

Paneer - The Synonym of Taste in Indian Cuisine

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Introduction

Paneer is an integral part of the rich Indian food culture. It is an essential source of high-quality protein, fat, minerals and vitamins. It contains 53-55% moisture, 23-26% Fat, 17-18% Protein, 2-2.5% carbohydrates and 1.5-2% minerals. Good quality paneer is characterized by a marble white colour, sweet, mildly acid taste, nutty flavour, spongy body and closely knit, smooth texture.

Paneer is used in a variety of forms in culinary dishes as an integral ingredient for ethnic Indian cuisine like *Matar Paneer*, *Palak Paneer*, *Salads* and many more. The ability of paneer to be deep fried without losing its shape is one feature that has enabled its multiple usage as an ingredient for making *pakoras* and fried paneer chunks.

Paneer is manufactured by the traditional method involving lot of human interaction right from receiving of milk to the finished product. This method calls for special skills which are exhaustive, like manual acid coagulation, keen monitoring, collection of coagulated curd in muslin cloth for whey removal and pressing done by putting weight on compacting.

Hygienic Paneer Production: Traditional vs Automated

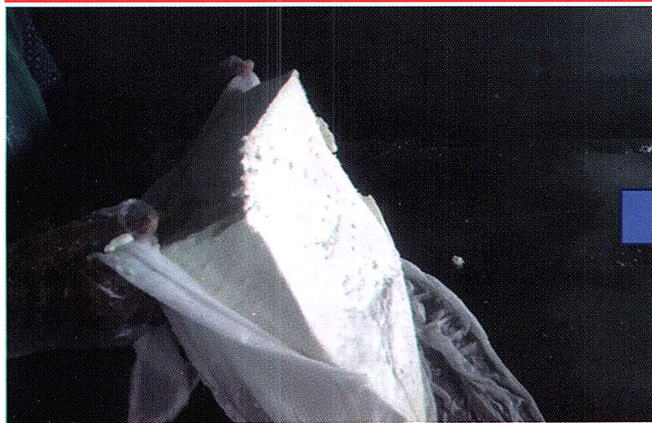
At industrial scale, manufacturing challenges like excessive human interaction, huge labour requirement

and manual method of manufacturing makes it a tricky product. It is difficult to maintain hygiene with manual process during mass production and this leads to higher bacterial load shortening the shelf-life of product. Due to these challenges, Paneer is manufactured in small scale by sweet shops and sold in open format within local area. And no other big dairy brand is so successful in large scale production and marketing of Paneer.

For assuring high quality of value-added dairy products automation and instrumentation have become an important component of today's dairy industry. Hygienic design of plant with latest automation is essential requirement for value added dairy products. Amul Dairy is the leader in technology innovations in milk processing sector and has always been committed on delivering best quality of hygienic dairy products to customers all over India and abroad.

Paneer has been the focus product for Amul Dairy for the last 10 years. Amul Dairy made a humble start in this domain by setting-up a manual Paneer Plant initially. We faced many challenges like availability of expert manpower for optimal coagulation, inconsistent product quality, high losses in overall yield and short shelf-life. Due to the manual process, it was very difficult to get required yield of 16 to 17%, thus resulting into losses. Amul was focused for setting-up New generation Automatic

Traditional Paneer Making Requires Hand Touch at Many Places



Use of Muslin Cloth



Paneer in Deformed Shape and Body

Indian cuisine is marked by a rich and balanced combination of nutrients and Paneer is an integral part of it. It not only provides high protein, fairly high fat, minerals like Calcium and phosphorous, but also has been enriching recipe with its significant taste and texture since centuries. It is also a good source of fat-soluble vitamins A and D, thus making it a highly nutritive product. The fully automated Paneer plant enhances the yield, improves quality, softness and shelf-life by maintaining hygiene, reducing labour, process time and cost and it allows precise control of process parameters. Use of antimicrobials and natural antioxidants and vacuum packaging of paneer in thermoforming pouches has reasonably increased its shelf life and facilitated wide distribution and marketing of product.

Traditional Paneer Manufacturing at Large Scale



Paneer Manufacturing Plants to bring top quality paneer with best hygiene to the customers.

In year 2010, Amul Dairy came with the set-up of automated Paneer manufacturing line with technology imported from western countries at Dr. Kurien Cheese Plant, Khatraj. The European technology is made for the varieties of cheese and paneer is treated as a cottage cheese and hence they provided similar production lines

for Paneer. Paneer being a very different product all together, they could not produce right quality of Paneer with desired characteristics and overall yield due to the higher volume of coagulation vat, different technology of paneer cutting after settling and improper pressing technology. The moisture content of final product was not increasing more than 48% affecting the viability of plant. After three years of operation, Amul Dairy modified

**Automatic
Imported
Paneer Line
Established in
Year 2010**



Coagulation VAT



UFP unit & Pressing Line



Pressing Unit



Washing Unit

the design of paneer block cooling with indigenous dip cooling system which includes various size fine filtration of circulating water as well as the bacteria filter of 0.2 micron. The modification resulted into the quick cooling as well as the moisture gain up to 52% in final product. Still there was lack of proper technology in this area.

