies are absorbed through the calf's intestines and pass into the bloodstream, ready to protect the calf. However, after those 24 hours the calf's intestinal wall 'closes,' the antibodies can't squeeze through anymore and the calf is left unprotected.

Given how important colostrum is for the calf, it's always a good idea to review the four principles of good colostrum management.

Quickness The most commonly recommended timing is to give the colostrum within 6 hours after birth, and while this is still true, it really should be given as soon as possible. Within an hour is best. The sooner colostrum is given after birth, the more antibodies the calf is able to absorb, and it's not a high amount to begin with. A calf can absorb at most ~35% of the IgG's she ingests immediately after birth and from then on, the intestinal wall's ability to specifically absorb IgG decreases rapidly. By 6 hours after birth, the absorption ability has decreased by one third and after 24 hours, only 3.5% of what the calf takes in is actually absorbed. How fast the gut 'closes' varies by calf (some lose the ability to absorb antibodies as soon as 10 hours after birth!) so the clock starts ticking as soon as a calf is born.

Quality To provide enough IgG's to the calf, the colostrum must have a concentration of IgG's that is greater than 50g IgG per liter (or quart) of colostrum, so that she receives a total of 150g to 200g of IgG total. The only way to determine if colostrum is high quality is to test it either with a refractometer or a colostrometer.

While a refractometer can be expensive, a colostrometer online is only \$28 plus shipping for the meter and measuring tube. Plus, it's very easy to read: if the fluid level falls on the Green range, it's high quality and can be used. If the fluid level falls on the yellow or red range, the milk shouldn't be used as colostrum, but can be used as a regular milk feeding for older calves.

To ensure high quality colostrum, make sure the cow has an appropriate length dry period and that she receives all her dry cow vaccines. This allows her immune system time to make new antibodies and for the antibodies to concentrate in the milk. An added bonus for pregnant cows raised on farm is that they have IgG's specific to infectious organisms on that farm that will be passed on to the calf.

The volume of milk produced also affects colostrum quality. Cows that make over 2 gallons of colostrum often end up diluting the antibodies with such a large volume, while smaller amounts are more concentrated. If a cow happens to leak milk before calving, she's actually leaking out the best colostrum and what's left behind is diluted when she makes more milk.

Nutrition during the dry period is also important in determining colostrum quality. If the cow isn't getting sufficient energy and nutrients during the dry period, she'll rightfully send it first towards the growing calf at the expense of fortifying the colostrum with IgG's and nutrients. The cow requires enough energy to satisfy her own needs, support the fetus and produce high quality colostrum. This is especially true in the winter when her energy requirements are already elevated to create body heat.

Younger cows tend to have poorer quality colostrum since they haven't been exposed to as many infectious organisms as older animals. Breed also plays a role colostrum quality, Jerseys tend to have slightly higher IgG concentrations than Holsteins, but both average to close to the minimum of 50g/L.

In addition to antibodies, colostrum is much higher in energy and vitamins than whole milk, but has less lactose, which reduces the incidence of diarrhea. Leukocytes (white blood cells) are also present in colostrum, and recent research has found that they contribute toward the calf's health and reduce the effects of bacterial diseases.

Quantity A calf requires 12-15% of her body weight in colostrum; with high quality colostrum (50g/L), a 90lb Holstein calf needs 4 quarts and a Jersey calf needs 3 quarts as soon as possible after birth. All breeds should then have another 2 quarts 12 hours after birth. Four quarts is a large volume that the calf may not drink on its own. Therefore, an esophageal or tube feeder becomes essential for ensuring the health of the calf. Fortunately,

the method of feeding the colostrum (bottle-fed or tube feeder) does not affect how well the antibodies are absorbed. With the proper equipment, tube feeding is quite straightforward and safe. Step-by-step instructions are available on the RVVC website in both English and Spanish, and we would be happy to walk you through it the next time we're out.

