

## Bovine Colostrum Powder: A Review

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### Introduction

Colostrum is the first production of the mammary gland after childbirth, and its composition varies dramatically in the first few days, distinguishing it from mature milk<sup>[1]</sup>. Bovine colostrum is a food rich in immunological chemicals that serve a passive immunity role in newborns<sup>[2]</sup>. Colostrum contains antimicrobial substances that protect the newborn against infections, especially in the initial few weeks after birth<sup>[3]</sup>. Its composition is rich in protein, immunoglobulins, lipids, and growth hormones, among other things, and has sparked interest in their use in human consumption for the development of medicines and food supplement<sup>[4]</sup>. For many years, the effect of bovine colostrum on human health has been studied, although they are still not fully understood<sup>[5]</sup>. Additionally, colostrum has more protein than breast milk and is quite useful.

Furthermore, the substance that is usually manufactured from cow colostrum is known as bovine colostrum powder. To retain bioactivity, colostrum powder production should be as gentle as possible.

### Bovine colostrum composition-

The significant differences in the contents of cow colostrum and mature milk have revealed that the two fluids perform different biological purposes<sup>[6]</sup>. The high fat and protein values of bovine colostrum are higher than the fat (4.69%) and protein (3.62%) levels observed in mature milk<sup>[7]</sup>. Colostrum's high protein concentration is connected to its high immunoglobulin concentration, which decreases during lactation until it reaches the mean for this component in mature milk. Unlike colostrum, IgG and IgA immunoglobulins in mature milk are 0.72 and 0.13 mg/mL, respectively<sup>[8]</sup>, highlighting the necessity of colostrum nutrition by the newborn. Colostrum contains considerable amounts of lactoferrin,



lactoperoxidase, and lysozyme, all of which have antibacterial and antiviral properties. Colostrum's antibacterial, antifungal, and antiviral properties allow it to destroy diseases such as *E. coli*, Rotavirus, and *Cryptosporidium*<sup>[9]</sup>. According to Davison (2012)<sup>[10]</sup>, the immunological benefit of employing bovine colostrum in human nutrition stems from the possibility of some bioactive components surviving digestion and allowing immune responses. The use of colostrum for the industrial production of immunoglobulins is intriguing because it has a high bioavailability and safety profile<sup>[11]</sup>. Bagwee *et al.* (2015)<sup>[9]</sup> underline that bovine colostrum is an abundant supply of fatty acids when compared to mature milk when assessing colostrum composition. Some colostrum lipids, like as conjugated linoleic acid, have been linked to cancer prevention<sup>[12]</sup>. Mašek *et al.* (2014)<sup>[13]</sup> identified colostrum as a potential functional food alternative for humans due to its lower saturated fatty acid content when compared to milk, as well as a higher participation of unsaturated fatty acids such as linoleic-conjugated acid, which has beneficial properties for human health. These qualities have piqued the pharmaceutical industry's interest in bovine colostrum components and potential uses in human health.

### **Bovine colostrum surplus**

Cows generate colostrum as the first milk they give to their newborn calf. The calf requires approximately 5 litres of colostrum to ensure immunity and gastrointestinal health. The cow produces 10-15 litres of colostrum, with 5-10 litres left over that the farmer might harvest and utilise for other uses.

### **Colostrum Powder Health Benefits**

There are various amazing health benefits to consuming colostrum, as we will see below.

- It strengthens and improves your immune system; it also helps the newborn develop a healthy gut and avoids hazardous bacteria from being swallowed.
- It is high in protein and carbs, both of which are extremely helpful.
- It can prevent fat and increase strength, as well as protect you from life-threatening diseases such as diarrhoea and cancer.
- Colostrum powder is also thought to be good for the skin, which is extremely astounding.
- Aids in the growth of newborns and animals in their early days.
- Promote skin healing, i.e., make your skin look radiant



- Aids in athlete rehabilitation, as well as muscle recovery
- In addition to vitamins and proteins, it contains immunologically active compounds that help your immune system.

