



## **Bovine Colostrum & Infant Health:**

The Importance of Colostrum for Infants Who Are Not Breastfed

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# Bovine Colostrum and Infant Health:

## *The importance of colostrum for infants who are not breastfed*

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### Making the Case for Extended Breastfeeding

The newborn gut is unique in that it has not completed maturation at the time of birth and needs the growth factors and other components of the mother's colostrum to complete its development. This incomplete development of the gut is initially beneficial to the newborn as it allows large proteins, such as immunoglobulins, to easily enter the body. Immunoglobulins in colostrum and mother's early milk bind to disease-causing pathogens on the mucosal surfaces of the GI tract, thereby preventing them from colonizing and causing infection. This modulation by the immune system creates passive immunity for the infant. Additionally, colostrum helps "seed" the newborn's GI tract with beneficial bacteria, something that cannot be provided by exclusive use of infant formulas.

Early weaning or exclusive formula use deprives the child of the immunity provided by the mother. Thus, breastfeeding helps prevent childhood illnesses, such as colic, respiratory and ear infections, infectious diarrhea, food and airborne allergies, and may help prevent leaky gut syndrome which has been linked to autism,<sup>1,2</sup> type 1 diabetes,<sup>3,4</sup> and other autoimmune conditions. Breastfeeding not only helps prevent disease in infants, but research shows that longer breastfeeding is associated with better mental health through childhood and into adolescence.<sup>5,6</sup> The bioactive components in mother's colostrum and breast milk are vital to neurological development.

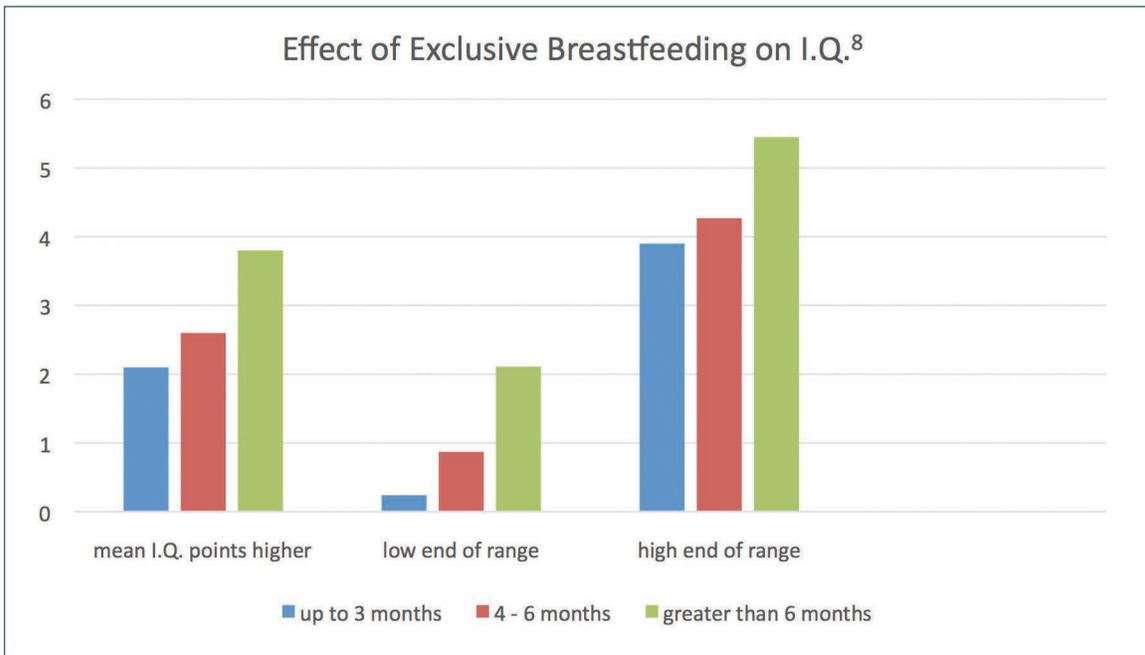
A review of 17 breastfeeding/I.Q. studies showed that breastfed infants achieved a mean score of 3.44 points higher than non-breastfed infants; if the studies controlled for maternal I.Q., the mean score was a smaller benefit at 2.62 points.<sup>7</sup> A study of 468 term babies with follow-up from infancy through preschool

