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Editorial on Milk Proteomics

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EDITORIAL

A better knowledge of the bovine milk proteome and its main drivers is a prerequisite for the modulation of bioactive proteins in milk for human nutrition, as well as for the discovery of biomarkers that are useful in husbandry and veterinary medicine. Milk composition is affected by lactation stage and reflects, in part, the energy balance of dairy cows. We aggregated the cow milk proteins reported in 20 recent proteomics publications to produce an atlas of 4654 unique proteins. A multistep assessment was applied to the milk proteome datasets according to lactation stages and milk fractions, including annotations, pathway analysis and literature mining. Fifty-nine proteins were exclusively detected in milk from early lactation.

The growth in urban population, coupled with the expansion of the railway network in the mid-19th century, brought about a revolution in milk production and supply. Individual railway firms began transporting milk from rural areas to London from the 1840s and 1850s. Possibly the first such instance was in 1846, when St Thomas's Hospital in Southwark contracted with milk suppliers outside London to ship milk by rail. The Great Western Railway was an early and enthusiastic adopter, and began to transport milk into London from Maidenhead in 1860, despite much criticism. By 1900, the company was transporting over 25 million imperial gallons (110 million litres; 30 million US gallons) annually. The milk trade grew slowly through the 1860s, but went through a period of extensive, structural change in the 1870s and 1880s.

Urban demand began to grow, as consumer purchasing power increased and milk became regarded as a required daily commodity. Over the last three decades of the 19th century, demand for milk in most parts of the country doubled or, in some cases, tripled. Legislation in 1875 made the adulteration of milk illegal – This combined with a marketing campaign to change the image of milk. The proportion of rural imports by rail as a percentage of total milk consumption in London grew from under 5% in the 1860s to over 96% by the early 20th century. By that point, the supply system for milk was the most highly organized and integrated of any food product.

Milk basic protein (MBP) is a fraction of whey protein found in milk. Separated from milk through the process of fractionation, it is a functional compound and consists of several milk proteins which are biologically active. The composition is approximately 54% lactoferrin and 41% lactoperoxidase, with other active proteins, such as Cyastin C and high mobility group-like proteins, making up the remainder of the fraction. MBP has been evaluated for safety and is intended for use as a dietary ingredient. It is approved in Japan as a functional food ingredient in tofu and nattō

Active substances in the milk basic protein fraction promote bone formation and suppress bone resorption. It has been found to decrease the formation of osteoclast pits, which act to break down bone and release minerals for resorption into plasma, MBP helps to reduce this process. It also increases bone mineralization by stimulating proliferation of osteoblasts which are involved in collagen production and bone formation. Daily supplementation with 40 mg of MBP over 6 months has been shown to result in increased bone mineral density and lower urinary markers of bone resorption.

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