



**ensymm Offer  
for a  
Soy milk plant  
For  
30 L/h**



## Introduction:

Strictly speaking, "soymilk" is a water extract of whole soybeans. It is an off-white emulsion/suspension containing the water soluble proteins and carbohydrates, and most of the oil of the soybeans.

Soy milk has been produced traditionally in China, and to a lesser extent elsewhere in East Asia, but was never a predominant element in the popular diet. The concept of a milk-like food from soybeans was introduced to Europe in the beginning of our century. A patent for soymilk production was issued in 1910, to **Li Yu-ying**, a Chinese living in France.



## Market:

Soy milk has been Western Europe's fastest growing 'dairy' sector over the last six years, presenting new challenges to dairy firms via consumer health trends and new fears over lactose intolerance, *reports Chris Mercer*.

The value of Western Europe's soy milk market has more than doubled to €375m (£249.5m) between 1998 and 2004, thanks to consumer obsessions with health and wellness, according to a new report on the global dairy market from research group *Euro monitor*.

The report says soy milk has benefited from rising consumer awareness that soy is high in fibre, protein and minerals yet low in saturated fat and free of cholesterol.

The global soy beverage market continues to grow, offering plenty of opportunities for the development of products with new health benefits and/or taste experiences, as well as concepts for specific age and lifestyle-related target groups.

Dairy products and soy beverages belong to the fastest growers in the global food & beverage market. "From 2006 to 2007, the category grew at a rate of 11%, to almost €35 billion (\$ 47 billion). In comparison, the overall food & beverage market grew by 6% over the same period," said Kongkiat Phanawadee, Executive Director Client Solutions with ACNielsen's Thailand branch, in his contribution.

## Applications:

There exist many different applications for soy. Regarding to this producers can adapt their soy products to the different consumer preferences depending on regional traditions. To present all existing soy milk applications in detail would go beyond the scope of this abstract. Therefore we present only soy milk and Tofu which are the base for the most soy food applications.

**Soymilk:** Soybeans soaked, ground fine, and strained produce a fluid called soybean milk. Plain, unfortified soymilk is an excellent source of high-quality protein and B vitamins. Soymilk is most commonly found in aseptic containers (nonrefrigerated, shelf stable), but also can be found in quart and half-gallon containers in the dairy case at the supermarket. Soymilk is also sold as a powder that must be mixed with water.



**Tofu:** Tofu, also known as soybean curd, is a soft, cheese-like food made by curdling fresh, hot soymilk with a coagulant. Tofu is a bland product that easily absorbs the flavors of other ingredients with which it is cooked. Tofu is rich in both high-quality protein and B vitamins and is low in sodium. Firm tofu is dense and solid and can be cubed and served in soups, stir fried, or grilled. Firm tofu is higher in protein, fat, and calcium than other forms of tofu. Soft tofu is good for recipes that call for blended tofu. Silken tofu is a creamy product and can be used as a replacement for sour cream in many dip recipes.

**Other famous Products which are made of Tofu and Soymilk:** Nondairy Soy Frozen

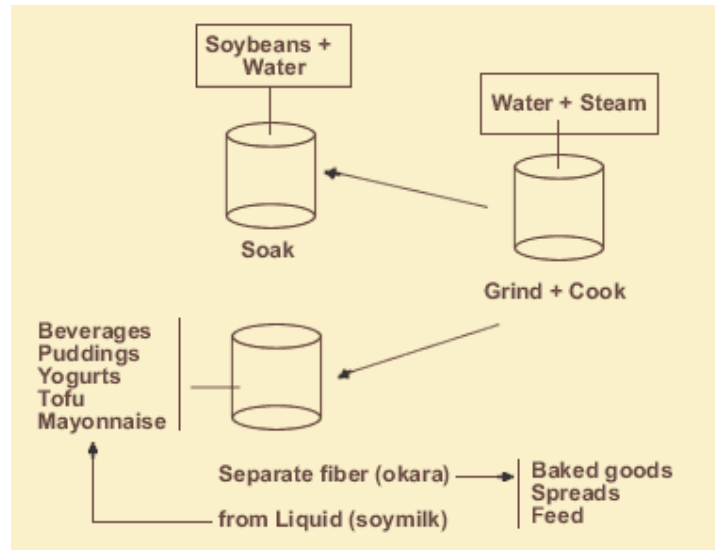
Desserts, Soy Cheese, Soy Yogurt, Soy Beverages.

## Soy milk production:

### Layout of a Production Line:

There exist generally 5 steps to produce soy milk:

1. Soak soybeans in water
2. Discard soaking water and transfer beans along with fresh water to grinding/cooking vessel.
3. Grind and pressure-cook mixture
4. Separate undissolved fiber (okara) from liquid (soymilk)
5. Make soyfoods from okara and soymilk



### PROCESS DESCRIPTION – SOYMILK AND TOFU

#### 1. BEAN SOAKING

2 kg of good quality soybeans are cleaned, washed and then soaked in about three times their volume of water. The time for optimum soaking depends on the soaking water and ambient temperature, it varies from 4-6 hours at 25-35°C to 8-12 hours at 12-20°C.

#### 2. MAKING SOYMILK

##### 2.1 GRINDING AND COOKING

The soaked beans and water have to be charged into the grinder/cooker hopper. If the soymilk is not to be used for making tofu, baking soda ( $\text{NaHCO}_3$ ) may be added to enhance the flavour of the milk.

Start the grinder motor. Keeps the grinder running for 3-4 minutes.

Shut off the grinder and start steam injection. The temperature in the grinder/cooker will start to rise and should reach 110°C in 10-20 minutes. The pressure gauge should read 15 psi (1.1 kg/cm<sup>2</sup>). Shut off the steam inlet valve and hold for 2-3 minutes.

