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САРЫСУ МЕН ПАХТАНЫ ҚАЙТА ӨҢДЕУДІҢ ҚАЛДЫҚСЫЗ ТЕХНОЛОГИЯЛАРЫ ЖӘНЕ ӨНІМДЕР

ZARDOB VA PAXTA URUG'INI QAYTA ISHLASH UCHUN CHIQINDISIZ TEXNOLOGIYALAR VA MAHSULOTLAR

WASTE-FREE TECHNOLOGIES AND PRODUCTS FOR PROCESSING WHEY AND COTTONSEED

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Түйін

Қалдықсыз технологияларды сүт өңдеу өнеркәсібінде қолдану Қазақстан үшін экологиялық және экономикалық тұрғыдан маңызды бағыт болып табылады. Бұл технологиялар өндіріс қалдықтарын азайтып, ресурстарды тиімді пайдалануға мүмкіндік береді, соның арқасында қоршаған ортаға зиянды азайтуға және өнім сапасын жақсартуға болады.

Зерттеулер көрсеткендей, қалдықсыз өндіріс технологияларын енгізу кәсіпорындардың өндіріс тиімділігін арттырып, шығындарын төмендетеді. Сонымен қатар, бұл әдістер сүт өнімдерінің халықаралық стандарттарға сай болуына және экспорттық әлеуетінің өсуіне ықпал етеді.

Қазақстандағы сүт өңдеу өнеркәсібін дамыту барысында қалдықсыз технологияларды кеңінен енгізу тұрақты даму мен экологиялық қауіпсіздікті қамтамасыз етеді. Бұл бағытта мемлекеттік қолдау мен ғылыми-зерттеу жұмыстарының үйлесімділігі аса маңызды.

Қорытындылай келе, қалдықсыз технологиялар сүт өнеркәсібінің болашағын жаңғыртып, өндірістің экономикалық тиімділігі мен экологиялық тұрақтылығын қамтамасыз етудің негізі болып табылады.

Xulosa

Sut sanoatida chiqindisiz texnologiyalardan foydalanish Qozog'iston uchun ekologik va iqtisodiy nuqtai nazardan muhim yo'nalish hisoblanadi. Ushbu texnologiyalar ishlab chiqarish chiqindilarini kamaytirish va resurslardan samaraliroq foydalanish imkonini beradi, bu esa atrof-muhitga zararni kamaytiradi va mahsulot sifatini oshiradi.

Tadqiqotlar shuni ko'rsatdiki, chiqindisiz ishlab chiqarish texnologiyalarini joriy etish korxonalarning ishlab chiqarish samaradorligini oshiradi va xarajatlarni kamaytiradi. Bundan tashqari, ushbu usullar sut mahsulotlarining xalqaro standartlarga muvofiqligi va ularning eksport salohiyatining o'sishiga yordam beradi.

Qozog'istonda sut sanoatini rivojlantirishda chiqindisiz texnologiyalarning keng joriy etilishi barqaror rivojlanish va ekologik xavfsizlikni ta'minlaydi. Ushbu yo'nalishda davlat tomonidan qo'llab-quvvatlash va ilmiy tadqiqotlarni muvofiqlashtirish katta ahamiyatga ega.

Muxtasar qilib aytganda, chiqindisiz texnologiyalar sut sanoatining kelajagini modernizatsiya qilish va ishlab chiqarishning iqtisodiy samaradorligi va ekologik barqarorligini ta'minlash uchun asosdir.

Annotation

The use of waste-free technologies in the dairy industry is an important direction for Kazakhstan from an ecological and economic point of view. These technologies allow to reduce production waste and use resources more efficiently, which reduces environmental damage and increases product quality.

Studies have shown that the introduction of waste-free production technologies increases the production efficiency of enterprises and reduces costs. In addition, these methods contribute to the compliance of dairy products with international standards and the growth of their export potential.

The widespread introduction of waste-free technologies in the development of the dairy industry in Kazakhstan ensures sustainable development and environmental safety. In this direction, it is of great importance to coordinate state support and scientific research.

In short, waste-free technologies are the basis for modernizing the future of the dairy industry and ensuring the economic efficiency and environmental sustainability of production.

Кілт сөздер: *сарысу, пахта, қалдықсыз технологиялар, сүт өңдеу өнеркәсібі, қайта өңдеу*

Kalit so'zlar: *zardob, paxta, chiqindisiz texnologiyalar, sutni qayta ishlash sanoati, qayta ishlash.*

Key words: *whey, cotton, waste-free technologies, dairy processing industry, processing.*

Currently, the issues of environmentally friendly production and resource conservation are relevant in all industries, including the dairy industry. The introduction of waste-free technologies is an innovative solution for reducing, recycling and fully integrating waste into production processes. This article considers the main types of waste-free technologies in the dairy industry and their effectiveness. Currently, the issue of environmentally friendly technologies and efficient use of resources in production sectors in the world is of particular importance. The dairy industry is not an exception to this trend, and work is being carried out to increase labor productivity and reduce environmental damage through the use of waste-free technologies.

The dairy industry is an important branch of agriculture that provides the daily food needs of the population. During the production of cheese, cottage cheese and other dairy products, waste such as whey and cottonseed are formed. The effective use of these wastes ensures that the processing of dairy products is environmentally friendly and economically efficient. By introducing the principles of waste-free technologies, it is possible to reduce waste in production, save resources and reduce the harmful impact on the environment. The dairy industry in Kazakhstan is developing, therefore, the study of technological solutions for the production of new products from whey and cottonseed is relevant. This article considers modern methods of processing whey and cottonseed, their biochemical composition, possibilities of application in production and waste-free production technologies.

