

Automatic Ghee Making System

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Abstract: *Ghee has a long and rich history in Indian cuisine, traditional medicine, and culture. Its popularity and market size in India are a testament to its importance and widespread use. The fact that ghee is considered to be sattvik or sattva-guni in Ayurveda when used as food is also significant, as it highlights the belief in the holistic benefits of ghee consumption. Efforts to make small-scale ghee making machines available to women in Indian villages is a positive development. This can empower women by providing them with a means to generate income and contribute to their families' economic well-being. It can also help to promote the production of pure and high-quality ghee, which is essential for maintaining its reputation as a premium product. Overall, ghee is a fascinating topic with many layers of cultural, historical, and practical significance.*

Keywords: Ghee, Market, machine

I. INTRODUCTION

The desi method, also known as the traditional method, involves heating butter in an open pan until the water content evaporates and the milk solids settle at the bottom. The clear, golden liquid that remains is ghee. The creamery- butter method involves churning cream into butter and then heating the butter to produce ghee. The direct cream method involves heating fresh cream directly to produce ghee.

The pre-stratification method involves heating milk to produce cream, which is then separated and heated to produce ghee. The continuous method involves heating cream continuously in a closed system to produce ghee.

The traditional process of making butter involves churning yogurt or cream to agitate the fat globules and separate the butterfat from the buttermilk. The agitation causes the fat globules to come together and form butter grains, which are then fused together to form butter. The remaining liquid is called buttermilk.

Over time, different materials such as animal leather, wood, metal, or glass have been used to make butter churns. While early churns were manual, there have been attempts to automate the process. However, the traditional method of churning butter by hand is still commonly practiced in some parts of the world. Satisfying quantity or quality of fat or buttermilk is collected. The local churn process is still a manual process although there were many attempts toward churn automation.

Based on the information provided, it is clear that there are several challenges and issues with the traditional process of Jameed and ghee production in Jordan. These challenges can have a negative impact on the quality of the products as well as human health. The use of plastic and aluminum containers in processing is not suitable for food production and may result in contamination of the products. The lack of effective cooling in the milk collection stage can also result in the growth of microorganisms, which can lead to acidity development and production of harmful materials.

Furthermore, the absence of milk pasteurization is a significant risk for the transfer of milk-borne diseases from animals to humans. There is also a lack of control equipment for heating and cooling of the milk and products, fermentation process, and acidity development. The use of direct gas fire for heating can result in a cooked flavor and brown color to the final products. Adding chilled water and ices to the products for cooling can also increase the possibility of contamination.

To address these challenges, it is necessary to modernize the process of Jameed and ghee production in Jordan by implementing proper hygiene practices, cooling and pasteurization equipment, and quality control measures. This will not only improve the quality of the products but also reduce the risks of contamination and improve human health. Additionally, there is a need to provide training and education to farmers and workers on proper hygiene practices and food safety regulations to ensure the production of safe and high-quality products.

We have developed an interesting and innovative solution for making ghee at home. Automating the process using technology such as the Arduino Nano and microcontroller development board can certainly make the process more efficient and easier for the user.

By using an on delay timer, the churning and heating process can be automated, allowing for a consistent and reliable end product. This can be especially useful for individuals who may not have the time or experience to manually make ghee using traditional methods.

Overall, our "Advanced Automatic Ghee Maker" seems like a practical and innovative solution for making ghee at home. It's exciting to see how technology can be used to automate traditional processes and make them more accessible to people

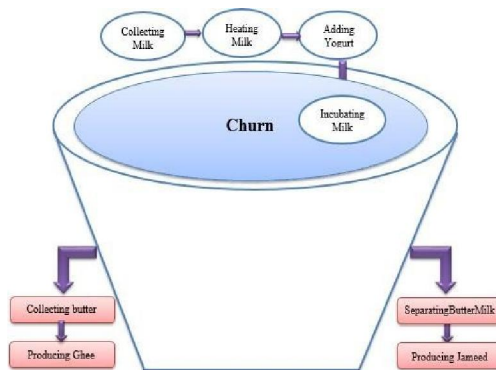


Fig (a) The Traditional process of Ghee production.

II. MATERIALS

The material or components required for the Making Model.

