

Goat Milk Cheese Manufacturing

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Goat cheese consumption in the United States has been on the rise in recent years. Besides liquid milk consumption, presently a lot of surplus goat's milk was used or sold for feeding calves, greyhounds and hogs, with some for powdered milk processing. Cheesemaking can definitely add value to high quality goat milk and create another source of income for the goat producers. To meet the demand for goat cheese and to increase profitability of goat dairying, dairy goat producers need skills and techniques to produce high quality goat's milk cheeses. Hands-on cheesemaking workshops allow participants to learn basic principles and practical techniques through actual cheesemaking processes.

In this cheesemaking workshop, manufacturing of a hard cheese, a soft cheese and a quick-method Mozzarella cheese will be demonstrated. Following are step by step procedures.

1. Cheddar Cheese Make Procedure

(100 gallons of milk)

STEP	TIME	pH/TA	COMMENTS
Raw Milk	0 min	6.55 /0.15-0.16	Pasteurize, standardize, and temper the milk to 88-90 °F (32°C).
Add Starter	60 min (DVS)		DVS cultures are used at one of the following rates: Original DVS – 50-60 g DVS and bulk starter cultures normally consist of <i>Lactococcus lactis</i> subsp. <i>cremoris</i> and <i>Lactococcus lactis</i> subsp. <i>lactis</i> .
Add calcium (optional)	1 h 15 min		Cal-Sol (calcium chloride) may be added at this time.
Add Color (optional)	1 h 15 min		If desired, Cheese Color (annatto) may be used at the rate of 1.0 to 1.5 oz. Dilute the coloring with cold water (do not use hard water) at a minimum ratio of 1:20.
Add Rennet (Coagulant)	1 h 20 min	6.49/0.16	Liquid rennet is used at the rate of 1 to 1-1/2 oz. According to the manufacturer's instruction. Dilute with water at 1:40 prior to addition.

Cutting	1 h 50 min to 2 h	6.51/0.10	Cut the curd with 3/8 to 1/2 inch knives.
Healing	2 h 5 min		Heal the curd for 5 min without stirring.
Heating	2 h 35 min		Cook the curd to 101-102° F. in 30 min. During the first 15 minutes, do not increase the temperature more than a total of 5-6° F.
Cooking	3 h 5 min		Cook the curds at this temperature for another 30 min
Draining	3 h 20 min	6.12/0.24	Drain the whey from the vat or pump the curd and whey to the drain table.
Cheddaring	5 h 20 min	5.35/0.50	Cut the matted curd into slabs and turn the slab every 15 min for 2 h.
Milling	5 h 30 min		Mill the slabs into 1 in. cubes
Salting	5 h 45 min		Salt the curd using a minimum of two applications for a total of 2.0-2.5 lb.
Hooping	6 h		Hoop the salted curds into Cheddar cheese molds.
Initial Pressing	8 h		Press the cheese initially at 30 – 35 psi for 2 h.
Final Pressing	24 h		Increase the pressure to 60-70 psi and press overnight.
Vacuum-packing			Vacuum-pack the cheese blocks in proper films
Alternatively, Air-drying for wax-coating	2 – 3 days		Place the cheese blocks in an aging room at 55°F with 70% humidity for 2 – 3 d for easy waxing.
Ripening	3 – 6 months		Ripen the cheese in a cheese ripening room at 50 - 55°F with 70 - 80% humidity for at least 3 months.
Sales-packing	3 – 9 months		Cut the cheese blocks into retail sizes, wax-coat and/or vacuum-pack with shrinking films.

2. Low Fat Cream Cheese Make Procedure

(10 gallons of milk)

Cream Cheese is a fresh cheese with at least 50% of fat in dry matter, which is consumed without any ripening. Low fat cream cheese may be produced with fat contents ranging from 30-40% of fat in dry matter. This low fat cream cheese is white to yellowish, the consistency smooth and pasty without being too dry and grainy, and it is easy to spread. The flavor is fresh and acidic, and the pH value is normally between 4.6 and 4.8.

