COLOSTRUM AND NEWBORN CALVES

Introduction

Since 1984, La Belle colostrum has saved millions of animals’ lives from pathogenic and environmental threats. Our colostrum products are developed out of a thorough understanding of scientific evidence and industry factors surrounding the lack of passive transfer of immunity, exposure to diseases, standards for immunoglobulin absorption, recommended colostrum feeding in the first 24 hours, and variations in colostrum management practices. La Belle, a leader and expert in first-day colostrum, seeks to continue its innovation in high quality, thermally treated neonatal products for beef and dairy producers to combat the life-or-death struggles facing calves today and into the future....

Newborn Survival

Scientific research and thousands of years of animal husbandry have confirmed that maternal colostrum is critical for newborn survival. Colostrum is the first lacteal secretion of the mammary gland prior to and after parturition. Colostrum provides calves with the essential antibodies and nutrients needed for survival. Calves require fat and protein for energy and muscle development in the first days of life, as well as growth factors and many other nutrients that are concentrated in the first lacteal secretions of the dam post-calving. The mammary gland selectively transports IgG (primarily IgG1) in large amounts from the blood to colostrum via an intracellular transport mechanism. Although there are several types of immunoglobulins (IgG, IgA, IgM), IgG is the predominant immunoglobulin passed to calves via colostrum.

This intake and absorption of colostral immunoglobulins, which include antibodies against disease, are essential to the health of the newborn calf. A well-managed colostrum program on farms is the most important step in reducing disease in neonatal calves. Ingestion and absorption of colostrum immunoglobulins are two of the most important aspects in the prevention of neonatal calf diseases because calves acquire virtually no immunoglobulin in utero. In spite of this understanding, failure of transfer of passive immunity (FTPI) remains extremely common in the US dairy industry.
A recent nationwide evaluation of the quality and composition of colostrum on dairy farms in the United States found that almost 60% of maternal colostrum on farms is inadequate, and a large number of calves are at risk of failure of passive transfer or bacterial infections, or both.9

Failure of passive transfer in calves is defined as a blood IgG level of less than 10 mg/mL at 24 - 48 hours after birth.10 Calves that experience failure of passive transfer are more likely to become sick and die in the first two months of life than calves with adequate immunity.11 Calves with adequate immunoglobulin concentrations have reduced growth rates, increased risk of disease and death, increased risk of being culled, and decreased milk production in their first lactation.12,13 In comparison, calves with adequate passive transfer of immunity have lower mortality and morbidity and fewer antibiotic treatments compared with animals with failure of passive transfer.13 For nearly three decades, La Belle has proven efficacy that demonstrates the prevention of failure of passive transfer and delivers high quality liquid colostrum every time, in every product and in every feeding. This assurance alleviates the concerns and stress around colostrum, every time, in every product and in every feeding. This alleviation lessens the concerns and stress for farmers.

Almost 60% of maternal colostrum on farms is inadequate, and a large number of calves are at risk of failure of passive transfer or bacterial infections, or both. K.M. Morrill, et al., 2012

Colostrum Management

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Colostrum Supplements and Replacers

Many factors contribute to failure of passive transfer. Some of these factors include insufficient quality of maternal colostrum, lack of calf vigor, diminished suckling drive, and udder health issues. Adequate immunoglobulin content is essential for preventing failure of passive transfer. Research suggests that calves should be fed at least 100 g of IgG. Supplement products can be used to increase the amount of IgG fed to calves when only low or medium quality colostrum is available and for additional nutritional support. Any and all colostrum given to calves should be tested to ensure its quality. This is not always practical or feasible on farms. Yet, it can prove to be a life-or-death decision for calves.