#### **Human supplementation with bovine colostrum—**

Bovine colostrum has been utilised in human cuisine for thousands of years in India, and it was employed as an antibacterial agent in the United States until the invention of antibiotics. However, there was a rise in research in the 1990s with the goal of using bovine colostrum for human consumption, as well as manufacturing products with colostrum in their formulations <sup>[14]</sup>. Bovine colostrum has been used in India since the domestication of this animal type and is used in both medical processes and spiritual ceremonies <sup>[12]</sup>. In India, colostrum is served alongside mature milk, and it has been shown to be effective in fighting influenza in elderly patients <sup>[15]</sup>. In India, the use of bovine colostrum to irrigate the eye after ocular surgery is mentioned in Ayurveda, an ancient Indian medicine <sup>[16]</sup>. Colostrum was first used medicinally in the Western world in the 18th century, with the goal of improving the immune system. Until the development of penicillin, colostrum was frequently utilised in the fight against bacterial illnesses <sup>[12]</sup>. Although it has medicinal benefits for human health, therapeutic use of bovine colostrum has indeed been confined in the past due to technical considerations such as oxidation being linked to the development of type 1 diabetes, Hashimoto's thyroiditis, or diseases associated with autoimmune hepatitis and autoimmune connective tissue. Bovine colostrum supplementation lowers intestinal permeability <sup>[17]</sup>.

#### **Use of bovine colostrum in producing dairy products –**

Some experiments in recent years have focused at developing dairy dishes with additional bovine colostrum for human utilization. Ahmadi et al. (2011)<sup>[18]</sup> investigated yoghurts with various colostrum additions and discovered that the inclusion of bovine colostrum in yoghurt manufacture had desirable sensory acceptance. Saalfeld et al. (2012)<sup>[19]</sup> discovered a similar phenomenon when producing milk drinks and butter with the introduction of cattle colostrum silage. Other products with added colostrum that demonstrated good sensory acceptance were revealed in a study by Mouton & Aryana (2015)<sup>[20]</sup> with ice cream formed with bovine colostrum added and with the development of fermented milk with varying percentages of bovine colostrum. Other research targeted at assessing bovine colostrum in the production of food intended for human consumption were



conducted by Poonia and Dabur (2012)<sup>[21]</sup>, who created a traditional Indian delicacy called Khes, and Anamika Das and Seth (2017)<sup>[11]</sup>, who created curds with colostrum addition. Lactic acid bacteria are one of the most intriguing types of bacteria in terms of technology, and they are commonly utilised as starter cultures in many fermentation processes<sup>[22]</sup>.

### **Colostrum Powder Side Effects**

There have been numerous bogus reports concerning Colostrum Powder. Colostrum, in contrast, does not seem to have any significant negative effects, according to research. But first, consider the potential side effects of colostrum powder.

- Nausea
- Vomiting
- Diarrhoea
- Anaemia
- Abnormal liver enzymes

### **Conclusion**

As an alternative to human milk powder, bovine colostrum can be used in neonates which are facing problems with getting human milk. Although there are various advantages of giving bovine colostrum powder to newborns, but sufficient studies have not been done on this aspect. Hence, an ample number of studies should be done and then only the inclusion of it in the food of babies should be done. Also, adult humans can have bovine colostrum powder as a feed supplement in their diet.

### **References:**

- [1] Rathe M, Müller K, Sangild PT, Husby S. (2014). Clinical applications of bovine colostrum therapy: a systematic review. *Nutrition Reviews*.72(4):237-254.
- [2] Nikolic I, Stojanovic I, Vujcic M, Fagone P, Mangano K, Stosic-Grujicic S, Nicoletti F, Saksida T. (2017). Standardized bovine colostrum derivative impedes development of type 1 diabetes in rodents. *Immunobiology*. 222(2): 272-279,
- [3] Menchetti, L., Traina, G., Tomasello, G., Casagrande-Proietti, P., Leonardi, L., Barbato, O., & Brecchia, G. (2016). Potential benefits of colostrum in gastrointestinal diseases. *Frontiers in Bioscience-Scholar*. 8(2). 331-351
- [4] S. Yurchenko, A. Sats, V. Poikalainen, A. Karus. (2016). Method for determination of fatty acids in bovine colostrum using GC-FID. *Food Chemistry*. 212:117-122,