- Electric Boiler
- Universal Motor
- Grinder
- On Delay Timer
- Ardunio Nano
- Connecting Wires
- Push Buttons
- Plaud sheet
- Supporting Rods

Electric Boiler



Fig (b) Cordless Electric Heater

Specification-

- Features - Cordless electric kettle with 360° base.

- Optional wall mount, ergonomic handle, one-touch opening, water level indicator, safety lid with automatic switch off and removable limescale filter.
- ON/OFF- ON/OFF button with blue light indication.
- Capacity-1.8 litre
- Safety standard - GS/CE
- Power supply- AC 220-240V ~ 50/60Hz, 1500- 1600 Wmax.
- Cable specifications- H05RR-F 3G*0.75-
- mm2250V~16A L = 0.85 m
- Material-PC, PP, sandblasted aluminum, PA66+GF.

Universal electric motor



Fig (c) Universal electric motor

Specification-

- Operates on- AC and DC
- Rated voltage for AC- 230V-240V
- Rated voltage for DC-12V
- Rated frequency-50Hz
- Rated Speed-9500+-5% r/min
- Rated Power-550+-5% W
- Rated Horse Power-0.73825 HP
- Spark Class-<1.5
- Life-500-2000 Hours
- Maximum Efficiency->= 40%
- Starting Torque-450% of running torque

Grinder

Specification



Fig(d) Griender

- Brand-Boss
- Product Dimensions-7.5D x 32W x 6.4H Centimeters
- Wattage-125-W
- Power Source-AC
- Style-4-blades
- Recommended Uses For Product- Churning
- Special Feature- Portable
- Material- Plastic

Timer



Fig(e)Timer

Specification

- Range-3 / 10 / 30 / 60sec / min
- Operating Modes-08 Time ranges, ON delay / Interval
- Supply Voltage-20 to 240V AC, 12 to 240V DC4) Relay Contact-2 C/O SPDT
- Contact Rating-5A @ 250V AC or 24V DC6) Resolution-0.3 sec
- Accuracy- Setting: $\pm 5\%$ Of Full Scale, Repeat: $\pm 0.5\%$ Of 50ms (Whichever Is Greater)
- LED Indications- Power ON, Relay ON
- ProductDimensions-2.3Dx10.5Wx7.5H Centimeters
- Item Weight-0.45 Kilograms
- Material- ABS PLASTIC
- Brand- Select
- Size-22.5mm
- Color- Black
- Certification- CE
- Mounting Type- DIN Rail Mount

III. METHOD

Curing of Butter - It's true that curing of butter is an important process in making ghee. However, the process you have described for making butter from milk is not accurate. To make butter, you first need to separate the cream from the milk. This can be done by letting the milk sit for a few hours or by using a cream separator. Once you have the cream, you can then churn it using a butter churn or a food processor until it separates into butter and buttermilk. To cure the butter, you need to heat it slowly in a heavybottomed pan over low heat until the milk solids separate from the butterfat and sink to the bottom of the pan. You then need to strain the butter through a cheesecloth or a finemesh strainer to remove the milk solids.

Boiling of butter - Butter obtained from curd is made up of fat and water. When it is heated to a certain temperature, the water evaporates, and the fat solids begin to separate from the liquid. The fat solids will then brown and settle at the bottom of the container, while the liquid on top will turn into ghee. The temperature at which this process occurs can vary depending on factors such as the type of curd, the altitude, and the desired flavor of the ghee. Typically, the

temperature ranges from 90 degrees to 120 degrees Celsius. To control the temperature, a heating coil is connected to a temperature control device, which regulates the heat

IV. WORKING

Heating of the milk and the yogurt inside the tank done through the jacket gradually with the slow agitation which keep the products with no cooked flavor. The tank is equipped by many sensors to control and monitor the heating processes, fermentation processes and churning Process Jameed manufacturing process, which has been followed by our work, is as follows:

Churning process will make a foam of large protein bubbles due to agitation of the yogurt. Being surface active, the membranes of the fat globules are drawn toward the air/water interface and the fat globules are concentrated in the foam. When agitation continues, the bubbles become smaller as the protein gives off water, making the foam more compact and thereby applying pressure on the globules. This causes a certain proportion of the liquid fat to be pressed out of the fat globules and cause some of the membranes to disintegrate. The liquid fat, which also contain fat crystals, spreads out in a thin layer on the surface of the bubbles and on the fat globules. As the bubbles become increasingly dense, more liquid fat is passed out and the foam is soon so unstable that it collapses. The fat globules coagulate into grains of butter, at first, these are invisible to the naked eye. But they grow progressively larger as working continues.

