

TECH-KNOWLEDGE

The Official PMG Engineering Newsletter

**FOOD & BEVERAGE
INDUSTRY**

**ENGINEERING
& DESIGN**

**SCIENCE &
TECHNOLOGY**

CONTENTS



1. WHITE PAPER

- A. Squash Manufacturing Process
- B. Curd Manufacturing Process

2-5

2. INDUSTRY BUZZ

Latest Food Industry News Updates

6-7



3. WEEKS HIGHLIGHT

A Look Into The Main Events Of The Week

8

4. DID YOU KNOW?

Fascinating Food Facts To Expand Knowledge

9-12



PROCESSING OF SQUASHES



Introduction

Among the various activities, which are termed agriculturally based, fruits and vegetable processing are the most important. Over recent years, consumers have shown an increasing interest in health and wellbeing, with many wanting food and drink products that are healthy and nutritious yet fit in with busy lifestyles. Fruit Squashes is one beverage that has seen a dramatic increase in consumer demand, especially in summers. So let's find out what is it and how is it processed.

Definition of Squash:

Squash is a non-alcoholic concentrated syrup that is usually fruit-flavoured and usually made from fruit juice, water, sugar, or a sugar substitute. Some traditional squashes may contain herbal extracts, most notably elderflower and ginger. Squash must be mixed with a certain amount of water before drinking. Citrus fruits (particularly orange, lime and lemon) or a blend of fruits and berries are commonly used as the base of Squash. As per FSSAI specifications, the Squash should contain no less than 25 per cent fruit content in the finished product, and the total soluble solids content should not be less than 40° Brix. The acidity of the Squash should not be more than 3.5 per cent as anhydrous citric acid.

Processing:

1.Selection of fruit: Ripe fruits are selected. Overripe and unripe fruits adversely affect the quality of the juice.

2.Washing: Dirt and spray residues of arsenic, lead etc., are removed by washing with water or using dilute hydrochloric (HCl) acid solution (0.5%) followed by washing in water.

3.Sorting and grading: Send the fruits to the grading and sorting table/machine to manually check the uniformity of ripened fruits.

4.Peeling/deseeding/destoning: As per the fruits selected, it is sent for peeling, de-seeding and destoning process (removal of seeds).

5.Cutting/slicing/crushing: Conduct the slicing operation of the peeled fruit using a slicer and send it to the crusher.

6.Pasteurization: Once the juice is extracted, it is sent for pasteurization at 80-95°C for 10-12 mins. 1.Three types of pasteurizer are generally used for juices plate pasteurizer, tubular pasteurizer and steam pasteurizer, and plate pasteurizer is the most prevalent.

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Plate Heat Exchanger working:

These plates are commonly made of steel, aluminium alloy, titanium, nickel, or even graphite materials and are the thermally conductive pathways between the two working fluids. Their corrugations increase surface area and create turbulence, both of which help enhance the heat transfer rate through the exchanger.

7.Clarification: Rapid methods such as centrifugation(with a speed of 6000 to 6500 RPM. and filtration can produce a clear juice. A continuous or a decanting centrifuge with automatic desludging to produce a clear or nearly clear juice is quite effective. Ultraclarifier can also be used.

8.Syrup preparation: Simultaneously, sugar, water and acid is mixed and heated to dissolve to form a syrup.

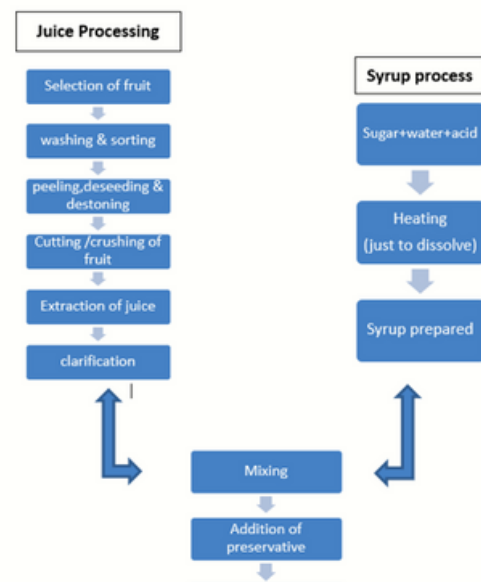
9.Mixing: Syrup and clarified juice are mixed in a tank.

10.Addition of preservative: Sodium benzoate or KMS is generally used.1.0gm/lit is used in case of Sodium benzoate.

11.Cooling: The product is cooled to room temperature.

12.Deaeration: Freshly extracted juice contains appreciable quantity of oxygen which may affect the quality of juice if not removed before packing

13.Bottling and capping: Aseptic processing and packaging is done which are defined as- when a commercially sterile product is packed into a pre-sterilized container in a sterile environment.



Conclusion

Squash is a diluted fruit juice. Among all beverages, Squash is quite popular all over the world. It consists of strained juice containing moderate fruit pulp quantities (optional) to which sugar is added for sweetening. Acid is added to lower the pH, which arrests microorganisms responsible for spoilage of the product. The acid, in combination with sugar, also improves the taste of sugar. Sulphur dioxide (SO₂) is also used as a preservative to prevent non-enzymatic browning reaction.

CURD PROCESSING- AN INSIGHT



Introduction

Most common as well as traditional dairy based product, Curd, locally known as Dahi, is consumed widely all over the world. Curd falls under the category of fermented dairy product, produced from heat treated milk after inoculation with certain Lactic Acid Bacteria (LAB) in the form of starter culture. Lactic acid bacteria multiply, grow and produce lactic acid, acetic acid, and carbon dioxide by utilizing available lactose in milk. Some bacteria use citric acid of milk to produce certain volatile organic compounds mainly diacetyl, which is mainly responsible for flavor of Dahi.

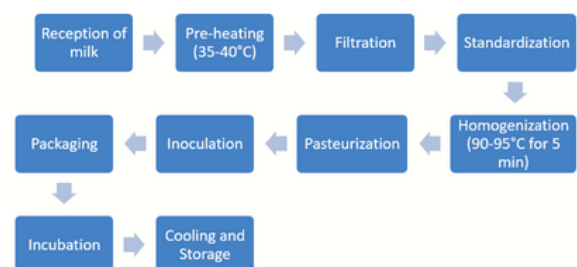
Due to its rich nutritional profile and high consumer demand, it is commercially produced to meet the market demands. A new revolution in the industrial manufacturing of Dahi is using Dahi as functional food.

Principle behind Curd Production

Curd has live cultures and the lactose in the milk is converted to lactic acid by the action of starter cultures and the lactic acid act as preservative for the milk and the low pH (4.5- 5.0) also inhibit the growth of harmful micro-organism, thus increasing the shelf life of the product.

Dahi is manufactured using single or mixed cultures, *Lactococcus cremoris*, *Lactococcus diacetylactis*, along with *Leuconostoc* species, *Lactococcus lactis*, a combination of acid and flavor producing bacteria. These bacteria are responsible for imparting firm body, sweetness, and a mild acidic flavor to the Dahi increasing its acceptability to the consumer.

Process Flow chart of Curd:



Curd Processing Steps

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1.Reception of milk: Fresh, good quality milk is received and analyzed for SNF and fat%.

2.Pre-heating: Done at 30-40°C

3.Standardization: 2.5% to 3.0% fat and 10% solids not fat.

4.Preheating (Optional): It is an optional step to heat milk up to 60°C

5.Homogenization: Milk is subjected to high pressure pump forcing milk through extremely small orifice for even distribution of fat globules. Homogenization reduces the cream layer formation during incubation and single-stage Homogenizer, or double stage homogenizer can be used as per process requirement.

6.Pasteurization: Milk is heated to 85-90°C for 15-30 minutes and temperature brought down to 3-4°C.

7.Pre-heating: Pasteurized milk is preheated to 40-45°C and transferred to inoculation tank.

8.Inoculation: Milk is inoculated with 1-2% of specific curd starter culture at 37°C. The incubation tanks are insulated, to ensure that the temperature remains constant during the incubation period. The tanks can be fitted with pH meters to check the development of acidity (4.2 – 4.5)

9.Packaging: The inoculated milk is then packaged in separate cups with lids. Dahi is generally packaged in polyethylene, polypropylene, polystyrene packaging material and plastic cups.

10.Incubation: Cups are arranged in crates which are then transferred to hot room (37°C) while the fermentation process proceeds. In case of set curd, incubation is done when the product is in its final retail container at 30-42°C for around 4-5 hours, while for stirred types of products it can be done within the inoculum/incubation tank and then packed in pouches.

11.Cooling: The pH of the milk in the cups should be regularly checked and when it reaches 4.4-4.5, these crates are transferred to room with temperature 3-4°C for proper setting

12.Storage: It is stored in the cold store below 6°C



INDUSTRY BUZZ



By JANE DOE

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PMFME approved 76 incubation centres for Rs 205.95 cr, Parliament was informed.

