

The Innovative Development of Manufacturing Technology Child Yogurt from Goat's Milk

Irina Serafimovna Bushueva, Dinara Iskanderovna Ahtyamova and Vasilii Evgenevich Seleznev

Volgograd State Technical University, Lenin Avenue, 28, 400005, Volgograd, Russia

Abstract: The article considers the problem associated with balanced nutrition of children of preschool and school age. Statistics shows that in recent years among children aged 3 years and older, the number of allergic reactions to cow's milk increased. Due to the fact that goat's milk is rich in natural trace elements compared with cow's milk, it is highly nutritious and was decided to use it for the production of yogurt child. There are an information on new developments, using to increase the range of products made from goat milk and the results of research and conducted to determine the effect of bioactive and nutritional supplements on the organoleptic, physico-chemical and microbiological parameters of kefir child "Tyam-tyam".

Key words: Goat's milk • Yogurt • Lactulose • Glycine • Ascorbic acid • Malic acid • Balanced diet

INTRODUCTION

"The market for baby food is presented in two major segments: breast-milk substitutes (dry and liquid)-they accounted for 21% of the market-and complementary foods (cereals, meat, vegetable and fruit purees, juices, desserts and a children's water), the share which accounted for 79%,-said the analysts of the company IndexBox.-Baby puree is most claimed the first three years of life. Juices, cereals, also play an important role during 36 months. Other segments are more relevant to the second and third year of life, for example, all dairy products" [1].

Nowaday in Russia there is a tendency to increase the range of dietary dairy products intended for children of preschool and school age. Particular attention is paid to their diet, as from an early age are prerequisites to diseases of the gastrointestinal tract (intestinal dysbiosis, diarrhea, etc.) due to unfavorable environmental conditions in some areas of Volgograd and Saratov are regions of the Russian Federation. One of the basic principles that contribute to a balanced diet of children in this age group is the rational use of raw milk in the production of dietary dairy products.

Goat milk can fully satisfied of children, both in quantitative and qualitative terms in essential nutrients (proteins, fats, carbohydrates, vitamins, enzymes, macro- and micronutrients). Moreover, goat's milk has antiallergic

properties, as part of the casein fraction of goat milk no 1S- α -casein and albumin fraction α -lactalbumin dominates β -lactoglobulin, which are potent allergens. Thus, the use of goat's milk may help to solve the problem of food allergic children with cow's milk protein intolerance. [2]

Goat milk differs from bovine fat component at: goat milk fat globule significantly smaller in size than a globule of cow milk, which increases their availability for pancreatic lipase child in fat goat milk is considerably higher than cow milk fats, the relative content of medium fats that are absorbed directly into the venous network, bypassing the lymphatic capillaries. This provides better digestibility of fat goat milk compared to bovine [3-5].

In general, goat's milk is a source of high quality protein, fat, vitamins and minerals. Compared to cow's milk in it about 13% more calcium, 25%-vitamin B6, 47%-Vitamin A: it is 1.5 times richer in potassium, 3 times-niacin, 4 times-copper and third-selenium. It has no carotene, it has been redesigned the body into vitamin A, it is much more vitamin B12-hematopoietic factor controlling all metabolic processes in the body. Goat's milk has a good antirahiticheskim property due to the high content of calcium, phosphorus, cobalt, copper, selenium, magnesium, iron, manganese, sialic acid, which is part of the body's immunological barriers [6, 7].

As it was mentioned, goat's milk is recommended for the production of children's dairy products, particularly yogurt child. Kefir, like most dietary dairy products, is a

good source of animal protein. They are easily digested and absorbed by the body of the child, because they contain all the essential amino acids. Due to the fact that during the fermentation lactic acid is formed, which is able to destroy pathogens, stimulates the digestive process and improves absorption of nutrients.

MATERIALS AND METHODS

The importance to expand the nutrition status of children of preschool and school-age due to the following factors:

- Introduction of an additional body increasing the energy of the child and a number of food and bioactive substances (proteins, iron, etc.);
- Spreading nutrient diet, containing in food of various kinds of carbohydrates, fatty acids, organic acids, trace elements necessary for further growth and development of the child;
- Development of the digestive system and stimulation of the motor activity of the bowel.