It is well recognized in the industry that ‘the sooner, the better’ is the standard for colostrum consumption. The consumption of quality colostrum is as important as the timing. Feeding every 8 to 12 hours is recognized as an acceptable feeding in the first 24 hours. The age of the first feeding is extremely important because colostral antibodies are absorbed through the calf’s intestinal wall during the first 24 hours; thus, early feeding of colostrum is mandatory (preferably during the first hour after birth). Colostrum management programs differ in timing, volume, and preferred methods of feeding. However, current expert recommendations promote feeding calves 10 to 12 percent of bodyweight in colostrum at first feeding.

La Belle provides consistent, high quality colostrum, every time, in every product and in every feeding. This assurance alleviates the concerns and stress for farmers.

Maternal Colostrum

A high quality liquid colostrum source is essential for achieving adequate immunoglobulin levels. For the highest IgG levels, colostrum needs to be extracted from the udder following calving. It is this high standard that La Belle upholds for colostrum procurement. La Belle collects only first day milkings to guarantee high immunoglobulin content.

In some herds, the supply of disease-free, high-quality colostrum is very limited and colostrum supplements and replacer products can provide viable options for ensuring adequate immunity in calves. For these reasons, La Belle’s colostrum procurement network ensures a broad-spectrum immunoglobulin content. La Belle collects first-day colostrum from healthy herds comprising a pool of over nine million cows from thousands of individual dairy farms. These vast networks allow La Belle to have access to an enormous supply of liquid colostrum from cows in varied environments, contributing to greater effectiveness against a wide variety of microorganisms. La Belle’s manufacturing facilities are licensed and inspected USDA veterinary pharmaceutical establishments. La Belle also works closely with state, federal and international regulatory agencies to provide the utmost safety of our colostrum product lines.

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La Belle True Bovine Colostrum™ provides efficacious supplement and replacer products to guarantee superior immunoglobulin protection and nutritional content for beef and dairy calves. La Belle has a diverse colostrum product lineup formulated for calves at every life stage and is designed for use with any colostrum management program.
uncertainties about colostrum ingestion and pathogenic threats. Required Ig intake can be guaranteed and not just assumed. An additional level of assurance comes with the licensing of colostrum products by the United States Department of Agriculture Center for Veterinary Biologics (USDA-CVB). Colostrum products containing IgG are regulated and divided into two categories: supplements and replacers. Supplements are classified as products that are unable to raise the blood concentration of IgG above the species standard, which is 10 mg/mL for calves.28 Replacers are defined as any product that is able to raise serum IgG concentration about 10 mg/mL, considered worthy of being a complete substitute for maternal colostrum if necessary.29 La Belle has earned US veterinary biologics licensing in product codes 3606.00 (FIRST START 50) and 3606.02 (FIRST START 100) as well as 3610.00 (First Colostrum) and 3610.03 (Colostrum Plus).

**Protecting Against Pathogenic Threats**

Newborn calves are extremely vulnerable to pathogenic and environmental threats because of absence of previous exposure to these elements. A newborn calf lacks strong immune function and is immediately susceptible to pathogenic and biological threats that can cause life-threatening diseases. There are many factors that lead to pathogenic exposure, including herd diseases and unclean and unsanitary conditions in the birthing environment. It has been determined that calves allowed to nurse have an increased risk of exposure to pathogens because they may ingest manure from the environment while searching for and suckling teats.30 Scours present a dangerous, life-threatening struggle for calves and is associated with a host of different diseases. Scours, defined as extreme diarrhea, if left untreated, can quickly devastate a calf’s fragile health. Scours is the most important single cause of calf sickness and death in the United States that occurs within the first several days of birth.31 In calves, the characteristic E. coli that causes simple scours is termed K99.32 E. coli bacterium possess K99 fimbriae or pili which is what makes it so detrimental to the calf. These pili are small fibers or “hairs” on the outer wall of the pathogen and attach to the gut lining of the calf. The effects of this toxin are to stimulate hypersecretion of water and electrolytes from the cells.33, 34, 35 The end effect of this activity is like that of other scours causing organisms to produce severe diarrhea and electrolyte and fluid loss.36 K99 E. coli does not invade the intestine or kill calves directly, but rather it kills calves via the production of dehydration and severe acidosis.37 Fluid loss can be so rapid and extreme that calves affected by this strain of E. coli can die within 24 hours from the onset of the disease.38

