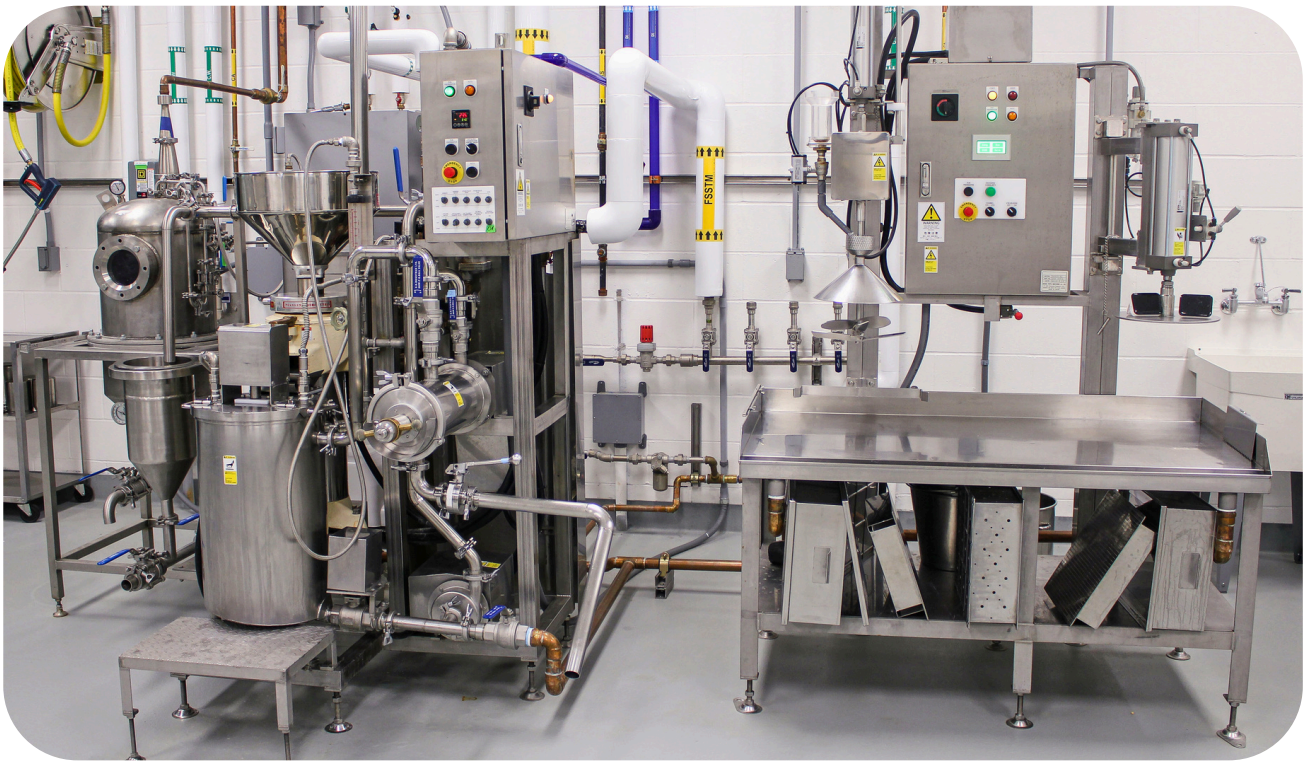
NCI MASE SOYMILK AND TOFU PILOT PLANT

The soymilk and tofu processing system at the Northern Crops Institute (NCI) is a scaled-down pilot system designed to mimic large commercial production. The system requires only 2 kg of soybeans for soymilk and tofu production, making it ideal for evaluating soybean processing performance.



This system is used to:

- Evaluate soybean quality for soy food applications
- Demonstrate soymilk and tofu production to visitors and short-course participants
- Support product and process development for customers interested in food-grade soybeans

Soymilk Production Procedure

1. **Soaking:** 2 kg of soybeans are soaked in water overnight.
2. **Washing and Draining:** The soaked soybeans are washed and drained before processing.
3. **Grinding:** 14 L of water are added during grinding.
4. **Cooking:** The soybean slurry is cooked for 5 minutes at ~98°C.
5. **Separation:** The cooked slurry is pumped into a screw separator and processed. Soymilk exits through the milk outlet pipe. Okara (soy pulp) exits through the end of the screw pressure relief valve. Soymilk yield is measured and recorded.
6. **Cooling and Storage:** Soymilk may be cooled and refrigerated if used as a beverage. If tofu production is intended, the soymilk should remain hot and not be cooled.

Tofu Production Procedure

1. **Soymilk Preparation:** 11 kg of hot soymilk is transferred into a coagulation pan.
2. **Coagulant Preparation:** 35 g of calcium sulfate is used as the coagulant. The coagulant is dissolved in 150 g of filtered water.
3. **Coagulation:** The soymilk is gently mixed while the dissolved coagulant is added through the coagulant hopper.
4. **Curd Formation:** After mixing, the pan is covered and allowed to sit for 12 minutes to allow curd formation.
5. **Curd Cutting:** The curds are gently broken using a wire whip, and the pan is covered again.
6. **Curd Setting:** After 1 minute, the curds are transferred into a draining mold and covered.
7. **Pressing:** A series of pressing cycles using a pressure plate removes whey from the curds.
8. **Weighing and Cutting:** The tofu block is weighed and cut into squares.
9. **Cooling and Storage:** Tofu is placed in cold water for 15 minutes, then transferred into containers and refrigerated for analysis.

Soymilk and Tofu Quality Evaluation

The following parameters are commonly used to evaluate soybean suitability for soymilk and tofu production.