#### RISKS of NOT BREASTFEEDING\*

- Acute otitis media
- Gastroenteritis
- Atopic dermatitis
- Severe lower respiratory infections
- Necrotizing enterocolitis
- Sudden infant death syndrome
- Type 1 diabetes
- Asthma
- Childhood leukemia
- In later life, higher risk of elevated blood pressure, obesity, type 2 diabetes



\*American Academy of Family Physicians. Breastfeeding, Family Physicians Supporting (position paper).



concluded that additional months of exclusive breastfeeding increased I.Q. score by as much as 5.45 points.<sup>8</sup> One study even suggests that a single month of breastfeeding increases I.Q. score at five years of age by three points.<sup>9</sup> Another study suggested that breastfeeding is associated with more favorable performance on intelligence tests 30 years later which in turn, may increase both educational attainment and income in adulthood.<sup>10</sup>

In modern times, the length of breastfeeding has been determined by social norms, mothers returning to the workplace, and the successful marketing of infant formulas. From 1900 to 1960, negative attitudes caused a significant decline in breastfeeding, however, the trend has been reversing. Experts now recommend that children be breastfed within one hour of birth (for mother’s colostrum), exclusively breastfed for the first six months, and subsequently breastfed until age two, complimented with age-appropriate and nutritionally adequate foods.

### BARRIERS TO BREASTFEEDING

- Social norms
- Poor family and /or social support
- Maternal embarrassment regarding breastfeeding in public
- Hindrances resulting from a return to the workplace
- Maternal lactation problems (i.e., failure to latch onto the breast)
- Infant was adopted



A note about infant formulas: these are basically “junk food.” Although infant formulas contain protein, fats, carbohydrates, vitamins, minerals, and more recently, lactoferrin, they contain none of living components present in bovine colostrum and mother’s milk. Immunoglobulins are not present in infant formula or pasteurized milk. Formulas simply cannot provide protection against disease-causing pathogens which attack an infant’s immature immune system. If we rob children of these living components, bovine colostrum is the best substitute we presently have.

A note about breast milk sharing: a study showed that while good intentioned, 74% of breast milk samples purchased via the Internet contained infectious bacteria and 21% contained cytomegalovirus.<sup>11</sup> Mothers can feel safe knowing that bovine colostrum is an alternative way to impart the “life-giving” substances without the potential risks of breast milk sharing.

The maternal milk of all mammals offers passive protection to a newborn against enteric pathogens, primarily via the transfer of immunoglobulins and growth factors from mother to infant.<sup>12</sup> The historical concept of “immune milk” (the transfer of passive immunity via lacteal antibodies) dates back to the 1950’s.<sup>13</sup> In the 1960’s, the underlying mechanisms of passive immunity were realized when the chemical structure of immunoglobulins was discovered. Later in the 1970’s, the secretory immune system was identified which gave way to the role of secretory antibodies in the prevention or treatment of enteric infections in mammals. Since the 1980’s, there has been considerable interest in utilizing antibodies from the milk and colostrum of heterologous species, particularly ruminants. Studies show that bovine antibodies can be effective in the prevention or treatment of human and animal diseases caused by enteropathogenic microbes (bacteria, viruses, protozoans, and fungi). Bovine colostrum is the most prevalent colostrum preparation available today, and it passes immunity to all the disease-causing pathogens that the cow has encountered in her lifetime, including the antibodies she received from her own mother – a broad spectrum pharmacy, for certain. The efficacy of any bovine colostrum supplement is determined by the antimicrobial activity of the specific antibodies and complement factors, which must be preserved during the manufacturing process.

