



# Cattle Producer's Handbook

Animal Health Section

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## Feeding Colostrum to a Calf

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When a calf is born it has limited immunity against infectious diseases. If it absorbs an adequate supply of colostrum its immunity is enhanced. Generally, we must rely on good management and a sanitary environment to help protect the calf from immediate infection.

Within hours of suckling colostrum from its dam, the calf absorbs protective antibodies into the blood stream and other immune cells into its lymph nodes that help to fight off infection. If the calf fails to suckle or, for some reason, does not receive an adequate amount of colostrum, it must rely on its naive immune system to develop protection soon enough to avoid clinical disease.

For most infections it takes the immune system 6 to 10 days to respond adequately. If management and environmental factors depress the calf's resistance and the infectious agent is present in large numbers or is particularly strong (virulent), the calf's immune system is overwhelmed and the calf succumbs to disease.

### Natural Protection

A newborn calf does have some natural protection against infectious disease. For example, its skin, tears, saliva, and digestive juices are natural barriers for some harmful microbes. However, colostrum provides an additional and immediate source of natural protection. Ingestion of this antibody (immunoglobulin) and immune-cell rich milk is critical for newborn calf survival.

The dam's serum antibodies (IgGs) and some important immune stimulating cells are concentrated in the udder as colostrum during the last month of pregnancy. For maximum protection, a calf must receive an adequate amount within 4 to 12 hours of birth.

Researchers believe that the non-antibody immune cells found in colostrum are required for complete maturation of the calf immune system. Research has shown that without their presence calves are more susceptible to disease throughout their lives than calves that received adequate levels of these immune stimulating cells.

Colostrum in the beef cow tends to be more concentrated than in the dairy cow. Generally speaking, a 75-pound calf ingesting 2 to 3 quarts of colostrum in the first 4 to 6 hours of birth will receive adequate colostrum.

### Measuring Antibody Concentration

We cannot assume that the IgG antibody concentration in the colostrum of all cows or heifers is equal. In fact, studies have shown that the antibody concentration varies considerably from cow to cow, breed to breed, and heifer to heifer. There is no practical way to measure with certainty the antibody concentration of colostrum before delivery. However, we can measure antibody concentration after birth by using a Colostrometer™. It is designed to estimate the IgG antibody concentration in colostrum. A few tips on using a Colostrometer™:

- Always collect a clean sample. Make sure no foreign debris falls into the container.
- Be certain the temperature of the colostrum is about 70°F. Very cool or warm temperatures will result in misleading results.
- For best results feed only colostrum that registers solidly in the green zone or >60 mg/ml.
- Fresh or fresh frozen and properly thawed colostrum is the best source of natural protection for a newborn calf.

### Handling and Storing Colostrum

Even though a calf may need its own dam's colostrum for the immune stimulating cells that seem to energize its immune system, the next best substitute for the natural dam's colostrum is colostrum from another cow. This should be collected from cows within 12 to 24 hours of their calving and used fresh for optimum results. It is recommended to collect colostrum from a quarter not yet suckled by a calf. Also, colostrum may be frozen for future use. Storing in small (quart size) containers is recommended for easy thawing and individual calf delivery.

Many modern freezers that have an automatic defrosting system may cause the frozen colostrum to lose a percentage of its protective antibodies and all of the immune stimulating cells during storage. Despite this, most natural cow colostrum is superior to other colostrum supplements even after freezing and thawing.

Some care must be taken when thawing frozen colostrum. Studies have shown that rapid defrosting using boiling temperatures destroys a portion of the colostrum by destroying the protein antibodies. These same studies have shown that defrosting in a microwave has the same result.

One method that can be recommended is a warm water thaw. The container (1 or 2 quarts) of colostrum is immersed in 110°F water and stirred every few minutes to assure even thawing and warming. Continue process until colostrum reaches 104°F. The process will take approximately 40 minutes.

## Colostrum Supplements

What can be done for the calf that is in some way deprived of an adequate supply of colostrum? During the past several years, many colostrum products have been promoted for use in calves. These products are not adequate substitutes for cow colostrum. They are most effective as colostrum supplements for calves that have already received some natural colostrum. Following are examples of colostrum supplements that are commercially available.