Milk	Whole milk is pasteurized and homogenized (optional). After homogenization, the milk is cooled to ripening temperature, i.e. 21°C (70°F).
Culture	Freeze-dried DVS (20 - 25 u) or Frozen DVS (20 – 25 u)
Rennet	To improve the curd formation and the whey drainage, it is recommended to add 1 – 2 ml of liquid rennet which is diluted with water prior to addition (1:40).
Curd forming	The milk is covered and left at room temperature overnight (14-16 h) or until pH reaches 4.7.
Dipping the curd	The curd is dipped or scooped into perforated colander or proper container lined with cheese cloth.
Draining	Drain the curd in the room for a few hours and move the curd to a cooler and continue to drain overnight.
Moisture (%)	The moisture content after 24 h of draining should be around 50 - 55% and pH 4.7.
Final treatments	A mix of 1% salt (0.15 – 0.2 lb) and 0.25 - 0.5% stabilizers (20 – 50 g) is blended with the cheese curd in a high speed blender and the cheese is cold-packed. Or, the curd and the salt-stabilizer mix is pasteurized in a container by indirect heating to 78-80°C (172-176°F) for 5-10 min for better consistency and longer shelf-life. The pasteurized low fat cream cheese is then hot-packed and stored cold.
	(For strawberry flavored cream cheese, add 15-20% sterilized strawberry base to the final mix before blending in the blender.)

3. Quick-Method Mozzarella Cheese (2 gallons of milk)

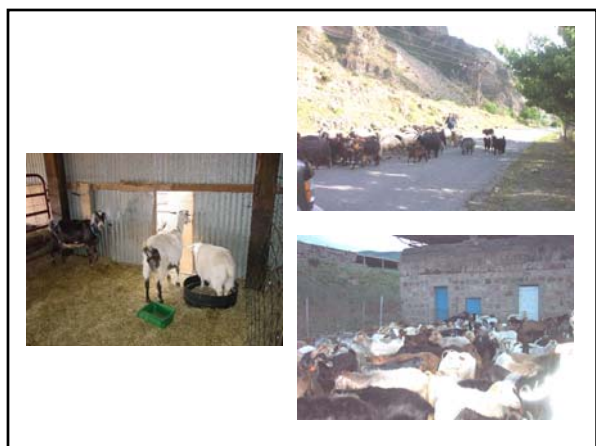
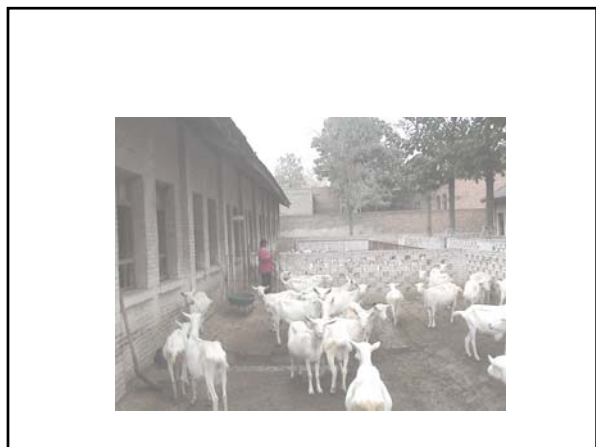
Milk	High quality standardized milk is used.
Heat treatment	Pasteurize at 63°C (145°F) for 30 min and then cool to 32°C (90°F). Optional: use raw milk.
Culture	No culture is needed.
Citric Acid	Add 4 teaspoons (16-18 g). The pH should be around 5.1-5.3.
Rennet	Liquid rennet at 2 ml (½ teaspoon), diluted with 2-3 tablespoons of water.
Cutting	When a soft curd is developed after 15 min, the curd is cut.
Heating and stirring	The temperature is increased to 43-45°C (110-115°F) for 15-30 min with stirring depending on desired moisture.
Draining	Drain the whey and hand-squeeze out excessive whey from the curd.
Microwaving	Microwave the curd for 1 min
Knitting and stretching	Hand-work the curd and the curd is stretched.
Microwaving again	Microwave the curd for the second time for 30 sec. Or before microwaving, add dry salt (2 teaspoons) at this time.
Stretching and shaping	Work the curd into desired shapes.
Salting	Salt the cheese in a saturated salt brine at a temperature of 10°C (50°F). Or dry-salt, heat and mix.



Goat Milk & Goat Milk Products

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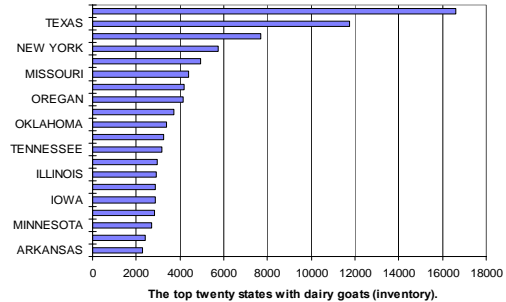
300 Million Heads of Goats in the Whole World



Dairy Goat Facts

- 300 million in the world
- A larger proportion of the world population consuming goat milk
- Averaging one gallon of milk/doe per day during peak months
- High production efficiency
- Cheaper than cow milk in many developing countries

1 to 1.5 million dairy goats in the US



Merits of Goat Milk

- A natural source of nutrients
- An alternative to cow milk
- A “cure” to cow milk allergy
- