

What makes the best colostrum?

The virtues of colostrum in successful calf raising cannot be overemphasized. This “liquid gold” not only delivers critical immune protection, but also provides specialized nutrients, energy, fluid and warmth to newborn calves.¹

Longer term, successful passive transfer of immunity from colostrum has been shown to correlate with reduced disease treatment and mortality rates; improved growth rates and feed efficiency; decreased age at first calving; and increased milk production in the first and second lactation.²

But simply getting colostrum into calves is not enough to ensure protection and health. Maximizing colostrum's value requires consistent attention to many small details, for every feeding to every calf.

The five fundamentals of excellent colostrum

Deriving maximum value from colostrum – without doing harm – is dependent on the following fundamentals:

- **Quality** – Colostrum quality usually is evaluated in terms of IgG concentration, as measured on-farm with a colostrum tester or Brix refractometer. An IgG concentration level of 50 g/L or higher commonly is used as the threshold to define good-quality colostrum.

Colostrum quality can vary greatly from cow-to-cow and farm-to-farm. A survey from multiple farms in Pennsylvania revealed an average IgG concentration of 41 g/L, with values ranging from 14.5 to 94.8 g/L.³ Similarly, a single-farm study in Minnesota showed an excellent average IgG concentration of 71.7 g/L, but that average was produced by a range of values spanning 14.5 to 132.7 g/L.⁴ This level of variation speaks to the importance of testing colostrum for quality and sorting off low-IgG lots.

- **Quickness** – Time is of the essence in both harvest and delivery of colostrum. As more time lapses between calving and first milking, IgG levels go down. A University of Missouri study showed a linear decrease in IgG concentration as harvest time was delayed after calving, from 100 g/L two hours after calving, to 67.3 g/L 14 hours after calving. The authors of that study suggested a goal of colostrum harvest at 4 hours post-calving or sooner.⁵

Similarly, calves' ability to absorb IgG declines precipitously as time passes post-birth. Calves rapidly lose their ability to absorb antibodies as their digestive systems change in the hours immediately after birth. By 24 hours of age, this absorptive ability is depleted almost completely. And, researchers have found that by 12 hours of age, the digestive tract begins to secrete enzymes that can break down IgG, decreasing the number of full antibody structures available for absorption.⁶ The upshot: feed colostrum to newborns as soon as possible, ideally within the first 2 hours of life.⁷

- **Quantity** – Calves need more than a standard, 2-quart bottle full of colostrum for optimal results. Industry standards recommend feeding colostrum at 10% of the calf's birthweight. For Holsteins, that's about 4 quarts; for Jerseys and smaller crossbreeds, 3 quarts.⁸

- **Cleanliness** – Colostrum should be free of visible contaminants like blood, manure, mastitis and flies. There also are many touchpoints in the colostrum delivery process at which bacterial contamination can occur, including dirty udders, milking equipment, transfer vessels, human handlers and feeding equipment. The result can be the introduction of a host of diseases to newborn calves, including enteritis (scours), septicemia, joint infections and ear infections. High bacterial counts in colostrum also can interfere with antibody absorption. Calves exposed to high levels of bacteria in their environment also has been shown to absorb immune factors less efficiently.⁹

University of Minnesota researcher Sandra Godden notes that bacteria also can proliferate when colostrum is stored too long. She recommends storing refrigerated colostrum no more than 48 hours. Her research also has shown a significant decrease in bacteria levels when colostrum is pasteurized on-farm.¹⁰

The Dairy Calf and Heifer Association's Gold Standards for dairy heifers from birth to freshening list a standard for bacteria in colostrum as fed is a standard plate count (SPC) of 50,000 CFU/mL or less, and a coliform count of 5,000 CFU/mL or less.¹¹

- **Biosecurity** – Colostrum can be a vector for many vertical diseases that are passed from dam to calf. These include Johne's disease, bovine leukemia virus (BLV), Mycoplasma, Salmonella and *E. coli*. A comprehensive maternal vaccination program is important for transfer of protective antibodies. In addition, if a herd has a high prevalence of any of these diseases, a high-quality commercial colostrum replacer might be a better choice than maternal colostrum.

Can colostrum replacers do the job?

In addition to biosecurity control, commercial colostrum replacers can address many other colostrum concerns. Clearly, feeding colostrum successfully is not an easy task.

Sanitary processing and packaging of colostrum replacer greatly reduce the chance of bacterial contamination before it reaches the calf. Because it is readily available on the shelf, time to feeding can be more effectively controlled. And commercial replacers are highly consistent, delivering the same dose of IgG every time.

Colostrum replacer also helps address labor issues – on large dairies with extensive labor forces on which training may be an ongoing challenge; and in small herds where labor resources are stretched thin among many tasks on the farm.

But do colostrum replacers provide the same level of protective immunity as maternal colostrum? Research indicates variable results when colostrum replacers containing less than 150 grams of IgG per feeding are used. However, when colostrum-derived colostrum replacers containing 150 grams of IgG or more are fed, successful passive transfer has been shown to be achieved 100% of the time.¹²

A recent study at a large dairy in the Southwest compared the passive transfer of immunity between calves fed maternal colostrum and those fed a commercial colostrum replacer containing 150 g IgG per dose. This was a large study involving 1,200 calves – 600 per treatment group. The researchers found equally excellent passive transfer of immunity of nearly 100% in both groups. Apparent efficiency of absorption of immunity also was statistically similar.¹³

Even though this trial was conducted in a well-managed herd with excellent colostrum management, some maternal colostrum was found to be contaminated with coliforms. The calves fed replacer had fewer sickness episodes compared to those fed maternal colostrum.¹⁴

It is important to note that this research was performed with a maternally derived colostrum *replacer* containing high levels (150 g) of IgG per dose. Colostrum supplements and replacers with lower IgG levels will likely not produce equivalent results.

Choosing colostrum replacer is a significant financial decision as well. When considering the up-front cost, one must also consider the long-term potential benefits of healthier, more productive animals, plus lower labor and fixed costs for harvest -- and possibly pasteurization -- of colostrum. In short, what is the true cost of doing colostrum "right?" What is the true cost of doing it "wrong?"

The importance of excellent colostrum delivery to newborns is a constant. How to achieve it is variable. Whether colostrum protection is delivered via a well-managed on-farm maternal colostrum program, or a high-quality commercial replacer, the short- and long-term health and performance of calves is the ultimate goal.

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