Studies in SSI "Volga Research Institute of the production and processing of meat and dairy products RAAS" showed that the use of dietary supplements in the production of functional dairy products based on goat's milk contribute to the creation of fundamentally new varieties. So, a new fermented organic products from goat's milk with a dietary supplement "Glimalask" was developed by scientists SSI RIPP MMDP RAAS and stevia extract, which has curative properties. Also scientists SSI RIPP MMDP RAAS have developed a new food additive-flour from the seeds of chickpea sprouts in the salts of selenium and iodine, which provides administered technology of probiotic cheese products made from goat milk using bifidobacteria [8].

Due to the fact that a growing body needs energy and a number of food and biologically active substances, a method of enrichment of yogurt from goat milk bioactive substances to the child's body using sourdough kefir fungi was developed. Health and well-being of children depends on the requirements of high technological and sanitary requirements to producing children's dairy products [9].

For a comparative analysis of physical-chemical parameters and improving consumer properties of new varieties of yogurt child "Tyam-tyam" as dietary supplements have been used "Kumelakt" (composition of natural biologically active substances produced by a

combination of lactulose concentrate, honey extract, sprouted pumpkin seeds and apple acid) "Laktumin" (composition numbers of biologically active substances, obtained by combining honey extract from tubers of Jerusalem artichoke fresh, lactulose concentrate and succinic acid) in combination with a complex dietary supplement "Glimalask" (the combination of glycine, ascorbic and malic acids) [10].

Additives are designed for using with food as the source of lactulose, inulin, succinic and malic acids, flavonoids, polyphenols substances. Lactulose is a class of oligosaccharides is recognized bifidus factor. In many developed countries, it is used as a prophylactic and therapeutic agent for dysbacterioses. Metabolism of lactulose is converted to acetic, lactic and other organic acids that inhibit the development of putrefactive microflora of the intestine and its contents are acidified. As a result, it improves the function of the gastrointestinal tract, provides protection against intestinal infection, toxic poisoning of the body prevented protein decomposition products, reduces the load on the liver and kidney, immune responses are activated, inhibited the growth of cancer cells, stimulating the production of vitamins and facilitates removal of fecal matter, i.e. manifested laxative effect [10].

Ascorbic acid has a tonic and stimulant properties on the immune system, is a powerful antioxidant, normalizes the redox processes. Containing in the food additive amino acid glycine is a regulator of metabolism, normalizes and activates processes of protective inhibition in the central nervous system, enhances mental performance [10].

Dietary food acids-malic, succinic-involved in the conversion of sugars and fats in adenosine triphosphate, an energy source which possess anti-inflammatory and antibacterial properties, normalize production of gastric juice, stimulate the digestive processes. Used food acids have the ability to improve the absorption of iron from food, which is important in the treatment of anemia. The antioxidant properties of acids increase carbohydrate metabolism [10].

Studies of physicochemical and microbiological quality of kefir child "Tyam-tyam" enriched dietary supplements "Kumelakt" as well as a sample of enriched dietary supplements "Laktumin" and food additive "Glimalask" were conducted on the recommendations developed by the State Scientific Institution All-Russian Research Dairy Industry Institute (SSI VNIMI) with the participation of the Institute of Nutrition.

The Main Part: Production technology of kefir child "Tyam-tyam" enriched with biologically active substances, are provided acidification goat milk for 8-12 hours at a temperature of 20-24 °C, which consists of the following: maintaining the temperature, making the dietary supplement and the yeast prepared kefir fungus, soak for 8-12 hours, cooled to 12-16 °C and stirring within 60-90 minutes after the start of cooling during 10-30 min. [11, 12]. Fermentation is carried out until a clot acidity 90-110°T. Feature of the process of production of yogurt child "Tyam-tyam" is that BAA "Laktumin" paid before fermentation main raw material and food additive "Glimalask"-after the stage of ripening. Cooking time kefir child "Tyam-tyam" reduces by an average of 2 hours with a significant and sustained increase in the acidity of up to 90 ° T. Production technology kefir child "Tyam-tyam" enriched dietary supplements "Kumelakt" is provided the same stages in the manufacture of yogurt that children with BAA "Laktumin" except making food additive "Glimalask".

