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DRY WHEY: A PROMISING PRODUCT FOR THE FOOD INDUSTRY AND AGRICULTURE

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Abstract
The article presents an overview of studies devoted to dry milk whey, a valuable by-product of the dairy industry. The methods of dry milk whey production, its composition and properties, as well as the potential for use in various industries, including the food industry, agriculture and biotechnology are considered. Particular attention is paid to the prospects for the use of dry lactic acid as a functional ingredient for food enrichment, a feed additive for animals and a substrate for the production of valuable bioproducts.

Keywords: Dry whey, composition, properties, application, food industry, agriculture, feed additive, biotechnology.

Introduction

Whey is a by-product formed during the production of cheese and curd. Previously often considered a waste product, whey is now recognized as a valuable source of nutrients and functional components. Drying whey produces a dry product with a longer shelf life and ease of transportation, expanding the possibilities of its application in various industries [1,2,3]. Dry whey contains high-quality protein, lactose, minerals, vitamins and other biologically active compounds, which makes it promising as an ingredient for the production of a wide range of products [4,5,6].

Objective of the Study

The objective of this work is to summarize and analyze modern scientific data on the composition, properties and areas of application of dry whey, with an emphasis on its potential as a functional ingredient in the food industry, a feed additive in agriculture and a substrate for biotechnological processes.

Materials and Methods

The materials used for the study were scientific articles, reviews, monographs and patent documents published between 2010 and 2023 in the Scopus, Web of Science, Google Scholar and RINTS. An analysis of data on the chemical composition of dry milk whey, its production

methods, physicochemical and functional properties, as well as its use in various industries was conducted. The data analysis included a comparative analysis of various whey drying methods, an assessment of the effect of the composition of dry milk whey on its functional properties, and an assessment of the prospects for its use in various fields [7,8,9].

Results and Discussions

1. Composition and properties of dry whey: dry whey is a complex mixture of various components, the composition of which depends on the type of cheese, production technology and drying method. The main components are: Lactose: The most common component, making up about 70-80% of the dry matter mass.

Lactose has low sweetness and helps improve the texture and water retention of products. Protein: contains valuable whey proteins (alpha- lactalbumin , beta- lactoglobulin), which have high biological value and good digestibility. Minerals: include calcium, phosphorus, potassium, magnesium and other trace elements necessary for the normal functioning of the body. Vitamins: contains B vitamins, vitamin A and vitamin D. Lactic acid: a product of lactose fermentation, which can affect the taste and shelf life.

The functional properties of dry whey are determined by its composition and include:

–Solubility: good solubility in water allows the use of SMS in various liquid products.

–Water retention: the ability to retain moisture improves texture and prevents foods from drying out.

–Foaming: the ability to form a stable foam is used in the confectionery industry.

–Emulsification: the ability to stabilize emulsions allows the use of dry whey in sauces and mayonnaises.

2. Methods of producing dry whey: spray drying, the most common method, allows you to get a high-quality product with good solubility. Vacuum drying: used to dry heat-sensitive products, allowing you to preserve the maximum amount of biologically active substances. Freeze drying (sublimation drying): ensures the best preservation of nutrients and functional properties, but is the most expensive method.

3. Application of whey powder: food industry whey powder is used as an ingredient for the production of dairy products (yogurt, cheese, ice cream), bakery and confectionery products, beverages, sauces and other products. It improves the texture, taste, moisture retention and nutritional value of products. Of particular interest is the use for enriching food products with protein.

Agriculture: Dry whey is used as a feed additive for farm animals, especially piglets and calves. It is a source of protein, lactose and minerals necessary for the growth and development of animals.

Biotechnology: lactose contained in dry whey can be used as a substrate for the production of various bio-products such as ethanol, lactic acid, biogas and others.

Conclusion

Dry whey is a valuable by-product of the dairy industry with a wide range of applications. Due to its rich composition and functional properties, dry whey is a promising ingredient for the

food industry, a feed additive for agriculture and a substrate for biotechnological processes. Further research aimed at optimizing dry whey production methods, studying its functional properties and developing new areas of application will contribute to more efficient use of this valuable resource and reducing the negative impact of the dairy industry on the environment. In particular, a promising area is the development of specialized dry whey with improved functional properties intended for specific types of food or feed. It is also important to study the possibility of using dry whey for the production of biodegradable packaging materials.

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