Bovine colostrum influences the immune system in two ways. First, by stimulating it to fight infection and second, to modulate it up or down depending on the most efficacious outcome. Because the newborn gut has not completed maturation at the time of birth, the growth factors and other components of colostrum are absolutely necessary. All mammalian newborns have a “leaky gut” at birth; the lining of the stomach and small intestine is permeable. This is advantageous because the immunoglobulins are easily assimilated into the newborn’s body via the GI tract, and passive immunity is achieved. Complete gut development occurs when the growth factors and other bioactive components in the mother’s colostrum or from bovine colostrum supplementation are ingested which in turn, resolve the permeability issue.

### Common Conditions Affecting Infants & Young Children

#### Diarrheal Disease

Diarrhea is especially lethal to infants and worldwide, it is the second leading cause of infant death. An-

tibiotics are ineffective against virus-caused diarrhea, yet bovine colostrum has antibodies against many pathogens, including rotavirus which is very common in infants and young children. Chronic diarrhea caused by opportunistic Cryptosporidia and rotavirus is potentially fatal in children with AIDS because it causes muscle wasting and insufficient nutrient absorption in the gastrointestinal tract. The immunoglobulins in bovine colostrum help fight pathogens, and IGF-1 preserves and increases muscle mass.

### Respiratory Disease

Infants, particularly those born prematurely, are most susceptible to diseases affecting the lungs and respiratory tract because their immune systems are not fully developed.<sup>14</sup> Respiratory Viral Syndrome (RVS) is a common cause of infant mortality in the first two years. With no effective vaccine available, the administration of RVS immune prophylaxis is a viable solution. Research shows that lactoferrin and proline-rich polypeptides (PRPs) in colostrum block entry of the virus into cells, either by blocking cellular receptors, or by direct binding to the virus particles. Seasonal influenza is also a concern for infants and young children, and in the absence of vaccination, bovine colostrum's bioactives are a viable alternative. Concentrated PRPs and lactoferrin derived from bovine colostrum can be administered to infants and young children in oral spray form. Powdered bovine colostrum can be added to infant formula, milk, applesauce, or yogurt for easy ingestion at most ages.

### Allergies (including Milk Allergy)

Approximately one out of twenty infants is unable to tolerate the caseins in cow's milk/colostrum. Thus, cow's milk should not be introduced into the diet until this allergy is alleviated, so as to avoid any potential adverse reactions. Colostrum's PRPs modulate the pro-inflammatory cytokines, which can help improve or eliminate symptomatology of both allergies and autoimmune diseases. Additionally, PRPs inhibit the overproduction of lymphocytes and T-cells and ameliorate the major symptoms observed in allergies<sup>15</sup> and autoimmune disease (pain, swelling and inflammation). Again, an oral spray consisting of concentrated PRPs may help children under two years of age who have not yet been exposed to either cow's milk or cow's colostrum.

### Colostrum Supplementation: Literature Summary

- Studies with bovine colostrum have demonstrated the antiviral activity against rotavirus, the primary cause of diarrhea in infants and young children,<sup>16,17,18,19,20,21</sup> as well as bacteria-induced gastroenteritis.<sup>22</sup>
- Bovine colostrum supplementation has also been shown to be a useful method, in addition to known medical and psychological treatments, to increase the weight of children with nonorganic failure to thrive.<sup>23</sup>
- Oral lactoferrin (a component of colostrum) prophylaxis reduces the incidence of late-onset sepsis in infants weighing less than 3.3 pounds and most effective in infants weighing less than 2.2 pounds.<sup>24</sup>