Purpose and objectives of the study:

Purpose: To study effective methods of processing whey and cottonseed using waste-free technologies and to identify product types.

Objectives:

- Study of the chemical composition of whey and cottonseed;
- Analysis of processing technologies;
- Assessment of the economic and environmental efficiency of waste-free technologies;
- Consider the possibilities of introducing these technologies into dairy processing in Kazakhstan.

Waste-free technologies are technological solutions that minimize waste generated during production and include effective methods for recycling or complete disposal. This approach allows you to protect the environment and reduce production costs. The study used literature review, production data collection, qualitative and quantitative analysis methods. Standard GOST methods were used to determine the chemical composition. Economic efficiency and environmental impact were assessed through comparative analysis. This study used standard analytical methods to determine the chemical composition of whey and cottonseed. Chemical analyses included the determination of protein, fat, lactose, and dry matter. In addition, qualitative and quantitative studies of vitamins and minerals were conducted.

The study was based on the following methods:

Chemical analysis: the concentration of the main components in whey and cottonseed was determined according to GOST standards.

Measurement of physicochemical indicators: indicators such as lactic acid, pH level, density were monitored.

Comparative analysis: comparison of milk yield and milk composition of Kazakh and Kochim breeds.

Statistical processing: the data obtained were processed using statistical programs, and the reliability of the results was assessed.

These methods ensure the accuracy and objectivity of the data obtained for the study and correspond to the situation in milk production in Kazakhstan.

Zero-waste technologies used in the dairy industry

Waste recycling and utilization

Waste generated in dairy production - milk waste, curd, kefir, water, etc. - is recycled for biogas production, animal feed or as fertilizer.

Energy and water resource conservation

Equipment that saves water and electricity is used in the production process, which reduces production costs and reduces the environmental load.

Automation and digitalization

Automation of production processes increases the ability to control and reduce waste generation.

Advantages of zero-waste technologies

Reducing environmental damage

Increasing production efficiency

Reducing costs

Improving product quality

Sources

Whey is the liquid phase of milk separated during the production of cheese or cottage cheese, containing proteins, minerals and vitamins of high biological value. Its effective processing is an important part of waste-free technologies in the dairy industry.

The study investigated the chemical composition of whey and cottage cheese and the possibilities of their waste-free processing. The analysis was carried out on samples taken from milk processing enterprises in Kazakhstan.

Chemical composition of whey

The analysis showed that the average whey content was:

Protein content - 0.7%

Lactose - 4.8%

Fat - 0.1%

Dry matter - 6.2%

Vitamins (especially C and group B) were determined.

The proteins in whey have a high biological value, lactoferrin, immunoglobulins and other bioactive components were found.

Chemical composition of cottonseed

Cottonseed contains:

Protein - 18.5%

Fat - 12.3%

Dry matter - 25.6%

Water content - 74.4%.

These indicators indicate that cotton is suitable for use as animal feed and organic fertilizer.

Production using waste-free technologies

Based on waste-free technologies, protein concentrates, biogas, animal feed and organic fertilizers were produced from whey and cottonseed. Recycling of production waste reduced the environmental impact of enterprises and increased economic efficiency.

The results of the conducted studies showed that the chemical composition of whey and cottonseed is suitable for productive and environmentally friendly processing in the dairy

industry. The high content of biologically active proteins and lactose in whey increases its nutritional and pharmacological value. These indicators prove the importance of using whey not only as a waste, but as a valuable product. The high protein and fat content of cotton indicates its effectiveness in animal feed. In addition, the conversion of cottonseed into organic fertilizer is an environmentally sustainable method that increases soil fertility and reduces the use of chemical fertilizers in agriculture. The introduction of waste-free technologies significantly reduces the environmental burden of production and increases economic efficiency. The use of these technologies in the dairy industry of Kazakhstan allows to increase the level of recycling of production waste, reduce the harmful impact on the environment, and increase the income of enterprises through the production of additional products.

However, for the widespread introduction of technologies, it is necessary to improve the regulatory framework and infrastructure. It is also important to train enterprise employees in new technologies and stimulate scientific research. In general, the study shows that waste-free processing of whey and cottonseed makes a significant contribution to the sustainable development of the dairy industry and environmental protection. Economic and environmental efficiency. The use of waste-free technologies reduced the costs of enterprises by 15-20%, and the volume of harmful substances to the environment by 30%. These indicators prove the importance of technological modernization in the dairy industry.

The introduction of waste-free technologies in the dairy industry ensures the stability of production, allows for the production of products that meet environmental requirements and increase economic efficiency. For Kazakhstan, this direction plays an important role in increasing the export potential of dairy products. In conclusion, the effective processing of whey and cottonseed is one of the main principles of waste-free production and ensures the environmental and economic sustainability of the dairy industry. During the study, the chemical composition of whey and cottonseed was determined and the possibilities of processing using waste-free technologies were considered. The high biological activity of whey and cottonseed showed that they are suitable for effective use in milk processing. The use of waste-free technologies reduces production waste, reduces the impact on the environment, and also allows for increased economic efficiency. The widespread introduction of whey and cottonseed processing technologies in the dairy industry of Kazakhstan ensures the stability of production and increases the income of enterprises by producing additional types of products. In this regard, the improvement and introduction of methods for waste-free processing of whey and cottonseed is an important direction in solving environmental and economic problems of the dairy industry.

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