- [5] Bodammer, P., Maletzki, C., Waitz, G., & Emmrich, J. (2011). Prophylactic application of bovine colostrum ameliorates murine colitis via induction of immunoregulatory cells. *The Journal of nutrition*. 141(6):1056-1061.
- [6] McGrath, B. A., Fox, P. F., McSweeney, P. L., & Kelly, A. L. (2016). Composition and properties of bovine colostrum: a review. *Dairy Science & Technology*. 96(2):133-158.
- [7] Czerniewicz M, Kielczewska K, Kruk A. (2016). COMPARISON OF SOME PHYSICOCHEMICAL PROPERTIES OF MILK FROM HOLSTEIN-FRIESIAN AND JERSEY COWS. *Polish Journal of Food and Nutrition Sciences*. 56(1s):61-64.
- [8] Gapper, L. W., Copestake, D. E., Otter, D. E., & Indyk, H. E. (2007). Analysis of bovine immunoglobulin G in milk, colostrum and dietary supplements: a review. *Analytical and bioanalytical chemistry*. 389(1):93-109.
- [9] Bagwe, S., Tharappel, L., Kaur, G. & Buttar, H. (2015). Bovine colostrum: an emerging nutraceutical. *Journal of Complementary and Integrative Medicine*. 12(3):175-185.
- [10] Davison, G. (2012). Bovine colostrum and immune function after exercise. *In Acute topics in sport nutrition*. 59:62-69. Karger Publishers.
- [11] Das, A., & Raman, S. (2017). Immunomodulatory response of orally administered colostrum whey powder supplemented dahi in immunocompromised swiss albino mice. *The Pharma Innovation*. 6(1, Part B):104.
- [12] Godhia, Meena L., and Patel N. Colostrum—its Composition, Benefits as a Nutraceutical—A Review. *Current Research in Nutrition and Food Science Journal* 1.1 (2013): 37-47.
- [13] Mašek, T., Krstulović, L., Brozić, D., Vranić, M., Maurić, M., Bajić, M., & Starčević, K. (2014). Cow colostrum and early milk enriched with eicosapentaenoic and docosahexaenoic fatty acid. *European Food Research and Technology*. 238(4): 635-640.
- [14] Jenny, M., Pedersen, N. R., Hidayat, B. J., & Fuchs, D. (2010). Bovine colostrum modulates immune activation cascades in human peripheral blood mononuclear cells in vitro. *The new microbiologica*. 33(2):129.
- [15] Conte, F., & Scarantino, S. (2013). A study on the quality of bovine colostrum: physical, chemical and safety assessment. *International Food Research Journal*. 20(2).

- [16] Buttar, H. S., Bagwe, S. M., Bhullar, S. K., & Kaur, G. (2017). Health benefits of bovine colostrum in children and adults. *In Dairy in human health and disease across the lifespan*. 3-20. Academic Press.
- [17] Hałasa, M., Maciejewska, D., Baškiewicz-Hałasa, M., Machaliński, B., Safranow, K., & Stachowska, E. (2017). Oral supplementation with bovine colostrum decreases intestinal permeability and stool concentrations of zonulin in athletes. *Nutrients*. 9(4):370.
- [18] Ahmadi, M., Velciov, A. B., Scurtu, M., Ahmadi, T., & Olariu, L. (2011). Benefits of bovine colostrum in nutraceutical products. *Journal of Agroalimentary Processes and Technologies*. 17(1):42-45.
- [19] Saalfeld, M. H., Pereira, D. I., Borchardt, J. L., Sturbelle, R. T., Rosa, M. C., Guedes, M. C., Leite, F. P. L. (2014). Evaluation of the transfer of immunoglobulin from colostrum anaerobic fermentation (colostrum silage) to newborn calves. *Animal Science Journal*. 85(11): 963-967.
- [20] Mouton, E., & Aryana, K. J. (2015). Influence of colostrum on the characteristics of ice cream. *Food and Nutrition Sciences*. 6(05):480.
- [21] Poonia, A., & Dabur, R. S. (2012). Physico-chemical and sensory properties of khees obtained from buffalo and cow colostrum. *Journal of Dairying, Foods & Home Sciences*. 31(4): 256-258.
- [22] Ruiz, P., Barragán, I., Seseña, S., & Palop, M. L. (2016). Functional properties and safety assessment of lactic acid bacteria isolated from goat colostrum for application in food fermentations. *International Journal of Dairy Technology*. 69(4):559-568.