The Pradhan Mantri Formalization of Micro Food Processing Enterprises (PMFME) Scheme, which runs through December 2023, has authorized 76 Incubation Centers across 25 States and UTs with an investment of Rs. 205.95 crore, according to a statement made to Parliament by the Ministry of Food Processing Industries (MoFPI).

Four of these 76 Incubation Centers have been put into service, according to MoFPI.

The ministry added that 54,767 beneficiaries—individuals and businesses—have participated in capacity-building programs to date, including 526 Master Trainers, 1058 District Level Trainers, 1941 District Resource Persons, and 54,767 beneficiaries overall.

Mumbai's HRAWI hosts the FSSAI's most recent FoSTaC program.

The Food Safety and Standards Authority of India's (FSSAI) most recent Food Safety Supervisor Training in Advance Catering (FoSTaC) session was hosted by the Hotel and Restaurant Association (Western India) - HRAWI on December 14 at the Pritam Da Dhaba in Mumbai. Thirty-nine hotel industry specialists attended the workshop to expand their knowledge and guarantee perfect safety standards in their facilities.

The FSSAI's FoSTaC training programs aim to provide professionals with the fundamental information and abilities needed to guarantee safe and healthful food practices in their enterprises.

This thought-provoking training session was jointly inaugurated by Himanshu Chauhan, assistant secretary general of HRAWI, Dr Pasupathy from Parikshan, and Raosaheb Shinde, banquet manager of Pritam Da Dhaba.





The centre instructs associations in the rice industry to guarantee lower retail prices.

Sanjeev Chopra, secretary of the Department of Food and Public Distribution, called a meeting with top members of the rice processing business in New Delhi to discuss the domestic price scenario of non-basmati rice.

Despite a good crop in Kharif, ample supplies with FCI in the pipeline, and many regulations on rice exports, it was discussed in the meeting that domestic rice prices are rising. The rice sector must ensure that attempts at profiteering are appropriately dealt with and that prices in the domestic market are lowered to optimal levels. It is concerning that the rice annual inflation rate, which has been 12% for the previous two years, is rising with time.



ICBA unveils the Women Alliance for Climate Action in agriculture.

On the Gender Day of COP28, the Women Alliance for Climate Action in Agriculture (WACAA) was officially launched, according to the International Center for Biosaline Agriculture (ICBA).

Mariam bint Mohammed Almheiri, UAE Minister of Climate Change and Environment, attended the official high-level event at the UAE Pavilion, Blue Zone, at Expo City Dubai, which was led by Razan Khalifa Al Mubarak, UN Climate Change High-Level Champion for COP28 and chair of ICBA's board of directors.

Acknowledging women's critical role in agriculture in poor nations, WACAA seeks to enhance and facilitate their participation in climate action within the industry.



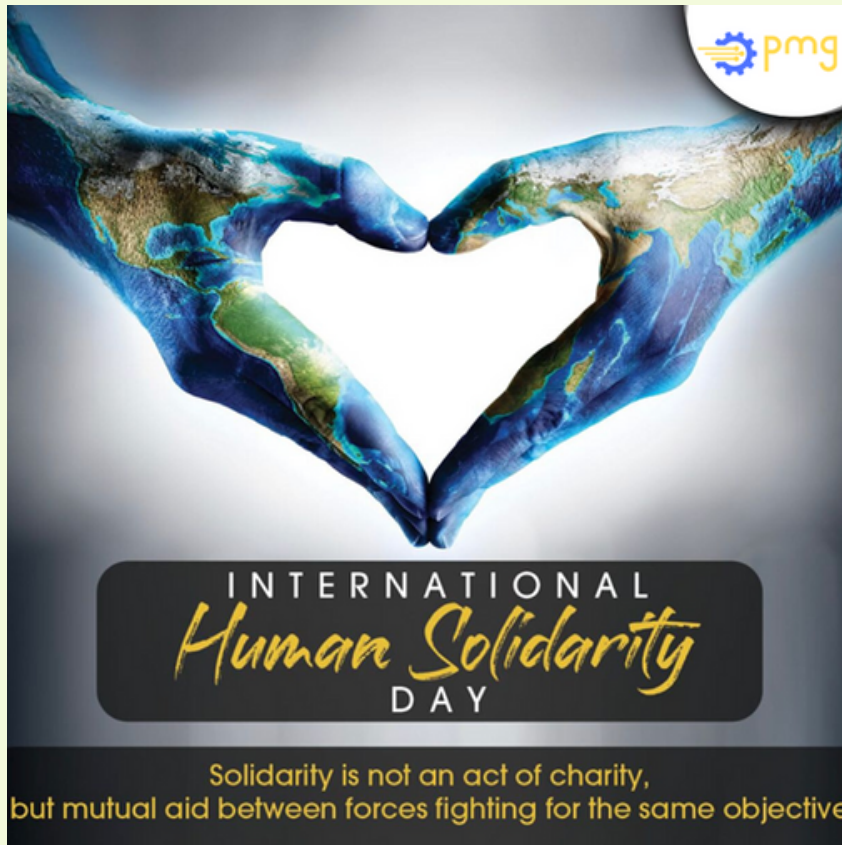
Kamble received recognition for his exceptional contributions to food safety with the FSSAI Award.

