

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

**FOOD & BEVERAGE
INDUSTRY**

**ENGINEERING
& DESIGN**

**SCIENCE &
TECHNOLOGY**

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INTRODUCTION TO FERMENTED DAIRY PRODUCTS



Introduction

Milk has been used to produce fermented milk products as far back as 10,000 B.C. in different regions worldwide. The benefits of fermented milk products include enhanced digestibility, new and unique flavours, added probiotics, vitamins and minerals, and preservation products for food that usually has a concise shelf life.

Principle

Fermentation is a metabolic process that produces chemical changes in organic substrates through the action of enzymes. Fermented milk products are created when milk ferments with specific kinds of bacteria called Lactobacilli or Bifidobacteria. In other words, it can also be said that fermentation is partial digestion by bacteria. The fermentation process increases the shelf life of the product while enhancing its taste and improving the digestibility of its milk

How it works?

1. Microorganisms survive using carbohydrates (sugars, such as glucose) for energy and fuel.
2. Organic chemicals like adenosine triphosphate (ATP) deliver that energy to every part of a cell when needed.

1. Microbes generate ATP using respiration. Aerobic respiration, which requires oxygen, is the most efficient way to do that. Aerobic respiration begins with glycolysis, where glucose is converted into pyruvic acid. When there is enough oxygen present, aerobic respiration occurs.
2. Fermentation is similar to anaerobic respiration—the kind that takes place when there isn't enough oxygen present. However, fermentation leads to the production of different organic molecules like lactic acid, which also leads to ATP, unlike respiration, which uses pyruvic acid.
3. Depending upon environmental conditions, individual cells and microbes have the ability to switch between the two different modes of energy production.
4. Organisms commonly obtain energy anaerobically through fermentation, but some systems use sulfate as the electron transport chain's final electron acceptor.

Different Fermented Dairy Products

There are various fermented dairy products in the market. Fermented milk products also known as cultured dairy products are dairy foods which have been fermented by a consortium of lactic acid bacteria (LAB) responsible for the curdling or souring of milk. LAB are best-suited organisms for milk fermentation while preserving the taste and nutritional properties.

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These bacteria are non-sporulated, mostly anaerobic in nature, and can only grow in rich nutritional conditions that provide growth factors like vitamins, amino acids, and nucleotides. Bacterial members associated with fermented dairy products belong to the genera of *Lactobacillus*, *Lactococcus*, *Leuconostoc*, *Pediococcus*, *Bacillus*, *Propionibacterium*, and *Bifidobacterium*.

1. Dahi/Curd:

Dahi is produced by bacterial fermentation of milk. The bacteria used to make dahi are known as "dahi cultures. As per the national standards, the minimum requirement for milk fat is 1.5 per cent for double-toned milk and 3.0 per cent for toned milk. For cow milk, the minimum milk fat requirement is 3.2 %.

2.Shrikhand:

Shrikhand is a semi-solid, sweetish-sour fermented milk product prepared from dahi. It is a popular dessert and a part of the meals on festive occasions, especially in Gujarat and Maharashtra. The product has a shelf life of 40 days under refrigeration at 8°C or below.

3..Buttermilk:

Buttermilk is a popular fermented dairy drink. This can be salted, without salted and/ or spicy variant. It is manufactured by breaking the curd. The product has a shelf life of 7 days at refrigeration temperature (8°C or below) when packed in polyfilm

4..Cheese:

Cheese is a dairy product made from the curds of milk that have been separated from the whey. The curds form a fi

Originally, it can be done by naturally occurring lactic acid bacteria in the milk. However, today dairy industries usually standardize the process by adding domesticated bacterial cultures, including strains of *Lactococcus lactis*, *Streptococcus thermophilus* and *Lactobacillus sp.*



Conclusion

Fermented dairy products are the economical source of many nutrients. Lactic acid is produced by fermentation of lactose which reduces the pH, affects the casein physical properties, and consequently enhances digestibility. It also meliorates usage of calcium and different other minerals and suppresses the development of potentially injurious bacteria. Fermented dairy products include cheese, buttermilk, yoghurt, kefir, etc. Fortunately, lactobacilli, lactic acid bacteria and streptococci are the dominant bacteria in fermented milk that effectively suppress the pathogenic and spoilage micro-organisms.