### Colostrum Powders

These are generally products derived from filtration of cheese whey. The label on each bag should state the concentration of antibody immunoglobulin or IgG contained in the package or delivered in the label dose. The highest concentration of IgG currently available in this product form is 50 grams of immunoglobulin. A calf requires between 150 to 250 grams, therefore, it must consume three to five bags of the best products. These products are reconstituted at about 1 quart/bag.

In order to receive adequate amounts of antibody mass, a calf would need to be given 3 to 5 quarts within 12 hours. Five quarts is not recommended for small (<60 pounds) calves.

Other colostrum powder products have less than 10 grams of antibody concentrate. Producers are encouraged to know the IgG value of the product they choose and, therefore, know how best to use it for supplementing colostrum to calves.

### Colostrum Boluses and Pastes

These products have been reported to contain from 0.3 to 5 grams of immunoglobulin in each delivery unit (bolus or tube). It would be difficult to deliver even a minimal 50 grams of immunoglobulin (antibodies) to a newborn calf with these products. They too are supplemental colostrum products.

Many products on the market are promoted for colostrum supplementation of the newborn calf. We have given just a few examples. Remember, these products are supplements, not complete substitutes, and research has not shown that all provide protection. When used as supplements, however, some may provide additional protection against infectious diseases.

## “Tube-Feeding” Colostrum and Other Fluids

Giving colostrum or other oral fluids to a calf may be accomplished in one of two ways: (1) let them suckle from a bottle, or (2) restraining them and delivering the fluid down the esophagus into the stomach by tube.

Tube-feeding a calf requires restraint, gentle technique, and a specially designed device called an esophageal feeder. There are two passageways or “tubes” going down the throat: (1) the windpipe (trachea) that goes to the lungs, and (2) the stomach tube (esophagus) that goes into the rumen or fore-stomach. You do not want to put fluids down the windpipe. The calf will drown and die.

Several varieties and styles of esophageal feeders are commercially available. The essential feature of a calf esophageal feeder is a relatively non-flexible hollow tube about 1/2-inch in diameter with a 3/4 to 1 inch diameter bulb on the end of the hollow tube. The hollow tube is attached to a container designed to hold fluids such as colostrum. The better-designed feeders have a stopper or fluid-release valve that prevents fluids from entering the hollow feeding tube until the operator releases them.

The rounded bulb is important because it helps prevent accidental puncture of the back of the mouth and throat. Its ball-like shape is important because it helps the tube by-pass the opening of the windpipe. The opening to the esophagus is above and slightly next to the opening of the windpipe at the back of the mouth where the mouth joins the throat. Recommended steps to tube-feed a calf with colostrum:

1. Have the feeder cleaned, ready, and filled with desired amount of colostrum pre-warmed to body temperature.
2. Restrain the calf by stepping over its back, gripping its lower jaw, and pulling its head up toward your body.
3. With the calf’s head held up as described, gently place the feeder into the side of the calf’s mouth and direct the tube over the tongue to the back of its mouth and throat.
4. With the calf’s head still held up between your legs, apply gentle pressure on the feeder down toward the back of the throat until you feel the feeder slip down the calf’s throat into the esophagus.
5. Continue gentle downward pressure until the feeder-tube appears to be halfway down the throat between the head and chest.

6. As you reach this point you should be able to see the bulb end of the tube passing down the throat by just looking at the outside of the calf's throat.
7. Stop pressure now and place a hand on the outside of the throat and feel the bulb-end of the feeder through the skin of the calf.
8. If you **see and feel** the bulb-end of the feeder in the calf's throat, it is safe to continue further down, stop, and release the fluid into the tube after it is well placed in the esophagus.

**9. If you cannot see or feel the feeder tube going down the throat, then pull the tube out and repeat steps 1 through 8.**

It is important to note that most calves will struggle against your restraining efforts. Be prepared so that you do not lose control of the calf while you are delivering the fluid. This could allow a large volume of fluid to accidentally enter the windpipe and drown the calf.



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