During the process of production of yogurt child enriched with biologically active additives and food, and a control sample of yogurt produced comparing the effects of dietary supplements on the physico-chemical, organoleptic and microbiological parameters was revealed the effect of dietary supplements "Kumelakt" (sample # 1) and "Laktumin" (sample # 2) to increase the acidity during ripening (Figure 1).

Referring to Figure 1, during the ripening (0 to 12 hours) increases the acidity of the test samples compared to the intense test sample acidity. Therefore, the sample # 1 and sample # 2 for 2 hours before sending maturation, as the acidity of the bunch reached the optimum value. Acidity of yogurt child was also investigated during ripening. Due to the fact that the sample # 2 was added food additive "Glimalask" acidity of yogurt child reached 109 °T. In sample # 1, it began to grow more slowly and by the end of the ripening process has stabilized at around 110 °T, which is not true of the control sample, the acidity of which reached 125 °T. From the above mentioned we can conclude that BAA "Kumelakt" slows down the growth of acidity during maturation.

To determine the effectiveness of child enrichment kefir "Tyam-tyam" a comparative analysis of organoleptic characteristics of depleted samples was conducted, the results on the graph (Figure 2). Tasters Sample # 1 was estimated by fastest at 4,88 points, sample # 2 by 4,76 points and the control sample of 4,62 points out of a possible 5, indicating the beneficial effect of additives.

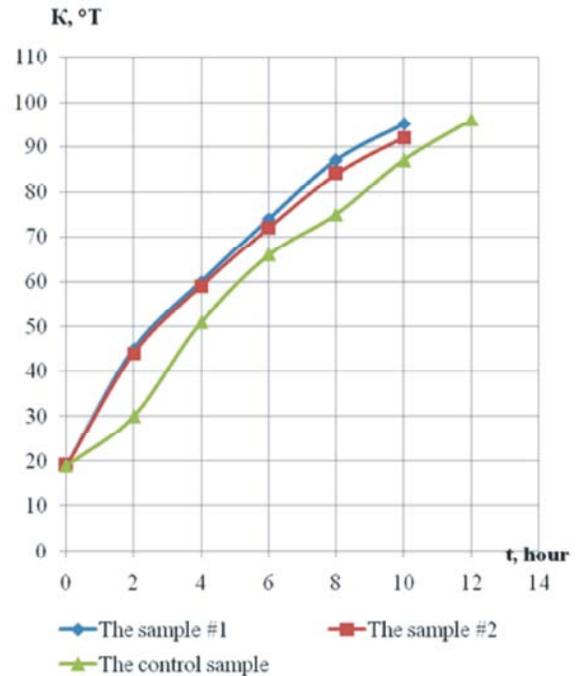


Fig. 1: Dynamics of growth acidity prototypes kefir

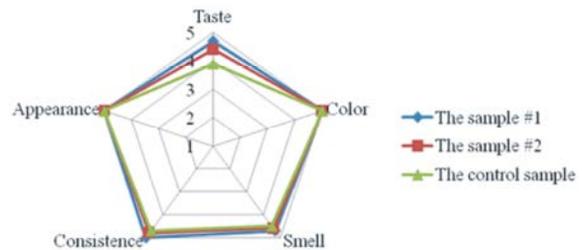


Fig. 2: Scale organoleptic evaluation

The physico-chemical parameters of kefir samples of children. Sample # 1: mass fraction of fat-3,3 %, mass fraction of protein-4 %, the mass fraction of carbohydrates-6,2 %, the mass fraction of vitamin E-0,59 mg %, the mass fraction of malic acid-20 mg%. Sample # 2: fat mass fraction-3,0 %, mass fraction of protein-3,7%, mass fraction of carbohydrates-6,0 %. Control sample: mass fraction of fat-2,9 %, mass fraction of protein-3,6%, mass fraction of carbohydrates-4,0 %.