MODIFIED ATMOSPHERIC PACKAGING



Introduction

Isn't it interesting to know that Injecting a gas increases the product's shelf life and offers extra protection, which prevents the product from discolouration. Usually, a mixture of nitrogen (N₂) and carbon dioxide (CO₂) is used. Dioxygen (O₂) can also be added to this combination. The use of argon (Ar) has been increasing, as this contains the same properties as nitrogen (N₂).

It is the practice of modifying the composition of the food packages' internal atmosphere to improve the shelf life of a product. It is a kind of replacement of air in a pack with a single gas or mixture of gases; where each component's proportion is fixed when the mixture is introduced. No further control is exerted over the initial composition. The gas composition is likely to change with time due to the diffusion of gases into and out of the product.

Need for MAP

Oxygen produces lipid oxidation reactions. It also causes high respiration rates in fruit and vegetables, leading to shortened shelf life. The presence of oxygen encourages the growth of aerobic spoilage microorganism and the potential formation of other unwanted microorganisms may also occur.

By reducing oxygen and replacing it with other gases, we can reduce or delay unwanted reactions. So, to change a package's atmosphere, the oxygen contained within must be reduced or removed. Thus, the MAP process lowers the volume of oxygen contained within the empty space of the packaging containing the product or Oxygen is often replaced with other gases.

Gases used in MAP

1. Oxygen (O₂):

Food deteriorates due to physical, chemical and microbiological factors. For these reasons, in modified atmosphere packaging, oxygen is either excluded or the levels set as low as possible. The exceptions occur where oxygen is needed for fruit and vegetable respiration, colour retention as in red meat, or to avoid anaerobic conditions in whitefish. One of the significant functions of O₂ in MAP meats is to maintain myoglobin in its oxygenated form, oxymyoglobin. This is the form responsible for the bright red colour, which most consumers associate with fresh red meat In MAP, oxygen levels usually are set as low as possible to reduce oxidative deterioration of foods.

2. Carbon dioxide (CO₂):

Carbon dioxide has bacteriostatic and fungistatic properties. There have been many theories regarding how CO₂ exerts its influence on a bacterial cell. These can be summarized as follows-

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- a) Alteration of cell membrane function, including effects on nutrient uptake and absorption.
- b) Direct inhibition of enzymes or decreases in the rate of enzyme reactions.
- c) Penetration of bacterial membranes, leading to intracellular pH changes.
- d) Direct changes to the physio-chemical properties of proteins.

3. Nitrogen (N₂) :

Nitrogen is an inert, tasteless gas, which displays little or no antimicrobial activity on its own. However, because of its low solubility in water and fat, the presence of N₂ in a MAP food can prevent pack collapse. In foods such as nuts, removing oxygen to <1% by nitrogen flushing helps prevent oxidative rancidity of fats. Nitrogen can also indirectly influence the microorganisms in perishable foods by retarding the growth of aerobic spoilage organisms

4. Noble gases :

He, Ne, Ar and Xe are the members of this group. Ar is the main gas used in MAP, it can replace nitrogen to fill in wine bottlenecks before corking, can prevent growth of the microorganism in foodstuff such as broccoli and lettuce.

Modification techniques

1. Gas flushing: During a gas flush process, a harmless gas (usually nitrogen) is actively pumped into the bag before sealing to displace ambient oxygen. This is done to decrease the amount of oxygen inside the package, which will in turn decrease the rate of spoilage, as oxygen is one of the top killers of freshness.

2. Barrier films: Plastic films and foils are used to seal the MAP food packaging. Once Nitrogen or other gas flushes the Oxygen out from the package, the barrier film protects the food from further involvement with Oxygen.



3. On-package valves: One-way valves added to the exterior of packaging are another example of MAP allowing certain gases to escape from the package without allowing any outside gases in. This is often done to release pressure from off-gassing, which is when products release gases or other compounds. Most often used in the coffee industry

4. Scavenger or desiccant packs: Another example of MAP packaging is adding an oxygen scavenger or desiccant pack to the packaging. These small sachet-type packages often contain a mixture of iron powder and ascorbic acid, and sometimes activated carbon. These ingredients act as catalysts or activators, absorbing ambient moisture and oxygen, thereby removing it from the packaging's interior that houses the perishable product.

