

Unveiling The Future of Dairy: Exploring Animal - Free Alternatives

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The dairy industry has undergone a remarkable transformation in recent years. With growing concerns about animal welfare, environmental sustainability, and health, there has been a rising demand for dairy products that do not rely on animal sources. This shift in consumer preferences has paved the way for a new era of dairy: one that explores and embraces animal-free alternatives. Unveiling the future of dairy means delving into the innovative realm of animal-free alternatives that are revolutionizing the way we perceive and consume dairy products. These alternatives, ranging from milk to cheese and yogurt, are crafted without the need for traditional animal-based ingredients. Instead, they harness the power of science and technology to replicate the flavors, textures, and nutritional profiles of traditional dairy, all while minimizing the impact on animals and the environment. These products are often developed using plant-based ingredients such as soy, almonds, oats, or coconuts. These ingredients are carefully selected and processed to create a milk-like base that can be transformed into a variety of dairy substitutes. Through advancements in food science and manufacturing techniques, these alternatives have achieved remarkable resemblance to their conventional counterparts, both in taste and functionality.

These alternatives offer a cruelty-free solution that allows consumers to enjoy the creamy goodness of dairy without compromising their values. Furthermore, these products can be suitable for a wide range of diets, including vegetarian,

vegan, and plant-based lifestyles. Beyond ethical considerations, these alternatives also contribute to environmental sustainability. Many traditional dairy products contain high levels of saturated fats and cholesterol, which can contribute to various health issues such as heart disease. Animal-free alternatives are lower in saturated fats and zero cholesterol, which is a healthier option for individuals seeking to improve their diet and overall well-being. One of the key advantages of these alternatives is their versatility. These products can be seamlessly incorporated into a wide range of recipes and culinary creations. Whether it's a creamy plant-based milk for your morning cereal, a delectable vegan cheese for a pizza topping, or a refreshing dairy-free yogurt for a post-workout snack etc.

Food scientists and researchers are continuously working to enhance the taste, texture, and nutritional profiles ensuring that they not only rival their traditional counterparts but surpass them in certain aspects. This commitment to innovation ensures that consumers can enjoy high-quality, delicious dairy alternatives that meet their dietary needs and preferences. Furthermore, the adoption of these alternatives has significant implications for the global food system. By reducing the reliance on animal agriculture, we can alleviate the strain on resources, mitigate the environmental impact, and promote a more sustainable and resilient food supply chain. This shift towards a more plant-centric approach to dairy production can contribute to a greener future and help address pressing issues such

as deforestation, water scarcity, and biodiversity loss.

Market analysis

The market for dairy products without animal ingredients had a value of USD 24.53 billion in 2021 and is projected to grow at a rate of 10.4% during the forecast period. The constant rise in consumer choice for a vegan diet might be linked to the market revenue growth of animal-free dairy products. Based on Rakuten's 2021 worldwide consumer survey, 81% of those surveyed had tried plant-based milk, 48% had tried various dairy substitutes, 44% had tried vegan meat alternatives, and 25% had tried vegan eggs. NSF surveyed professionals in the food sector worldwide in 2021, and 88% of them said they anticipated a rise in the demand for plant-based products. Another element boosting market revenue growth is the nutritional advantage provided by plant-based dairy substitutes. Due to issues like lactose intolerance and milk allergies brought on by the use of cow's milk, the demand for plant-based alternatives to milk has surged significantly. In response to these demands, the food industry has developed a variety of milk beverages that are advertised as plant-based substitutes.



Source: <https://omdfortheplanet.com/blog/5-reasons-plant-based-milk/>

Application

Animal-Free Dairy and Dairy Products

These innovative alternatives have the potential to make a significant impact in various

industries and sectors. Let's explore some of the key applications of animal-free dairy and how they are transforming different areas:



Food Service and Hospitality Industry: These alternatives have become a staple in the food service and hospitality industries. Restaurants, cafes, and hotels are incorporating these products into their menus to increase demand for plant-based options. From animal-free milk for coffee beverages to vegan cheeses for gourmet dishes, these alternatives offer chefs and culinary professionals a versatile range of ingredients to create delicious, inclusive, and environmentally friendly meals.

Food Manufacturing and Processing: Food manufacturers and processors are utilizing these alternatives in the production of a wide range of dairy-based products. Whether it's vegan ice cream, yogurts, spreads etc, animal-free dairy alternatives provide manufacturers with a way to meet the needs of consumers who are looking for healthier, more sustainable, and cruelty-free options.

Nutritional Supplements and Functional Foods: These products are fortified with essential nutrients, vitamins, and minerals, making them a viable choice for individuals seeking a convenient and sustainable source of nutrition.