The effect of dietary supplements "Kumelakt" and "Laktumin" on the development of lactic acid bacteria in yogurt samples was developed. At the beginning of the expiration date amounts of lactic acid microorganisms, both in the control and in the experimental samples was $2,3 \cdot 10^9$ CFU/g, on the fifth day of storage their number in test samples remained almost unchangeable and in the control was decreased by two orders of magnitude.

CONCLUSION

Studies of physicochemical and microbiological quality and consumer properties of kefir child "Tyam-tyam" showed that the introduction of dietary supplements "Laktumin" and food additive "Glimalask" does not affect on the change in the mass fraction of fat and protein mass fraction, mainly increases mass fraction of solids mass fraction of ascorbic and malic acid. Introduction to sample # 1 BAA "Kumelakt" affects the increase in fat mass fraction, mass fraction of protein and carbohydrates, as well as vitamin E. During observations of increases in acidity was found that dietary supplements at the beginning of ripening dramatically increase the growth of acidity since that contain organic acids, but then stabilize its tension and during maturation and does slow down.

Conclusions: Based on these studies, conducted at the Research Institute of Agricultural Sciences LVP, we can conclude that the resulting functional product "Tyam-tyam" complies with the essential requirements of the formation of a balanced diet. Dietary supplements further enrich children's yogurt lactulose, flavonoids, polyphenolic compounds and organic acids. Samples of children's yogurt "Tyam-tyam" improve performance of internal secretion and overall metabolism and regulate bowel movements and suppresses the growth of harmful microorganisms.

REFERENCES

1. Growing up on all ready. Baby food market volume for the year increased by 17.5%. Data Views 24.10.2013. www.rg.ru/2013/01/15/pitanie.html.
2. Matalygina, O.A., 2008. Therapeutic and preventive potential of new food products for children based on goat's milk. *Current Pediatrics*, 7(1): 71-81.
3. Fahmi, A.H., I. Sirry and A. Safwat, 1956. The size of fat globules and the creaming powder of cow, buffalo, sheep and goat milk. *Ind. J. Dairy Sci.*, 9: 80-86.
4. Juarez, M. and M. Ramos, 1986. Physico-chemical characteristics of goat milk as distinct from those of cow's milk. *Int Dairy Fed Buffl*, 202: 54-67.
5. Hachelaf, W., 1993. Comparative digestibility of of goats versus of cow's milk, fats in children with digestive malnutrition: a double-blind study. *Reunion de Surgeres*, 73: 593-599.
6. Ostroumova, T.L., 2005. Goat milk-natural health formula. *Dairy industry*, 8: 69-70.
7. Pelevina, G.A., E.S. Artemov and E.V. Potimko, 2010. Comparative characteristics of cow and goat milk. *Herald of the Voronezh State Agricultural University*, 4(27): 83-86.
8. Innovative technologies in the production and processing of agricultural products in the WTO. In 2 parts: Mater. Intern. scientific-practical. conf., Volgograd, 4-5 June 2013 / ed. VN Temple, 2013, Volgograd, VSTU, pp: 374.
9. Kuznetsov, V.V. and N.N. Lipatov, 2005. Directory technologist milk production. Technology and formulation. T. 6. Technology children's products. St. Petersburg: GIOR, pp: 512.
10. Gorlov, J.F., V.N. Hramova, M.I. Slozhenkina, S.E. Bozhkova and E.A. Selezneva, 2010. Innovative developments lactulose food additives and dietary supplements: a monographia VSTU. Volgograd, pp: 80.
11. Stepanova, L.I., 1999. Directory technologist milk production. Technology and formulation. In 3 T. 1. Milk products. St. Petersburg: GIOR, pp: 384.
12. Tverдохлеб, G.V., 1991. Technology of milk and dairy products. Moscow: Agropromizdat, pp: 463.