The floated butter granules are collected by sterilized (by hot water) sieve made of stainless steel and kept at low temperature store to be manufactured for a ghee through the evaporation of water by heating to achieve a fat percentage of 95%.

One of the conductivity, density and viscosity can be used as a sensor to follow the progress of the churning process.

The buttermilk which been left inside the tank after removing the butter heated up to 55 c with no agitation to help in whey separation.

The second is the safety. Many of the families don't pasteurize milk which makes it unsafe for producers as well as for customers. The third is the process efficiency in terms of power and time. In this research the three problems are tackled and solved by designing, building, and testing a high- tech local butter churn for automating the local butter churning process and come up with a high quality and safe products that can be commercialized. Also the local churning process efficiency is improved, less power, less cost, less time, more butter, and better and consistent dairy product quality. In this research a one tank is designed to automate all processing steps. All the processing steps are done in a sterilized, closed tank, leaving no chance for any contamination. The process is done with very little work because there is no need to transfer the products and no need to use gas fire for heating and chilled water for cooling. The ability of the tank to cool the raw milk will keep the quality of milk with very high standard. The ability of the tank to pasteurize the milk will keep the product safe, hygiene with acceptable flavors. The sensors of the tank will control all heating and cooling, fermentation, and churning processes. Automation is using technologies to operate machines and systems without human intervention



Fig(f). Final Model

V. RESULT AND DISCUSSION

The capacity of "Automatic Ghee Maker" is 1.5 kg. User can use this ghee maker for three type of quantity like half kg, onekg, and one and half kg, time require for different quantity is different. User have to set the timer as per the quantity of ghee making or raw material like yoghurt. The final output of application is in below figure.

By using Traditional method time required for Churning and Heating of Yoghurt.

Yoghurt (in Kg)	Time Require for Churing	Time Require for Heating
Half Kg	15Mins	20 Mins
One Kg	19 Mins	25 Mins
One and Half Kg	25 Mins	30 Mins

By performing various practical we conclude that the time required for the churning of yoghurt and making of gheefrom butter.

Yoghurt (in Kg)	Time Required for Churing	Time Required for Heating
Half Kg	8Mins	15Mins
One Kg	12Mins	20Mins
One and Half Kg	15Mins	27Mins



Fig. (g) Final output Ghee

VI. FUTURE SCOPE

6.1 Solar

Using a solar panel to power your Automatic Ghee Maker with a rechargeable battery is a very eco-friendly solution. Overall, using a solar panel with a rechargeable battery to power your Automatic Ghee Maker is an excellent way to reduce your carbon footprint and contribute to a more sustainable future.

Solar Panel-A solar panel, or solar module, is one component of a photovoltaic system. They are constructed out of a series of photovoltaic cells arranged into a panel. They come in a variety of rectangular shapes and are installed in combination to generate electricity. Solar panels, sometimes also called photovoltaics collect energy from the Sun in the form of sunlight and convert it into electricity that can be used to power homes or businesses. These panels can be used to supplement a building's electricity or provide power at remote locations. In addition to residential and commercial use, there is large-scale industrial or utility use of solar. In this case, thousands or even millions of solar panels are arranged into a vast solar array, or solar farm, which provides electricity to large urban populations.



Fig(h).Solar

VII. CONCLUSION

The project describes the scope and viability of the Household purpose and industry and mainly of the financial, technical and its market potential. Dairy products form one of the fastest growing segments in the livestock products in Jordan. In this project, the churning and fermentation process is automated for the local organic butter, fat and ghee manufacturing. This study is based on an extensive study of user requirements. We did field visits to dairy factory Parag Gowardhan Ghee plant. We have discussed the problems related to the process of yoghurt churning, and heating of butter. There was a consensus on the urgent need for a station that could do pasteurization, fermentation and churning automatically without human interference. This leads to a product of good quality and high safety. A system design is proposed in this paper to automate a manufacturing process for the production of the local organic butter, and Ghhee. Automation is based on fluid conductivity, temperature and time. To the best of our knowledge we are the first who think of automating such kind of manufacturing process

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