Conclusion

There are many advantages of MAP in fruit and vegetables, but the most obvious one must be shelf life extension. By decreasing the amount of available oxygen to the produce, the respiration rate and the rate of all metabolic processes are correspondingly decreased. This results in delayed ripening and senescence. Challenges in MAP include the cost of packaging material, storage temperature and specific gas composition for a specific product. Every technology has its own pros and cons, and hence balance has been achieved in such a way that can assure safety and quality.

A close-up photograph of several wine glasses filled with red and white wine, set against a blurred background of more glasses and warm lighting.

INDUSTRY BUZZ

A close-up photograph of several wine glasses filled with red and white wine, set against a blurred background of more glasses and warm lighting.

ProWine Mumbai 2023 is getting ready for a huge event.

ProWine Mumbai, a two-day international business event, is quickly becoming the most prominent gathering place for wine, spirits, and the hospitality sector in India, as well as for wine and spirit connoisseurs. Now available in India, this international platform provides a means for domestic and foreign wine and spirits firms to present their products and brands through live tastings and exhibit displays, facilitating peer-to-peer interaction and industry and consumer engagement.

The event is expected to unite the nation's AlcoBev brands, importers, distributors, wholesalers, and retailers, in addition to foreign brands hoping to break into the Indian market and notable large-scale purchasers such as owners of hotels, restaurants, bars, and wine and spirit enthusiasts.

A facility offering food grains at no cost as part of the Pradhan Mantri Garib Kalyan Anna Yojana

The Central Government is giving food grains to Antyodaya Anna Yojana (AAY) households and Priority Households (PHH) beneficiaries under Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) at no cost for a year starting on January 1, 2023. This is done to relieve the financial burden on the poor beneficiaries and ensure nationwide uniformity and effective implementation of the National Food Security Act (2013).

To guarantee the efficient and consistent implementation of the National Food Security Act of 2013 (One Nation-One Price-One Ration), it was decided to reinforce the provisions of the National Food Security Act, 2013 (NFSA) about accessibility, affordability, and availability of entitled foodgrains for people experiencing poverty.





Paras and the governor of the Brazilian state of Mato Grosso had a bilateral meeting.

Mauro Mendes Ferreira, the governor of Brazil's State of Mato Grosso, met bilaterally with Pashupati Kumar Paras, the minister of food processing industries. Senior Ministry officials and Minhaj Alam, the assistant secretary, attended the meeting. Kenneth Nóbrega, Brazil's ambassador to India, and other top government officials travelled with the governor from Brazil.

The historical relationship that has existed between the two nations for more than 70 years was discussed by both parties. The recent high-level engagements and visits demonstrate both sides' commitment to enhancing bilateral ties, and this momentum has to be maintained and further reinforced. Paras emphasized that our respective countries' prime ministers had highly fruitful conversations outside the G20 and G7 summits.



GBA group invests in Eureka Analytical Services, a food and pharmaceutical testing business

One of India's fastest-growing testing lab and inspection service providers, Eureka Analytical Services Pvt. Ltd., formally joins the GBA group as a member. With this investment, the group enters the Indian market. After making this investment, it will keep looking for chances to spend more in India's food, pharmaceutical, and environmental testing markets. With a 12% annual growth rate, the food TIC market in India is currently valued between Rs 1,800 and 2,000 crore.

It has been offering testing, inspection, and auditing services for the food, pharmaceutical, agricultural, cosmetic, and environmental industries since 2019. The business has quickly established a nationwide network of nine labs, five of which have received full accreditation. It intends to have 15 labs in India and abroad in the next two years.



A mouthwatering legacy: Kashmiri food

The JW Marriott New Delhi is pleased to host "A Flavourful Heritage: The Cuisine of Kashmir" at K3 - New Delhi's Food Theatre. Enjoy the delectable flavours of Kashmir without ever leaving the city. Enjoy a 10-day culinary experience by chefs Rahul Wali and Sunil Mattoo through November 26. The exquisite JW Marriott ambience will complement each mouthful as you discover the rich tapestry of Kashmiri cuisine.

Taste the delicious Kabargah and Nadru Kebab to relish the wonderful Delhi Autumn. Vegans will love the rich, creamy Chaman Qaliya, delicious Dum Aloo, and filling Haakh, and meat lovers will love the soft Rogan Josh, flavorful Chicken Yakhni, and juicy Muji Gaad. The tempting menu also features fragrant Subuz Pulao, Muji Chetin, and Doyn Chetin to go with these delicacies.