To ensure the quality of the steam, do not allow the boiler pressure to fall below the recommended values during injection. To purge out the air depress the air purge valve with a metal rod, till a small amount of slurry comes out. Then continue injecting steam until the pressure reaches 15 psi (1.1 kg/cm<sup>2</sup>).

## 2.2 Extracting the Soymilk

Place the prepared open filter press below the discharge spout of the grinder/cooker with its discharge valve open and a vessel for collecting the soymilk below its spout. Start the grinder motor and open the discharge valve on the grinder/cooker quickly and close it again. This is to clear any slurry clogged in the discharge. The slurry is under pressure and extremely hot and the discharge must be done with care to avoid burns. Now open the discharge valve on the grinder/cooker slowly so that the slurry flows into the filter bag without splashing.

When the grinder/cooker is almost empty (5 psi or .4 kg/cm<sup>2</sup>), shut off the grinder motor, allow all the slurry to be discharged, and close the discharge valve. The grinder/cooker is now ready to start processing the next batch.



Hold the filter bag up from its open end and tie it to prevent slurry from getting out of the bag during pressing. Tuck the tied end into the cylindrical portion and turn the slurry spout away from the press. Now fasten the lid of the press body after ensuring that the pressure plate is screwed all the way up. Tighten the eye bolts of the lid and gradually turn the screw counter clockwise to expel the milk. The screw must be turned down in steps with pauses of 2-3 minutes. Only hand tighten the screw press when the resistance of the okara prevents further tightening, tilt the press body to get out all the extracted milk. Cover the vessel containing the milk with a lid.

#### 4. MAKING TOFU

The coagulation of the soymilk is the most critical step in the making of tofu. Tofu quality and yield depends on expertise which is developed over a period of time. Coagulants that can be used include nigari,  $MgCl_2$ ,  $CaCl_2$ ,  $CaSO_4$ , vinegar, lemon juice, lime juice, acetic acid, etc. The chemical must be certified food grade. Since Acetic Acid and Citric acid are readily available throughout the world, the procedure described is for these acids.



- Coagulant shall be dissolved in water
- Soymilk temperature shall be maintained above 85° C.
- Add the coagulant slowly and stir gently. After stirring, keep it for settling for 5 minutes.
- Remove the excess water and pour the rest of the material into tofu box.
- Keep the tofu plate on the box and press the contents till excess water is removed.
- Now tofu is ready as a brick in rectangular shape.

#### 5. STORAGE OF SOYMILK AND TOFU

- Soymilk must be stored and distributed just like dairy milk.
- The shelf life of soymilk can be extended to about 4 days if it is stored at 4°C under sanitary conditions.
- Freezing of soymilk will cause it to split or curdle on thawing.
- Adding sugar to soymilk also extends its shelf life.
- Tofu should be stored immersed in cold water which should be changed frequently during storage.
- Under proper refrigeration, tofu can be stored for one week or longer.
- Freezing tofu makes it tough and chewy and should be avoided.

## Soy milk/tofu production system for 30l/H:

We are pleased to submit herewith our most competitive offer for supply of our soymilk machine to manufacture Soymilk and Tofu. This machine will yield 14-15 litres of soymilk from 2 kg soybeans every half an hour. This soymilk then could be converted into 2.5 – 2.7 kg of Tofu.

### Machine specifications:

- 30 litres/hour soymilk base 3.5 % protein at an economical price
- We will also supply Deodoriser System to remove unwanted odours and flavours from the soymilk.
- This is a tabletop plant for producing soy milk/soy paneer. It is a Table-top machine that makes high quality soy milk at the cottage industry level using a break-through Canadian technology.
- It produces 15 litres of soymilk every half an hour (using 2 kg of soybeans). The machine includes accessories for making Tofu (soy paneer) also.
- The machine requires 5-10 sqm area with domestic power supply for its installation (1 HP single phase 220 V). A skilled operator and one helper are enough for operating the machine.



### Budget Calculation for 30 L/h:

- |  |   |
|--|---|
| • Machinery and Equipment:             | new   |
| • Production Quantity for soymilk:     | 30L /h 600 L/day soy milk                             |
| • Volume of bottles:                   | 500 ml, 1 L, 2 L                                      |
| • filling                              | manual/automatic                                      |
| • Service/Inspection/tech supervising: | Ensymm/Germany  |
| • Transport                            | FOB   |
| • Payment                              | 80% in advanced 20% against B/L                       |
| • Area                                 | 10 qm <sup>2</sup> for Line/100 qm <sup>2</sup> total |

**VALIDITY OF OUR OFFER:** 30 days from the date of submission.

| Unit  | Information   | Price USD     |
|---|---|---------------|
| Soymilk Machine                                   | For soy milk and Tofu   | 14 500        |
| Local Supervisor from India or Germany            | For training, installation (travel and accommodation is clients duty) 3days | 200 per day   |
| Supervising/Consultancy                           | Calculated  | included      |
| Building,worker, Utilities,local custom and taxes | Not Calculated  | Client's duty |
| Spare Part  | One Set for 1 year  | Free          |
| Filling/Capping/Labelling                         |   | Client's duty |

## Benefit of Ensymm Project Consulting:

- Client design offer
- Local support
- State of art Technology
- Feasible production capacity
- Offers designed for the budget of investors
- Competence team for:
  1. Business and scientific issues
  2. Supervising for engineering, installation and production
  3. Inspection and guarantee for used plants
  4. Coordination of the Project from A-Z
  5. Quality control
  6. Advisory related to the project
  7. After sales services
- Project coordination from A-Z
- Support for raw material specially modern designed bottles and labels

