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CURRENT STATUS, IMPORTANCE OF THE RATIONALITY OF PROCESSING CURD WHEY

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One of the priority area in the Address of President N. Nazarbayev to the people of Kazakhstan «Strategy «Kazakhstan-2050» - a new policy of the constituted state», is the achievement of the leading positions on the world food market and increase the volume of agricultural production [1].

Due to the increase in production volumes of milk protein products in the Republic of Kazakhstan such as cheeses and acid, the resources of dairy whey increase proportionally. Given the shortage of raw milk, the problem of using secondary raw materials rationally becomes particularly relevant, and the task of experts of the dairy industry is to come up with such solutions so that valuable dairy whey is used to the fullest, which will ensure the environmental safety and the resource conservation of milk production.

Once upon a time, whey was a nuisance, but with time, science and technology, what used to be a problem has been turned into a gold mine. With the growth whey has experienced in the last 25 years, and given the steadily increasing world wide demand, more growth and utilization of whey proteins are expected. Whey processing and application today are yielding a wealth of quality products that are increasingly seen as ingredients in formulations that have recognized positive health benefits. The health benefits are expanding as more studies are reported in scientific journals.

Recently years in Kazakhstan, the sector of drinks and desserts based on dairy whey has become more popular, however, the share of whey, used for these purposes is small [2]. It is due to the features of its composition and properties. Dairy whey is characterized by high content of minerals and increased acidity (especially acid and casein whey), which limits its use for food purposes. However, its valuable composition, significant volume and accessibility predetermine the need for its industrial processing. Whey includes around 50% of milk solids, 70% of which is accounted for lactose, around 13% is protein components, less than 5% – milk fat and about 11% is minerals. Whey protein is represented by β lactalbumin, β -lactoglobulin, whey albumin, immunoglobulins, lactoferrin, osteopontin, lactoperoxidase and the protease-peptone fraction. These proteins have the highest biological value by the content of essential amino acids among other food proteins. In this regard, whey protein fractions can fully meet the need

in protein in the diet of infants, the elderly, athletes, as well as people exposed to stress and engaged in heavy physical labour [3]. Nowadays, the intensive research and scientific works are conducted to create new kinds of dairy products, the raw material for which can be dairy whey as a source of nutrients with the important physiological value, in order to solve the problem of providing the population with biologically full, affordable and safe food products.

Improvement of technological processes, as well as wide processing of secondary dairy raw materials improves the nutritional value of food products, while addressing a number of the issues of rational raw materials use and environmental safety. In this regard, the studies, aimed at the development and introduction of food products based on the principles of comprehensive non-waste milk processing, are relevant.

Using cheese whey as a beverage in human nutrition, especially for therapeutic purposes. The market dynamics is driven by five key factor groupings: increased concentration in the global beverages market; diverging functional beverage trends worldwide; flavor innovations; product differentiation; and cross-category innovations. Whey beverages are manufactured and formulated keeping in consideration the nutritional values, biological and functional properties. The major problems which are generally encountered in whey based fruit juice beverages are:

- a. Crystallization of lactose during storage at refrigerated temperature
- b. Coagulation of whey proteins during thermal treatments
- c. Higher viscosity of concentrates affect the effectiveness of thermal treatments
- d. Depleted shelf-life at room temperatures
- e. High content of minerals in the whey are responsible for undesired salty-sour flavour of whey.

Despite of the limitations of using whey in manufacturing beverages, whey is used on larger amounts due to the following reasons:

- a. Whey is having a broad range of solubility i.e. from pH 3-8
- b. Whey is having a bland flavor and on many occasion they can act as carrier for the aroma compounds.
- c. Buffering capacity of whey can be explored for survival of probiotic bacteria in the gastro intestinal tract [4].
- d. Addition of whey improves the 'mouthfeel' of the drink by increasing the viscosity of the beverage.
- e. Whey can be also used to solve the problems associated with cloudiness of tropical fruit juices and produce a cloud stable juice

Dietetic beverages, beverages with hydrolyzed lactose, are prepared by addition of some sweetening agent (most often saccharin and cyclamate), fruit bases of apple or some tropical fruits and stabilizing agent. These beverages have very low energy value (104-113 kJ/100 ml) what makes them suitable for

consumption by large group of consumers. Lactose hydrolyzation results in production of glucose and galactose - monosaccharides with much higher sweetness, better solubility and better absorption ability than lactose. Besides fruits, other flavoring agents like chocolate, cocoa, vanilla, cereals (mostly rice, oat and barley), honey, etc are added. Addition of cereals (especially bran), seems to be very interesting which results in production of a beverage fortified with dietary fibers, essential fatty acids (with addition of oat) and hypoallergenic proteins what makes these beverages suitable for consumption by allergic population and children. In order to prepare a hypoallergenic beverage, the addition of honey to such beverage instead of sugar or other sweeteners results in fortifying it with numerous other nutrients like vitamins, minerals and phytochemicals which are not naturally present in whey.

The health benefits of whey are being documented through a series of studies including in vitro animal and human, which show use of whey proteins for clinical indications such as cancer, hepatitis, human immunodeficiency virus (HIV) disease, cardiovascular disease (CVD), and obesity. Other health benefits include antitumor and antiarcinogenic responses due to glutathione modulation which increases the relevant amount of glutathione in tissues, stimulating immunity and detoxifying potential carcinogens. It is thought also that the iron binding capacity of lactoferrins reduces oxidative damage caused by unbound iron in tissues [5].

In the present competitive beverage market, the classical whey drinks may be facing tough times. For a beverage to be accepted by the modern consumers, it has to satisfy at least some of the main determinants of success—desirable sensory quality, thirst-quenching effectiveness, favorable price and positive ‘health image’. With the peculiarities of the whey flavor interfering with many flavoring ingredients and the processing costs adding to the rapidly rising value of the formerly bothersome waste, the future of the whey beverages might lie mainly in the last attribute, the special nutraceutical qualities of some of the whey components. Consumer features like convenience, practicability, flavor, nutritional value, variants are generally affecting the market size of the functional drinks. As far as milk is concerned, it is now steadily becoming a functional drink in its various forms like drinkable yoghurt, flavored milk and others and a vital role will be played by whey based drinks. Whey drinks with added carbohydrates and increased level of salts can be used for formulating sports drinks which will be having different function like recovery of muscle and muscle cramps, increase in lean weight, overcoming the adenine nucleotides depletion, acting as a neurostimulant, glycogen depletion and others. Whey and whey based products can be used to formulate different beverages with multiple application and functionalities.

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