WEEKS HIGHLIGHT

NON-TECHNICAL CONTENT



18 NOVEMBER

NATIONAL NATUROPATHY DAY

Union AYUSH Ministry celebrated the first Naturopathy Day in 2018 with aim of promoting drug-less system of medicine to prevent diseases by altering diet and lifestyle. The National Naturopathy Day is observed in India on 18 November every year, to promote positive mental and physical health through Naturopathy.



19 NOVEMBER

INTERNATIONAL MEN'S DAY

International Men's Day is observed on November 19th every year. It aims to raise awareness about men's health, promote gender equality, celebrate positive male role models, and highlight issues that affect men's well-being. It's an opportunity to address challenges men face, such as mental health stigma, societal expectations, and gender-based violence.

NOVEMBER



21 NOVEMBER

WORLD FISHERIES DAY

World Fisheries Day, celebrated on November 21, is dedicated to highlight the critical importance of healthy ocean ecosystems and to ensure sustainable stocks of fisheries in the world. The day also explores finding solutions to the increasingly interconnected problems that the world is facing to follow sustainable models of our ocean ecosystems.



21 NOVEMBER

WORLD TELEVISION DAY

November 21 is declared as World Television Day by the UN to recognise televisions as having an increased impact on decision making and being an ambassador for the entertainment industry. Television is a symbol of communication and globalization that educates, informs, entertains and influences our decisions and opinions.

DID YOU KNOW?



Fact 1

Edible fat and oil machines play a pivotal role in modern food production, efficiently extracting oils from various sources like seeds and nuts. These machines employ advanced technology, ensuring precision in processing, extraction, and purification. From solvent extraction to mechanical pressing, these systems contribute to the production of high-quality edible oils, meeting global demands while maintaining nutritional integrity. Their versatility and automation enhance productivity, making them indispensable in the edible oil industry.

WAFFLE PRODUCTION MACHINES INCL. ICE CREAM



1/3

Waffle production machines are specialized equipment used to make waffles.

These machines typically consist of two hinged metal plates with a honeycomb-like pattern on the surface that encounters the batter. The plates are heated, and the batter is poured onto one plate, which is then closed onto the other plate, allowing the batter to cook and form the characteristic waffle shape.

- Waffle production machines may also include features such as temperature controls, adjustable cooking times, and non-stick coatings for easier cleaning.

- Used to produce waffles of different shapes and sizes, which can be consumed plain or with toppings such as ice cream, chocolate syrup, fruits, and whipped cream.



2/3

Market Scope

- The market for waffle production machines is highly competitive, with many manufacturers offering a wide range of products to meet the diverse needs of the food industry.
- North America and Europe are currently the largest markets for waffle production machines, due to the popularity of waffles and other breakfast items in these regions.
- The major Key players in the global market for waffle production machines include *Murni Machinery Sdn Bhd*, *Guangzhou New Power Catering Equipment Manufacturing Co., Ltd.*, *GELGOOG*, and *Guangzhou Shinelong Kitchen Equipment Co., Ltd.*, among others.



3/3

Fact 2

Waffle production machines, equipped with advanced technology, effortlessly create golden, crispy waffles with uniform texture. These versatile machines streamline the production process, ensuring consistency in size and taste. Some models even integrate features for crafting delectable waffle cones, enhancing their appeal for ice cream pairing. With user-friendly controls and efficient output, these machines elevate the art of waffle-making, delivering a delightful experience for both producers and consumers.

MEAT GRINDERS

1/3

Meat grinder, also known as a meat mincer, is a kitchen appliance that is used to grind meat into small, uniform pieces. The meat is typically fed into the grinder through a hopper, where it is then ground by a series of rotating blades or a screw mechanism.

- Meat grinders come in a range of sizes and styles, from small manual models for home use to large industrial machines used in commercial meat processing.
- Used to grind a wide variety of meats, including beef, pork, chicken, and lamb, as well as game meats like venison and elk.

2/3

Used for

1. Ground meat

Used to grind meat for recipes like burgers, sausages, meatballs, and meatloaf. This includes beef, pork, chicken, lamb, and game meats like venison.