The prestigious AFSTI-FSSAI Award 2023 has been given to Dr. Umesh Kamble of F2F Corporate Consultants Private Limited to appreciate his outstanding contributions to food safety. The award was given in recognition of Dr Kamble's exceptional achievements in raising food safety standards in India at the 9th International Food Congress (IFCoN) in Mysuru.

Since joining FSSAI-FOSTAC as a nationwide training partner in 2018 and as an Advanced Manufacturing Trainer, Dr. Kamble has been the driving force behind successful food safety projects. Over 8,000 Food Safety Supervisors from various industries have been successfully certified by him and his team at F2F Corporate Consultants Private Limited through delivering more than 150 engaging in-person and virtual training sessions. The national food safety standards have greatly benefited from these workshops, which have improved food safety procedures and knowledge.

WEEKS HIGHLIGHT

NON-TECHNICAL CONTENT



20 DECEMBER

INTERNATIONAL HUMAN SOLIDARITY DAY

International Human Solidarity Day is annually held on December 20 to celebrate unity in diversity. It also aims to remind people on the importance of solidarity in working towards eradicating poverty.

DECEMBER

DID YOU KNOW?



Muesli (also spelled müsli) is a type of breakfast cereal that typically consists of rolled oats, nuts, seeds, dried fruits, and sometimes grains like wheat or barley. It was originally developed in Switzerland in the early 20th century by a physician named Maximilian Bircher-Benner as a healthy, nutritious food for his patients.

Steps

- **Ingredient selection**
Selected based on their quality, freshness, and nutritional content.
- **Blending**
Blended in large batches to create the desired mix of textures and flavors.
- **Packaging**
Packaged in airtight containers, such as bags, boxes, or canisters, and labeled with product information and nutritional content.
- **Quality control**
Product undergoes strict measures to meet food safety and quality standards.

Market Scope

- The global muesli market was valued at USD 1.5 billion in 2020 and is expected to grow at a compound annual growth rate (CAGR) of 3.9% from 2021 to 2028.
- Europe is currently the largest market for muesli, with Germany, Switzerland, and the UK being the top consumers.

The major players in the Market for Muesli are as follows:

Kellogg Company
Nestle SA
The Jordans & Ryvita Company
Dr. August Oetker KG
Weetabix Limited
Seven Sundays LLC
Dorset Cereals Ltd.



Fact 1

Muesli, a versatile and nutritious breakfast option, combines rolled oats, nuts, seeds, and dried fruits to create a wholesome and satisfying meal. Packed with fiber, vitamins, and minerals, muesli promotes heart health, aids digestion, and provides sustained energy throughout the day. Its customizable nature allows individuals to tailor their breakfast experience, making it a delicious and convenient choice for those seeking a balanced and nourishing start to their mornings.

GRAINS

1/3

Grains are the edible seeds of cereal crops that are cultivated for food. They are a staple food in many parts of the world and are used in various dishes, from bread and pasta to breakfast cereals and snack bars.

Types

- 1. Wheat**
Used to make bread, pasta, and other baked goods.
- 2. Rice**
Used in many cuisines worldwide, including Asian and Latin American dishes.
- 3. Corn**
Used to make tortillas, polenta, cornmeal, and other products.
- 4. Oats**
Used to make oatmeal, granola, and other breakfast cereals.
- 5. Barley**
Used to make beer, whiskey, soups, and stews.

2/3

Market Scope

- The global grain market is expected to grow steadily in the coming years due to several factors, including population growth, increasing urbanization, and changing dietary habits.
- The grain market is also driven by the increasing demand for convenience and ready-to-eat food products.
- Some of the major players in the market include Archer Daniels Midland Company, Cargill, Inc., Bunge Limited, Louis Dreyfus Company B.V., Glencore plc, The Andersons, Inc., CHS Inc., General Mills, Inc., Kellogg Company, and Nestle S.A.