Research and Development:

The development is an ongoing area of research and development. Scientists, food technologists, and biotechnologists are continually exploring new methods and technologies to improve the taste, texture, and nutritional profiles. This research contributes to the advancement of food science by offering insights into ingredient formulation, product optimization, and new production techniques that can further enhance the quality and acceptance of animal-free dairy alternatives.

Sustainability Initiatives: Companies and organizations committed to sustainability are actively seeking and promoting these alternatives as part of their eco-friendly practices. These initiatives of animal-free dairy contribute to lower greenhouse gas emissions, reduced water usage, and preservation of natural resources.

International Aid and Food Security: These alternatives have the potential to address global food security challenges. In regions where traditional dairy production is limited or unsustainable, plant-based dairy alternatives offer a viable solution. These alternatives can be produced using locally available plant resources, reducing dependence on imported dairy products, promoting self-sufficiency in food production, improving nutrition, addressing food accessibility and affordability issues in vulnerable populations.

Preparation techniques

Preparation of peanut milk

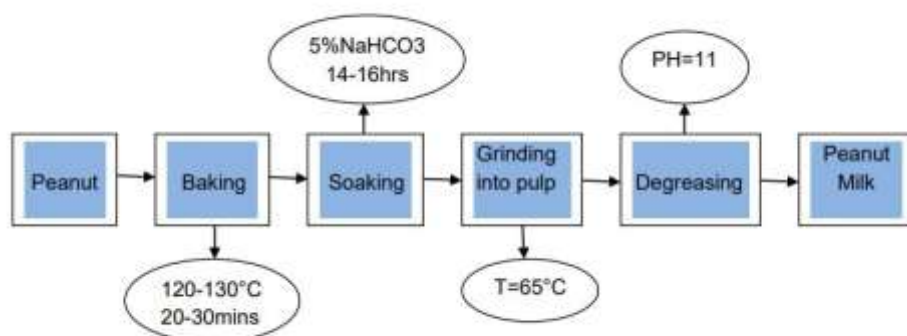


Fig 1: Steps used for preparation of peanut milk

The development of products involves combination of scientific expertise, culinary innovation, and technological advancements. These preparation techniques aim to improve flavors, textures, and nutritional profiles.

Plant-Based Milk Production: The production of plant-based milk involves various techniques, depending on the source ingredient. For example, soy milk is made by soaking and grinding soybeans, followed by straining the mixture to obtain a smooth, creamy liquid. Almond milk, on the other hand, involves blending soaked almonds with water and straining to remove solids.

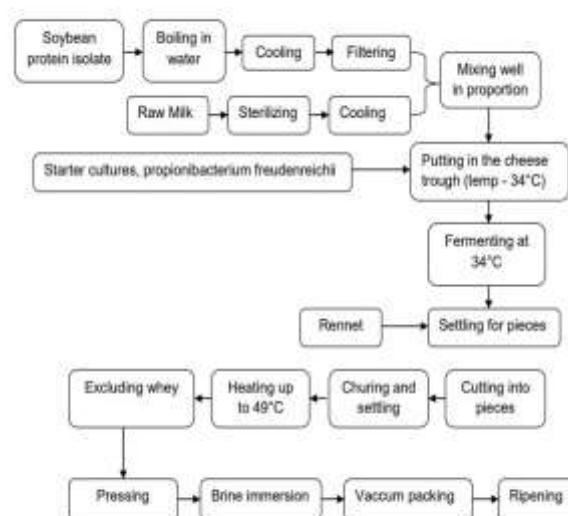


Fig 2: Process flow chart showing the production of mixed soybean cheese

Fermentation and Culturing: These techniques play a crucial role in creating animal-free dairy products with complex flavors and textures. Yogurt can be made by fermenting plant-based milk using specific strains of bacteria. These bacteria convert the sugars in the milk into lactic acid, resulting in the characteristic tanginess and thick consistency of yogurt. Similarly, plant-based cheeses can be crafted using fermentation techniques, allowing for the development of unique flavors and textures reminiscent of traditional dairy cheeses.

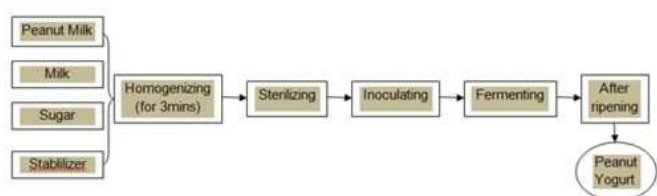


Fig 3: Steps used for preparation of peanut yogurt

Emulsion and Stabilization: These are employed to create stable and creamy textures. Emulsifiers, such as lecithin or gums like xanthan gum or carrageenan, are often added to plant-based milk to prevent separation and improve mouthfeel. These ingredients help to bind fats and water together, resulting in a smooth and cohesive product.

