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## Review article

# Properties of bovine colostrum and the possibilities of use

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## ABSTRACT

**Introduction:** Food manufacturers compete on the market, introducing innovative products. Functional products, which show a beneficial impact on human health over the one which comes from the basic product component, are becoming increasingly important. Since a few years researchers underline a huge importance of colostrum in this trade. 'First milk' is significantly richer in biologically active peptides, immunologic components and growth factors than later milk.

**Aim:** In the article an overview of literature concerning the meaning of bovine colostrum in human nutrition and its therapeutic properties was performed.

**Discussion:** A vast research which was conducted on animals, as well as in strict laboratory conditions (in vitro, in vivo) confirm clinical benefits of colostrum. A number of analyses is still conducted, which additionally refer to the design of the appropriate dose and time of treatment with colostrum. Colostrum is considered a fully safe substance. To this moment, even with very high doses, very few side effects were noted. The main functions of the colostrum are supplying the organism with essential nutrients which strengthen the immune system, stimulation of the immune system response, maintaining the intestinal microflora and tissue regeneration acceleration.

**Conclusions:** Summing up, further use of products based on colostrum both in healthy individuals – prevention, as well as with some diseases is justified. The interest in questioned substance is rising due to vast scientific and clinical research underlining the

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significance of colostrum in feeding of human beings. Scientists predict that products based on colostrum may play a significant role on the functional products market in the future.

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## 1. Introduction

The last decade brought a dynamic development in the functional food market.<sup>1</sup> The production of functional products is a main direction of food industry development.<sup>2,3</sup> This is due to the major attractiveness of such products.<sup>4,5</sup> The list of functional products is gradually rising.<sup>6,7</sup> In recent years, the use of colostrum in human food products is gaining popularity.<sup>8</sup>

The colostrum is produced by milking glands of cows in the first four days after calving. In subsequent days it changes into standard milk.<sup>9</sup> It is characterized by a unique composition.<sup>10</sup> The research proved that the colostrum from cows contains over ninety various biologically active substances.<sup>11,12</sup> Bovine colostrum (BC) is rich in growth factors, immunologically active compounds and nutrients, which appear in a highly digestible form.<sup>8,13</sup>

The quality of colostrum depends on the race of cows, number of calvings and calves which were born alive as well as health on animals, proper production practices and knowledge of a breeder.<sup>14,15</sup> The colostrum is the most valuable during the first 24–48 h after calving. The dependence between time after calving and the quality of colostrum is directly proportional – as time progresses the number of biologically active components in colostrum decreases.<sup>16</sup>

## 2. Aim

The aim of the article is to highlight the significance of BC use in human nutrition, the therapeutic characteristics of colostrum and the influence of its most important, immunologically active components on human organism.

## 3. Discussion

### 3.1. BC and colostrum preparations

In recent years, milk derivatives have become a subject of scientific research.<sup>17–19</sup> A significant popularity, as a product appropriate for consumption was gained by the BC. This is due to the fact that it is a perfect source of biologically active proteins which are not only antibacterial and antiviral but also improve peristalsis and regulate work of the digestive tract.<sup>20–22</sup> Nowadays, colostrum can be obtained in a clear form as well as a product based on it or colostrum mixed with other components in a lyophilized or liquid form. A line of products

based on BC is available on the market. Consumers can also buy products based on the goat colostrums.<sup>7</sup> Li and Aluko<sup>23</sup> underline that there is no possibility of introduction of human colostrum to the market. Therefore an alternative is a BC.

### 3.2. Potential benefits of BC

As Conte and Scarantino<sup>7</sup> report the healing properties of colostrum were known for centuries. In India, where cows are considered saint, colostrum is distributed together with milk to houses. Its positive therapeutic effect in elder individual flu symptoms treatment was noticed. Doctors, the so called 'saint healers' or 'rishi', gave their patients milk with an addition of colostrum, what had a positive healing effect. It was the first step to application of colostrum in human nutrition. In parallel, near the end of XVIII century, research concerning use of colostrum in animal feeding was started.<sup>24</sup>

The antibacterial properties and enhancing passive immunity against infection are crucial, particularly in the first weeks of the infant's life.<sup>25</sup> The antibacterial activity of colostrum can influence pathogens directly or indirectly by stimulating the development of intestinal microbiota, rich in *Bifidobacteria* and *Lactobacillus*.<sup>26,27</sup> The immune system receives signals from colostrum based food<sup>28,29</sup> and the transmitted information is associated with the non-invasiveness of these food antigens. This prevents from abnormal immune response, while supporting the immune response against pathogens.<sup>30,31</sup> Growth factors play an essential role in the repair and maturation of different tissues.<sup>32</sup> They accelerate the regeneration of muscles, skin, bones or nerve tissue. In addition, growth factors stimulate the body to burn fat. They are often applied to local burns or skin injuries.<sup>33</sup>

### 3.3. Usefulness of BC for humans

Colostrum has been used in the feeding of infants and adults, mainly for preventive purposes. BC based food is also used in treating gastrointestinal and immune system diseases, cancer, allergies and various infections.<sup>7</sup> There are colostrum based dietary supplements, drinks and chewing gums available on the market.<sup>34</sup>

The analysis conducted by Rak and Bronkowska<sup>8</sup> shows the significance of lactoferrin and secretory IgA form (sIgA) present in colostrum in fighting infections of gastrointestinal, respiratory and urogenital system in infants. Bovine colostrum contains significant amounts of sIgA which blocks the adhesion of pathogens to mucous membranes and inhibits their colonization.<sup>35</sup> In addition, sIgA effectively protects

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