That's when Amul Dairy took 'Vocal-for-Local' approach and selected an Indian Company who are in to dairy process automation as its implementation partner for setting up cost effective, indigenous fully automated paneer manufacturing line.

Amul Dairy started working on this ambitious project for day and night with the single aim to make authentic, nutritious, top quality Paneer without hand touch. This innovation took more than 1.5 years for the brainstorming and trials. It took many rounds of trials and testing before succeeding in making the desired quality of Paneer by state-of-the-art Fully Automated Indigenous Paneer Manufacturing facility at Amul Virar Dairy, Mumbai.

New Plant is controlled through Central PLC system and operated by multiple SCADA stations which include-

- Automated Transfer of Milk to Paneer Section

- Precise Pre-Treatment of Milk
- Fully Automated Coagulation machine for meticulous curd formation
- Micro-perforated moulds made by Food Grade Plastic; engineered with correct drain-ability for getting uniform Paneer to replace muslin cloth
- Controlled Pouring of Coagulated mass directly into Micro-Perforated Moulds.
- Automatic movement of Moulds through conveying lines
- Multi-Stage and Progressive technology in Paneer Pressing
- Paneer Block cutting through conveyor based cutting machine into right packing sizes
- Packing of Paneer Blocks through Thermoforming machine with Nitrogen and CO₂ in right proportion along with Vacuum to ensure fresh Paneer reaching directly to customer.
- Sterilization in later stage to ensure maximum shelf-life of paneer.
- Cleaning of Micro-perforated Moulds done by Ultrasonic Cleaning Machine with forced jet

...continue on page 68

Fully Automated Indigenous Paneer Manufacturing Line

technology to ensure proper cleaning of each micro-perforation to drain whey.

- Cleaning of all machineries, pipelines, tanks etc. through automatic Central CIP System.

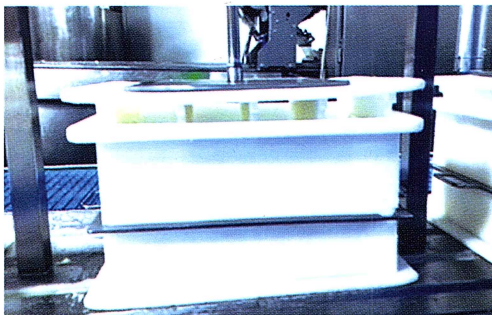
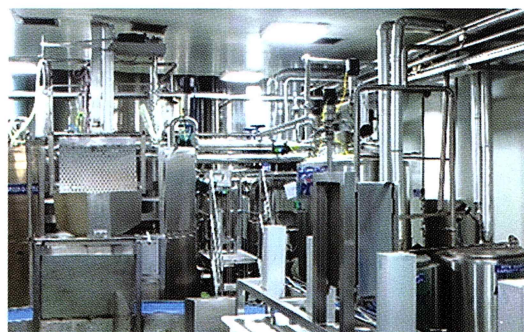
Benefits Reaped

Yield of paneer mainly depends on the fat and SNF content of milk as well as on the moisture, fat and protein retained in the product. Under optimal conditions, we achieved yield ranging from 16 to 17% at large scale production with zero coliform bacteria continuously. Softness of Paneer is superior compared to traditional paneer. Paneer being a perishable commodity is highly susceptible to physicochemical and microbiological changes. Therefore, its packaging must provide protection against these damages while maintaining its quality, sales appeal, freshness and consumer convenience. With use of thermoforming machine with vacuum, we extended its shelf-life to 45 days at 4°C and below whereas shelf-life of frozen paneer is 6 months at -18°C or below.

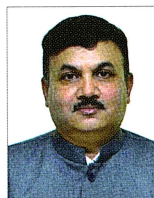
Conclusion

Indian cuisine is marked by a rich and balanced combination of nutrients and Paneer is an integral part of it. It not only provides high protein, fairly high fat, minerals like Calcium and phosphorous, but also has been enriching recipe with its significant taste and texture since centuries.

It is also a good source of fat-soluble vitamins A and D, thus making it a highly nutritive product. In view of its high nutritive worth, paneer is an ideal sustenance for the pregnant mothers, children, infants, growing children, adolescents and adults.



Perfect coagulation and complete pressing are most important parameters for the textural quality and yield of Paneer. The fully automated Paneer plant enhances the yield, improves quality, softness and shelf-life by maintaining hygiene, reducing labour, process time and cost and it allows precise control of process parameters. Use of antimicrobials and natural antioxidants and vacuum packaging of paneer in thermoforming pouches has reasonably increased its shelf-life and facilitated wide distribution and marketing of product.



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