Texture and Mouthfeel Enhancement: These alternatives strive to mimic the texture and mouthfeel of their conventional counterparts. Ingredients like agar-agar, carrageenan, tapioca starch can be added to provide the desired thickness and creaminess. Additionally, blending and homogenization techniques help create smooth and velvety textures in products like plant-based ice cream and yogurts.

Flavor Development: Natural flavorings, such as vanilla extract, cocoa powder, or fruit purees, are commonly used to enhance the taste of plant-based dairy products. Fermentation and aging processes

are employed to develop complex flavors in cultured products.

Nutritional Fortification: These are often fortified with essential nutrients to ensure their nutritional value. Calcium, vitamin D, and vitamin B12 are commonly added to plant-based milk and other dairy substitutes to match or exceed the nutritional content of traditional dairy and provide comparable health benefits to their animal-based counterparts.



Source:

https://www.pinterest.com/pin/436286282661249498/sent/?invite_code=bb1902f4d7b94baf9874c15c02aa3d6b&sfo=1

Advantages of preparation techniques

Healthier Options: These products are often lower in saturated fats and cholesterol compared to traditional dairy products. The preparation techniques allow for the creation of products that are more aligned with health-conscious lifestyles, providing consumers with healthier choices that can contribute to improved cardiovascular health and weight management.

Allergen-Friendly: Products can be suitable for individuals with common food allergies or intolerances. By utilizing plant-based ingredients

and avoiding common allergens like lactose and dairy proteins, these alternatives offer a viable option for those who are lactose intolerant or have dairy allergies.

Environmental Sustainability: Animal-free dairy production has a lower environmental impact compared to traditional dairy production. By reducing the need for animal agriculture, these techniques help conserve natural resources, reduce greenhouse gas emissions, and mitigate deforestation associated with the dairy industry.

Ethical Considerations: The preparation techniques allow for the creation of dairy alternatives without relying on animal exploitation, thereby providing consumers with cruelty-free options that align with their values and ethical beliefs.

Disadvantages of preparation techniques

While animal-free dairy alternatives offer numerous advantages, there are also some challenges and limitations associated with their preparation techniques.

Taste and Texture Variations: Despite significant advancements in preparation techniques, achieving the exact taste and texture of traditional dairy products can still be a challenge. Many animal-free dairy closely resemble their counterparts, some individuals may have subtle differences in taste and mouthfeel.

Ingredient Selection and Processing: The selection and processing of plant-based ingredients can impact the nutritional composition and overall quality of products. Careful consideration and optimization of ingredient choices and processing methods are necessary to ensure that these alternatives offer a well-rounded nutritional profile and desirable sensory characteristics.

Processing Complexity: Some alternatives require more complex processing techniques compared to traditional products. The use of emulsifiers, stabilizers, and fortification processes may involve additional steps and require specific expertise, equipment, and resources. This complexity can impact the scalability and cost-effectiveness of production, especially for small-scale producers.

Market Availability and Accessibility: While animal-free dairy alternatives have gained popularity, they may still be less readily available compared to traditional dairy products in certain regions or establishments. Limited market availability and accessibility can pose challenges for consumers who wish to incorporate these alternatives into their daily lives or rely on them as viable options in various culinary settings.

Conclusion

The idea of "animal-free dairy" has come to light as a potentially effective response to the myriad moral, environmental, and health issues raised by the manufacture of traditional dairy products. Modern scientific techniques, such as cellular agriculture, which includes raising animal cells in a lab setting to make milk and dairy products, are used to create animal-free dairy products. First off, it does away with the necessity for conventional methods of raising animals, which frequently involve cruelty, squalor, and environmental harm. Production of dairy products without the use of animals greatly decreases animal suffering and encourages a more humane approach to food production. Furthermore, dairy products made without animals have the potential to solve issues with traditional dairy consumption that are related to public health. Traditional dairy production is associated with significant greenhouse gas emissions, land and water

usage, and deforestation. Many people find it challenging to consume dairy products because they are lactose intolerant or have dairy allergies. Dairy made without animals offers a practical substitute that is free of allergies and can be adjusted to satisfy particular dietary needs. In summary, the development of dairy products free of animal products is a key step towards a food system that is more moral, sustainable, and diverse. The production and consumption of dairy products could be revolutionized by animal-free dairy by utilizing cutting-edge technologies, providing a prospective substitute that is better for humans, the environment, and animals.

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