- In a case study of a commercial hyperimmune bovine colostrum with potent anticryptosporidial activity, a four-year-old child with AIDS and severe cryptosporidiosis-associated diarrhea experienced significant clinical improvement in the diarrhea and permanent elimination of the parasite from the gut.<sup>25</sup>
- In another case study of bovine colostrum, a three-year-old child with acute cryptosporidia caused diarrhea was treated and recovered within two weeks.<sup>26</sup>
- Lysozyme, which is added to some infant formulas but found in colostrum naturally, is beneficial for the treatment of periodontitis and the prevention of tooth decay. Milk enriched with lysozyme has also been used to feed premature infants suffering from concomitant diseases.<sup>27</sup>
- Research in preterm, immune-compromised piglets demonstrated that supplementing with bovine colostrum prevents septic shock and ameliorates brain barrier disruption and neuroinflammation during bloodstream infection.<sup>28</sup>
- Other researchers using pig models are attempting to determine whether bovine colostrum can be used to feed preterm human infants who have insufficient access to mother's colostrum and milk.<sup>29</sup> Follow-up human studies have shown feasibility in using bovine colostrum in the first few weeks of life to supplement mother's milk in preterm infants; the colostrum helps increase enteral protein intake.<sup>30</sup>

### Growth Factors in Bovine Colostrum

Growth factors play an important role in maintaining the human body by stimulating cell growth, proliferation, differentiation and migration, which has remarkable overall benefits. Growth factors are capable of repairing leaky gut epithelia; bone remodelling and maintenance; fracture repair; wound healing; increased collagen production; and growth of blood vessels into damaged areas. There is an increasing use of growth factors for the treatment of hematologic and oncologic diseases and cardiovascular diseases. The most significant growth factors in bovine colostrum for the infant/child's benefit include: Insulin-like Growth Factor, Epithelial/Epidermal Growth Factor, Transforming Growth Factors, and Vascular Endothelial Growth Factor.

- Insulin-like Growth Factor I (IGF-1) – a protein hormone with a similar structure to insulin and a major growth factor that stimulates cell proliferation in wounds.
- Insulin-like Growth Factor II (IGF-2) – a protein hormone with a similar structure to insulin and a major fetal growth factor; promotes growth during gestation.
- Epithelial/Epidermal Growth Factor (EGF) – stimulates the proliferation and differentiation of epidermal cells, including the intestinal lining, to maintain gut integrity.

- Transforming Growth Factors Beta 1 & 2 (TGF- $\beta$ 1, TGF- $\beta$ 2) – control cell growth, proliferation, differentiation, and apoptosis; stimulate production of IgA by B lymphocytes; are vital factors in skeletal growth, bone mass maintenance, and fracture healing.
- Vascular Endothelial Growth Factor (VEGF) – creates new blood vessels during embryonic development and new blood vessels after injury.

### Liposomal Delivery & Colostrum Standardization

To achieve the gastrointestinal and immune benefits of bovine colostrum, it is crucial that the active components retain bioavailability for uptake and distribution to the body's cells and tissues. Additionally, colostrum must be soluble for free dispersion throughout the GI tract as well as be able to readily disperse in water or formula. Liposomal Delivery<sup>31</sup> enhances the bioavailability, and extensive research shows that such an enhanced delivery method allows ingested bovine colostrum to better achieve the intended results. When selecting a bovine colostrum supplement, look for one that is GMP certified; contains a standardized content of active components; is flash pasteurized and low-heat dried; is sourced from the first-milking of pasture-raised cows; and most importantly, is a liposomal delivery colostrum.

### Safety of Bovine Colostrum Supplements

No significant health risks have been reported during or after oral ingestion of immune milk or colostrum preparations. Colostrum has GRAS (generally recognized as safe) status, and oral supplementation is generally regarded as a non-invasive intervention, and therefore, safe for people of all ages. Bovine colostrum is ideal for formula-fed infants or those with limited breast milk feeding (after potential casein allergy is ameliorated). Infants with specific health issues, such as pathogen-induced diarrhea, may have successful resolution without the side effects of pharmaceutical drugs. Colostrum supplementation offers physicians and patients an alternative and/or adjunct to an infant's daily nutritional requirements.

*When mothers discontinue breast feeding their children before the age of two, liposomal bovine colostrum supplementation is strongly recommended for continued support and growth of all body tissue for optimal neurological and physical development and for overall health in childhood and beyond.*

## End Notes

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