To combat E. coli infection in the newborn, antibodies from the dam are present in colostrum. The antibodies are specific to the K99 and block the pili from attaching to the gut wall. Once the bacterium is neutralized, the antibody-bacterium conglomerate passes through the calf’s system without toxicity. E. coli has a relatively short life span. If enough antibodies are present, the E. coli cannot reattach and will die off quickly.

However, maternal colostrum of poor quality can present serious health threats to vulnerable neonates. If not collected and stored properly, dangerous microbial contamination can occur in procured colostrum. Also, despite its immune benefits, colostrum can represent one of the earliest potential exposures of dairy calves to infectious agents, including *Mycobacterium avium* spp. *Paratuberculosis*.39, 40 Other pathogens of concern that may be cultured from raw colostrum or milk include *Mycoplasma spp.*, *Escherichia coli*, and *Salmonella spp.*.41, 42, 43 It is also thought that bacteria in colostrum may interfere with passive absorption of colostral antibodies into the calf’s circulation.44 A recent nationwide study of colostrum quality and composition found that almost 43% of samples collected from dairy farms had total plate counts (TPC) >100,000 cfu/ml, 16.9% of the samples had >1 million cfu/ml.45 Only 39.4% of the samples collected met industry standards for both IgG concentrations and TPC.46 Current industry recommendations include discarding maternal colostrum that contains <50 mg of IgG/mL and >100,000 cfu/mL TPC.47, 48 La Belle’s thermally treated colostrum supplements and replacers can guarantee industry standards of quality and safety. La Belle’s finished products meet and exceed the industry standards for IgG concentrations and TPC, providing the assurance needed for calf safety and health.

La Belle’s manufacturing process maintains the powerful bioactive properties of colostrum. Gentle thermal processing techniques provide assurance against microbial contamination, while protecting superior immunoglobulin content, specific antibodies, growth factors, and other valuable components found within colostrum. Studies have shown that heat-treatment of colostrum has resulted in reduced bacteria concentrations in colostrum while preserving absorption of IgG.49

La Belle is able to harness the naturally occurring antibodies found in maternal colostrum against common antigens found in calf-raising environments. La Belle has the proficiency to manufacture and test products for confirmed titer levels for relative potency needed to guard against diseases such as *E. coli*. Decades of research and development have contributed to La Belle being the industry leader in USDA-licensed maternal colostrum supplements and replacers. Two products, *First Colostrum* and *Colostrum Plus*, have earned dual-claim approval from the USDA-CVB to aid in the treatment of failure of passive transfer of immunity and to aid in the prevention of death associated with *Escherichia coli* K99 (which represent two risk factors that greatly impact the survival and health of newborn calves). Both *First Colostrum* and *Colostrum Plus* have been efficaciously proven to protect calves from these threats with the required IgG content and a full dose of E. coli K99 antibody. La Belle also has Canadian Food Inspection Agency (CFIA) licensed colostrum supplement and replacer products. These products, *FIRST START 50* and *FIRST START 100* are proven to aid in the treatment of failure of passive transfer of immunity in neonatal calves.
References


7 Smith and Foster, 2007.


10 Jones and Heinrichs, 2011.


19 Smith and Foster, 2007.


23 Jones and Heinrichs, 2011.

24 Jones and Heinrichs, 2011.

25 Jones and Heinrichs, 2011.

26 Rice and Rogers. 1990.


28 Jones and Heinrichs, 2011.

29 Jones and Heinrichs, 2011.


45 Stabel, et al., 2004.


47 Morrill, et al., 2012.

48 Morrill, et al., 2012.

49 Morrill, et al., 2012.