2. Sausages

Used to grind meat and mix it with spices and other ingredients to make homemade sausages.

3. Pâtés and terrines

Used to grind the meat into a fine texture, which is then mixed with other ingredients to make pâtés and terrines.

4. Baby Pet food

Used to process cooked meat into a smooth puree for use in baby & pet food.

5. Vegetables

Used to process vegetables, such as carrots, onions, and celery, for use in recipes like meatloaf.

3/3

Fact 3

Meat grinders, essential kitchen tools, simplify food preparation by effortlessly transforming raw meat into customized textures. These versatile devices offer control over grind size, enabling culinary creativity from fine minces to hearty coarseness. With diverse attachments, they cater to various culinary needs, ensuring freshness and quality in every minced creation. Compact, efficient, and user-friendly, meat grinders redefine home cooking, making the process efficient and enjoyable.

BONE TRIMMING & CLEANING EQUIPMENT

1/3

Bone trimming/cleaning equipment is a type of food processing equipment that is designed to remove bones and clean meat products. The equipment is typically used in meat processing plants and is essential in the preparation of boneless meat products.

Used to

1. Ground beef

remove bone fragments and other unwanted materials from ground beef, resulting in a smoother and more consistent product.

2. Chicken breasts

trim excess fat and cartilage from beef and pork ribs, resulting in more visually appealing and easier to cook rib products.

3. Pork chops

Remove bones and excess fat from pork chops, resulting in leaner and more attractive meat products.

4. Beef and pork ribs

Remove bones and cartilage from chicken breasts, resulting in boneless chicken breasts that are easier to cook and serve.

2/3

Market Scope

- The global market for bone trimming/cleaning equipment is driven by the increasing demand for processed meat products, particularly boneless meat products.
- Geographically, the Asia-Pacific region is expected to witness significant growth in the bone trimming/cleaning equipment market due to the increasing demand for processed meat products in countries such as China and India.
- The major key players in the bone trimming/cleaning equipment market include Marel, Baader Group, Bettcher Industries, CTB Inc., and Prime Equipment Group.

3/3

Fact 4

Bone trimming and cleaning equipment plays a vital role in the meat processing industry, ensuring efficiency and precision. These specialized machines remove excess bone and unwanted tissues from meat cuts, enhancing product quality and minimizing waste. With advanced technology, these tools streamline production, maintain hygiene standards, and contribute to the overall safety and effectiveness of meat processing operations, meeting the rigorous demands of modern food processing facilities.

POWDERED FAT PRODUCTION PLANTS



1/3

Powdered fat production plants are facilities that specialize in the production of powdered fats, which are used in a variety of applications such as food production, animal feed, and cosmetics. Powdered fats are made by spray-drying liquid fats, such as vegetable oils, into a dry powder form.

Packaging formats

1. Bags

Made of various materials such as paper, plastic, or woven polypropylene. Bag sizes can vary from small 5kg bags to larger bulk bags of 500kg or more.



2. Drums

Made of metal or plastic. Drum sizes can vary from small 25kg drums to larger 200kg drums.



3. Bulk tanker trucks

Shipped in bulk tanker trucks which can hold several tonnes of product.



4. Custom packaging

To meet their specific needs, such as pre-measured pouches or containers with specific labeling requirements.

2/3

Equipment Used

1. Emulsification equipment

Liquid fats are first mixed with emulsifiers and water to create a stable emulsion.

2. Spray-drying equipment

The emulsion is then fed into a spray-drying tower where it is atomized and dried to create a fine powder.

3. Powder handling equipment

Includes conveyors, storage silos, and bagging machines.

4. Quality control equipment

Use a range of quality control equipment to ensure the powder meets the required specifications.

5. Utility equipment

Require various utility equipment such as boilers, chillers, compressed air systems, and waste treatment systems.

3/3

Fact 5

Powdered fat production plants play a crucial role in the food industry, efficiently transforming liquid fats into a convenient powdered form. Utilizing advanced technologies, these plants ensure precise control over the production process, resulting in consistent quality and improved shelf stability. The powdered fat produced serves as a versatile ingredient, enhancing the texture and flavor of a wide range of food products, meeting consumer demands for convenience and innovation in the culinary landscape.



PMG ENGINEERING

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