

# THE COLOSTRUM COUNSEL

## More Than an Antibody Bolus - The Benefits of Colostrum

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Colostrum has evolved alongside calves to serve as more than just an antibody bolus. It provides critical nutrients essential to survive the jarring transition from utero to the outside environment and delivers signals that tell tissues how to grow, differentiate and defend.

This liquid gold is a calf's first functional feed. It contributes to tissue growth, metabolism and disease resistance. Many of these effects are happening even before antibodies have even entered a calf's circulation and last for weeks after the initial dose which have long-term implications on health and productivity. Missing out on this, means limiting a calf's ability to reach its full potential.

**Colostrum has 4 primary functions**  
to support calves and their development:

**1** Promoting growth



**2** Antimicrobial action



**3** Priming of the immune system



**4** Nutrition and stimulating  
metabolism

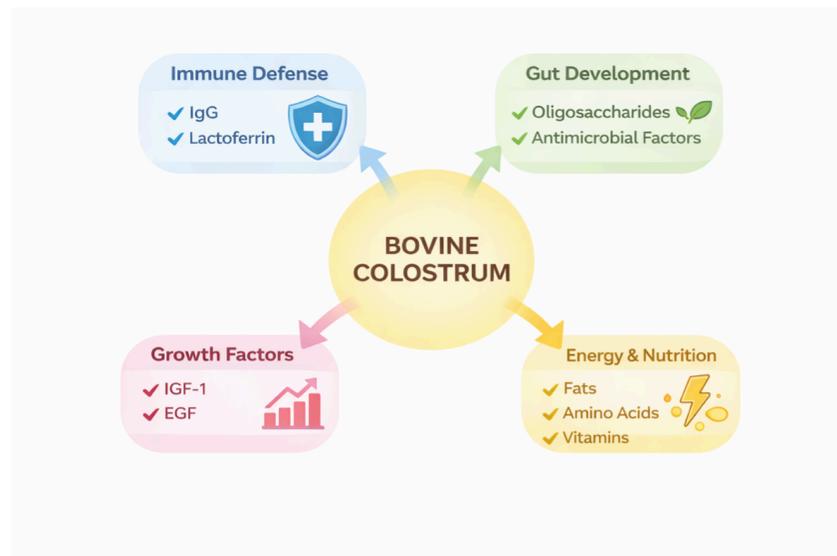


## Promoting Growth

Missing out on timely, adequate and high-quality colostrum does not just leave a calf vulnerable in terms of immunity, it also deprives them of key factors involved in early gut development. This leaves calves with permanently underdeveloped intestines which impacts early life average daily gain (ADG) and future feed efficiency.

Some of these growth promoting and cell development triggering compounds include:

- Amino acids
  - Needed for the building of proteins in the body and are essential to keep up with the high protein and nitrogen turnover in early-calf life
- Insulin Growth Factors 1 and 2 (IGF-1 and IGF-2)
  - Drive intestinal villi growth and crypt depth
  - Improve nutrient absorption
  - Linked to an increase in average daily gain (ADG)
- microRNA
  - Regulate gene expression
  - Aid in gut development
  - Promote cell viability, proliferation and stem cell activity in the intestines



## Antimicrobial Action

After spending 9 months in utero, the transition to the external environment is a shocking and filthy one. Barns have dirt, manure, materials from previous calvings, pathogens and bacteria among other things. While animals who live in this environment are healthy and thrive due to being adjusted to that environment and having a functional immune system, the same cannot be said for newborn calves who are taking it in for the first time with not a single antibody in circulation. While colostrum will provide this first immunity, antimicrobial compounds in the colostrum provide broad local action before IgGs even have the opportunity to identify and destroy potential invaders.

Specific compounds with antimicrobial action found in colostrum include:

- Lactoferrin
  - Functions by binding to iron which starves pathogenic bacteria that require it to proliferate
- Lysozyme and lactoperoxidase
  - These are enzymes that physically protect the calf by breaking down the cell walls of bacteria species
- Oligosaccharides
  - These serve as decoys, binding areas in the gut to directly prevent pathogens from binding in those same areas
  - They also are essential in supporting the growth of beneficial microbial populations in the intestines

## Priming the Immune System

Colostrum (as we know it) serves to give the calf its first immune system. The antibody profiles and concentration are influenced by a cow's exposure to pathogens in her own environment, properly timed vaccines, dry period length and nutrition. However, the impact colostrum has on the immune system goes beyond just IgG1 and IgG2. It also includes bioactives that train and assist the immune system so that it is as strong and effective as biologically possible.

A few examples include:

- Antibodies
  - Immunoglobulins (IgG), primarily IgG1 and IgG2. What's the difference? Basically, IgG1 are specific to colostrum, and are designed for passive transfer to provide passive immunity for newborn calves. IgG2s are the antibodies most commonly found circulating in adult animals, while they can provide some immunity, it is not as efficient as passing through the gut as IgG1s are designed to do.
- Leukocytes and cytokines
  - These compounds guide immune cell maturation which promotes regulatory pathways rather than just attack responses. This sets the calf up for the long-run by building a solid foundation of immune function.

In addition to providing maternal immunity for the first few weeks of life, there is evidence that good colostrum early in life promotes better vaccine responses later in life, larger due to these bioactives.

## Nutrition and Stimulating Metabolism

These compounds go beyond just the standard protein, fat and lactose we know come in high quantities in colostrum and milk. These are designed to be rapid energy and to efficiently kick start metabolism and give calves a boost to get up and get going.

- Hormones
  - Compared to milk, colostrum has a higher concentration of androstenedione, estrone, estradiol, cortisol, cortisone, GnRH, GH, TRH, insulin, glucagon, leptin, adiponectin and motilin.
  - The hormones kick start the endocrine and immune systems, and can contribute to maturation of cells in the gut.
- Fat soluble vitamins and antioxidants
  - These include vitamins A, D, E, K, and beta-carotene which are vital for early development and survival.
  - They are also essential in the antioxidant defense system of calves which helps protect them from oxidative stress.
- Colostral fat
  - This fat is different than the fats found in regular milk. It functions as a rapid energy source to get the calf going and to keep it going.
  - This energy metabolism also creates heat, as newborn calves are low on thermal insulation and have a low metabolism. In fact, calves require energy stores to create heat in temperatures at as high as 15°C, especially if they are wet or in drafty environments. This helps keep the calf warm and full of energy to get up, suckle and get excited for a second meal.
  - The metabolism it stimulates is also beneficial in heat stress. Energy is required to release heat from the body and having an efficient energy source to accomplish this especially when intake may be impacted is vital.

## Take Home Messages

Colostrum it is more than just the IgGs that are working to keep that calf healthy and strong. The more we learn about colostrum, the more we are learning that while timing and quantity are essential, good quality is non-negotiable. SCCL offers a range of 100% whole bovine colostrum products, never defatted and always preserving what makes colostrum the liquid gold that it is. Allowing nature to do what nature does best and supporting calves in not just surviving but thriving as a member of the herd.



## References:

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Silva, F.G., Silva, S.R., Pereira, A.M., Cerqueira, J.L., and Conceicao, C. 2024. A comprehensive review of bovine colostrum components and selected aspects regarding their impact on neonatal calf physiology. *Animals*. doi: [10.3390/ani14071130](https://doi.org/10.3390/ani14071130)