Fact 2

Grains, essential staples in global diets, encompass diverse cereals like rice, wheat, and oats, serving as primary sources of energy, fiber, and vital nutrients. Their cultivation, deeply rooted in agricultural history, sustains civilizations and fuels culinary traditions worldwide. From hearty whole grains to refined flours, grains play a pivotal role in promoting nutrition, supporting food security, and contributing to the rich tapestry of cultural gastronomy across the globe.

3/3

WINDING MACHINES CONE

1/3

Winding machines and cones are used in the textile industry to wind yarn or thread onto cones or bobbins for use in weaving or knitting. A cone is a spool-like object that holds the wound yarn and is used in textile production machines like weaving looms or knitting machines.

Uses

- Used in the production of ice cream, where they help to shape the ice cream into cones or cups.
- Used for shaping other types of frozen desserts, such as frozen yogurt or sorbet.
- Used for winding ice cream cones. The cones are fed into the machine and rotated while a nozzle dispenses the ice cream into the cone.
- Used in the production of other food products such as cotton candy and candy floss.



2/3

Market Scope

- The market is driven by the increasing demand for automatic and semi-automatic winding machines and cones, which can help manufacturers increase their production efficiency and reduce labour costs.
- The Asia-Pacific region is expected to dominate the market for winding machines and cones, driven by the increasing demand for ice cream and bakery products in countries such as China, India, and Japan.
- Europe and North America are also significant markets for winding machines and cones due to the high consumption of bakery products and ice cream in these regions.

3/3

Fact 3

Winding machines, specifically designed for the food industry, play a crucial role in the efficient production of conical shapes, such as ice cream cones. These specialized machines ensure precision and consistency in winding the paper or wafer material, resulting in uniform and high-quality cone production. With automated processes and customizable settings, these winding machines enhance productivity, reduce manual labor, and contribute to the overall efficiency of food manufacturing in the confectionery sector.

MEAT SEPARATORS EQUIPMENT FOR WINNOWING OF MEAT



Meat separators or equipment for winnowing of meat are devices used to separate meat from bone, gristle, and other unwanted materials. They work by using centrifugal force to separate the meat from the other parts.

Types

1. Continuous separators

Used a continuous feed system to separate meat from the bone. The meat is fed into the separator, where it is subjected to centrifugal force, which separates the meat from the bone.

2. Batch separators

Loaded into the separator, and the machine is then activated to separate the meat from the bone.

3. Manual separators

Used to separate meat from the bone. They work by manually applying pressure to the meat to separate it from the bone.



Used For

1. Beef

Used to separate beef meat from bones, tendons, and other unwanted materials, which is then used for making ground beef, beef patties, sausages, and other beef-based products.

2. Pork

Used to separate pork meat from bones, tendons, and other unwanted materials, which is then used for making ground pork, pork patties, sausages, and other pork-based products.

3. Chicken

Used in the chicken processing industry to separate meat from bones, which is then used for making ground chicken, chicken nuggets, chicken burgers, and other chicken-based products.

4. Fish

Used to separate fish meat from bones, which is then used for making fish cakes, fish burgers, and other fish-based products.



Fact 24

Meat separators are essential equipment in the food processing industry, specializing in the efficient winnowing of meat from bones, ensuring optimal yield and quality. Employing advanced technology, these devices streamline production processes, enhancing overall efficiency while maintaining hygiene standards. With their precision and speed, meat separators contribute to cost-effective operations, making them indispensable tools for meat processing facilities seeking to maximize productivity and deliver top-notch products to consumers.



PMG ENGINEERING

About PMG

Delivering End-to-End Engineering
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Meeting Global Benchmarks

In ENGINEERING DESIGN and PROJECT MANAGEMENT
for FOOD and BEVERAGE Industry with SINGLE POINT ACCOUNTABILITY

Process Engineering | Project Management | Mechanical | Electrical | Automation | Food Safety

PEOPLE DELIVERING RESULTS

Safe-by-choice. First Time Quality. Maximize Value. Objectivity.
Ownership. Reliable and Trustworthy Business.

- MAKING CUSTOMERS THE INDUSTRY LEADERS
- ENGINEERING MUST CREATE BUSINESS VALUE
- MEET THE EXPECTATIONS OF ALL STAKEHOLDERS
- OPTIMAL ENGINEERING

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