Cleanliness The main sources of colostrum contamination are mastitis, manure, incorrectly stored colostrum and contaminated collection, storage and feeding equipment. If a sample were to be cultured, it should have a total plate count of <100,000 CFU/mL. All processes related to the collection and storage of colostrum should be treated as if the colostrum were salable milk: all milking equipment and containers need to be cleaned and sanitized and teats should be prepared as you would for milking. Even if the calf is going to be allowed to nurse, the teats and udder should be clean to avoid a mouthful of bacteria. Remember to never use colostrum from Johnes positive cows and that colostrum should never be pooled because of the risk that one cow could infect many calves.

Heat treating at 60 deg C for 60 min reduces bacterial contamination without affecting the IgG concentrations, but it doesn't sterilize colostrum, it only reduces bacterial counts. If colostrum with a high cell count is treated, the cell count will decrease, but could still be relatively high compared to colostrum with a lower initial cell count. Traditional pasteurization will kill all the bacteria, but it destroys all the antibodies in the process.

Success? After the calf receives her high-quality colostrum, the question remains: did it work? The success of transferring sufficient immunity is easily measured from a blood sample taken when the calf is over 24 hours but less than a week old. From the blood sample, the Serum Total Protein (STP) is measured, which is highly related to IgG levels circulating in the calf's bloodstream. Calves that received sufficient, good colostrum have a STP of >5.5g/dL. Those with a STP of 5.0-5.5g/dL have an increased risk of getting sick, and calves with a STP of <5.0g/dL have a high risk of health problems and are considered to have a Failure of Passive Transfer (FPT). While any calf inundated with infectious organisms can get sick regardless of successful immune transfer, a calf with good passive transfer can be exposed to a larger dose of infectious organisms but be less sick than calf where passive transfer failed. Long-term, calves that were fed 4 quarts of good

colostrum within an hour after birth had 5% more milk by the end of their 2nd lactation.

Storage If colostrum can't be fed within an hour after collection, it should immediately be cooled to prevent bacterial growth. It is so rich in nutrients and energy, that the number of bacteria doubles every half hour it sits at room temperature. Stored in the fridge, colostrum can only be kept for 24 hours before the bacterial counts become too high. Frozen, it can be kept for 6 months at -5 deg F without significantly affecting the antibodies. To help the colostrum freeze quickly, transfer it to 1-2qt bottles or 1gal ziplock freezer bags laid flat. Stored in larger containers, it takes too long for the middle to freeze, allowing bacteria to grow quite a lot before finally cooling down. Thaw frozen colostrum in warm water (<120 deg F); any hotter and the IgG's will fall apart. The only problem with freezing is that the leukocytes are killed when frozen, so the only way to get them to the calf is through fresh colostrum. The effects of losing those leukocytes in colostrum is still being researched.

Replacers/Supplements If fresh colostrum isn't available, replacers or supplements provide an option. All products containing IgG's are regulated by the USDA. A colostrum supplement contains 40-60g of IgG per dose, but is not able to raise levels of IgG in the calf's bloodstream above normal. Colostrum replacers are able to raise the IgG level above normal. Supplements are used to improve the quality of marginal colostrum when there isn't another source, but are only able to improve it to an average quality colostrum. If colostrum quality is normally poor enough to consider using a supplement, it's likely more economical to figure out why the quality is so poor or to just use a replacer. Replacers have much more IgG's than supplements, 100-150g of IgG per dose; equivalent to that of a good to high quality colostrum. Beware of the replacers that only have 100g of IgG per dose, usually per bag, because the calf will need two bags. It's more economical to find a replacer that has 150g of IgG per bag instead of having to use two bags for every calf or running the risk of a failure of passive transfer. Colostrum replacers can be a convenient alternative if a consistent supply of high-quality, clean maternal colostrum isn't available.

Armed with the four principles of colostrum management, review your own practices and make sure your calves get going on the right hoof from day one.

Lost and Found! A red, down women's jacket was left on a chair in the garage at the Customer Appreciation Day lunch. Please call the Plain Clinic to claim it!