Water Absorption

Measures the ability of soybeans to absorb water during soaking.

Affects grinding efficiency, influences soymilk extraction and helps predict processing behavior (4.0 kg to 5 kg expected water uptake).

Soymilk Yield

Total soymilk yield obtained from 2 kg of soybeans, used as an indicator of processing efficiency. Based on our protocol and soybean to water ratio (1:7), the expected yield ranges from approximately 16 to 18 kg of soymilk

Soymilk and Tofu Color

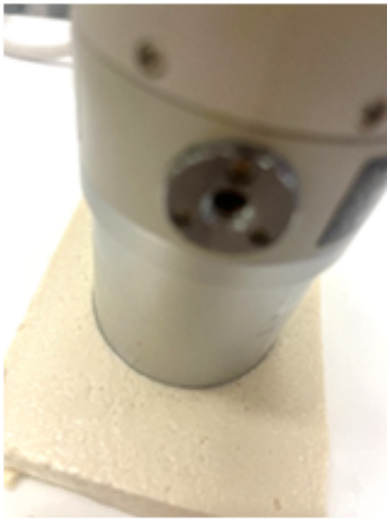
Analysis is conducted using a colorimeter (CIE L*, a*, b* system), which provides objective color values:

- L* = lightness (0 = black, 100 = white). Value above 80 are expected (clean, creamy white appearance).

- a* = green to red scale (negative = greener, positive = redder). Negatives values are expected (-1 to -5).

- b* = blue to yellow scale (negative = bluer, positive = yellower) mild yellow-cream tone (8 to 18).

Soymilk



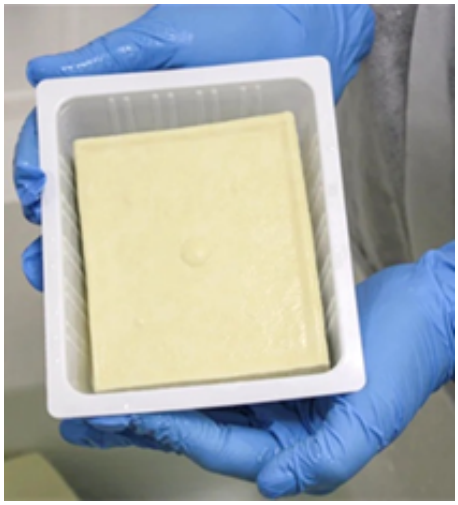
Tofu

Brix (Soluble Solids)

When using a refractometer to measure Brix in soymilk, we are essentially measuring the total dissolved solids, which include sugars, proteins, and other compounds. The Brix value correlates with the total concentration of these dissolved solids. Our method is standardized for a 1:7 ratio of soybeans to water during processing. We expect a Brix reading of 7 to 8%, which reflects the desired concentration of dissolved solids in the final soymilk product

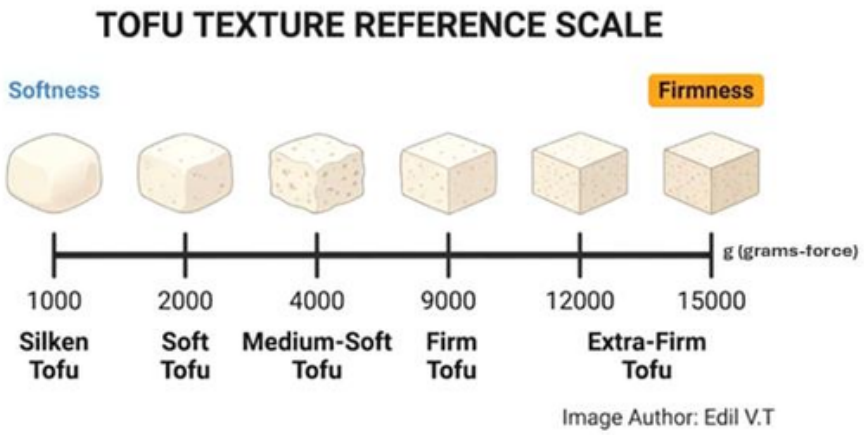
Tofu Yield

The amount of tofu produced from 11kg of soymilk. Expected weight (2.5kg to 4.5 kg).

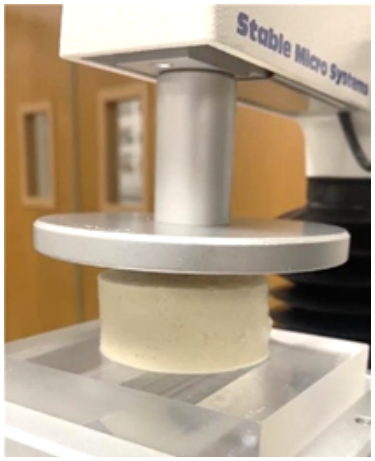


Tofu Texture

Hardness: Refers to the force required to compress the tofu. It measures how firm or soft the tofu is.



Springiness: Reflects the ability of tofu to return to its original shape after deformation. (0.90 to 1.0).
Cohesiveness: Describes how well the tofu holds together after being compressed or deformed (0.40 to 0.80).
Gumminess: Calculated as the product of hardness and cohesiveness, gumminess represents the energy required to disintegrate semi-solid food into a state ready for swallowing (500 to 15000).
Chewiness: Represents the energy required to masticate (chew) the tofu to a state ready for swallowing (500 to 15000).



Texture analyzer TA-XT2

ADDITIONAL INFORMATION

If you are interested in learning more about soy food production, soybean quality evaluation, or pilot-scale processing at the Northern Crops Institute, please contact us.

EXPLORE OUR SOY FOODS LAB!

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