

Functional food from bovine colostrum

Alimentos funcionales a partir de calostro bovino

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Abstract:

Bovine colostrum is known as the first secretion that is produced after farrowing and it differs from mature milk due to its high protein content by the presence of immunoglobulins, lactoferrin, lactoperoxidase and lysozyme in addition to being rich in vitamins and minerals, for which has been used in human food as a supplement or in making food colostrum based, showing improvement in the gastrointestinal, respiratory and immune system.

Keywords:

Functional food, bovine colostrum, protein

Resumen:

El calostro bovino es conocido como la primera secreción que producen los mamíferos después del parto y se diferencia de la leche madura debido a su alto contenido proteico por la presencia de inmunoglobulinas, lactoferrina, lactoperoxidasa y lisozima además de ser rico en vitaminas y minerales, por lo cual se ha usado en la alimentación humana como suplemento o elaborando alimentos a base calostro, mostrando una mejoría en el sistema gastrointestinal, respiratorio e inmune.

Palabras Clave:

Alimentos funcionales, calostro bovino, proteína

Introduction

Bovine colostrum is known as the first secretion produced by the bovine mammary gland, which is obtained within the first 48 postpartum hours. It is a complex mixture of proteins, fat, vitamins, minerals, active peptides, immunological components and growth factors, the which are significantly richer than mature milk. [4,13]

Colostrum compounds have been found to provide nutritional, antimicrobial, and growth benefits which are essential for stimulating the immune system, providing protection against infections and improving the gastrointestinal system. [15, 22]

The benefits provided by bovine colostrum can be exploited in the production of functional and nutraceutical food, improving the health of the consumer [9]. Although it began to be used since the domestication of cows in medical procedures, it has been in recent years when

research has been carried out to produce food based on colostrum, making use of its functionality. [10]

Biological components of colostrum are mainly of interest being responsible for diverse bioactivities that exhibits including mainly antithrombotic, antihypertensive, immunomodulating, antioxidant mineral fixing, antimicrobial, anticancer, and growth promoter. [7, 25]

The objective of the following review is to present the nutritional composition of bovine colostrum and the benefits of its main components, as well as the use it has had in obtaining functional food from it, which is why it has been aborted as a therapeutic alternative in the human health.

Nutritional composition

One of the main characteristics of colostrum is that differs from mature milk in chemical and physical composition, presenting a thick consistency and yellowish color, the

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most notable difference being the high protein content, mainly due to the abundance of immunoglobulins. [2] Its components can be classified into three categories presented in figure 1.

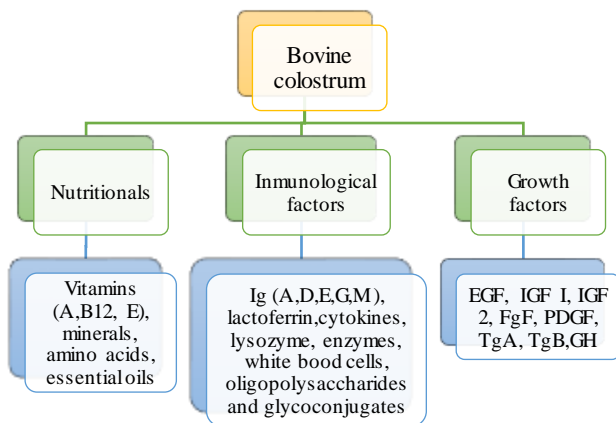


Figure 1. Main components of bovine colostrum

Nutritional components mainly provide health, vitality and growth to the new born, the growth factors as the epithelial growth factor (EGF), insulin I and II (IGF-I and IGF-II), fibroblast (FgF), platelet derivative (PDGF), transformant A (TgA), transformant B (TgB) and growth hormone (GH) they have the function of helping improve cell and tissue growth by simulating the formation of DNA, while immunological factors include various functions:

- Immunoglobulins, which are responsible for neutralizing toxins (IgG) and acting as antimicrobial (IgM) and antiviral (IgE and IgD).
- Lactoferrin, a protein that has been currently studied for presenting various functional properties that include antimicrobial, antifungal (herpes and candidiasis), antiviral, anti-inflammatory, anticancer, HIV, chronic fatigue syndrome and other infections.
- Cytokines, which regulate the duration and intensity of the immune response, responsible for the cell-cell communication and the production of immunoglobulins.
- Lysozyme, which helps hydrolysis and stimulates the immune system and is capable of destroying bacteria and virus.
- Enzymes, including lactoperoxidase- thiocyanate, xanthine oxidase and peroxidase that oxidize bacteria realising H₂O₂.
- Leukocytes, simulates the production of interferon.
- Oligopolysaccharides and glycoconjugates attract and bind pathogens by preventing them from adhering or entering mucous membranes. [9]

Use of bovine colostrum as functional food

Colostrum bovine has been used since the domestication of cows began in India, it was used in medical procedures

when its antibacterial properties were discovered, but it was until the 1990s when interest in developing food products with colostrum by its high concentration of bioactive components. [11, 27]

First, people started taking it naturally as mature milk, showing therapeutic action against influenza in older adults, later it was implemented as food supplement in powder, presenting the ability to reduce respiratory diseases, and gastrointestinal disorders. [12, 16, 18, 19] Subsequently, foods were made with bovine colostrum to take advantage of all its active components, for which dairy drinks and butter were produced by adding a fermentation of bovine colostrum, a probiotic drink bases on soy, colostrum and honey was also produced, which exhibited a great antioxidant capacity, while a colostrum-based yogurt was also made showing good sensory acceptance by consumers. [1, 3, 6, 8, 26]

Other products with good sensory acceptance include an ice cream and fermented milks with different percentages of bovine colostrum. [20, 21]

On the other hand, a traditional Indian dessert was produced called Khes and also a cheese that adds colostrum, while in the field of food technology, the lactic acid bacteria isolated from goat colostrum was evaluated for its application in food fermentations in order to establish their industrial value as starter cultures. [5, 23, 24]

Until now, colostrum is considered a totally safe substance and due to the functions, it has in the body, providing nutrients that strengthen the immune system, maintain the intestinal microflora and accelerate tissue regeneration, the interest in its use is increasing, although it has been limited by technical factor such as the sensitivity to oxidation of its lipids components. However, technological advances have provided that can be very useful in the processing of bovine colostrum such, as high pressures (HPP), irradiation, ultrasound, electric fields, etc. [17, 27] Scientific research highlights the importance of colostrum in human nutrition and it has even been predicting that colostrum-based products may play an important role in the functional products market in the future as they are increasingly important to the consumer. [14]

In conclusion, although the consumption of bovine colostrum is not frequent in México, its implementation can be promoted through functional foods or dietary supplements that can help combat various diseases that invade the population.

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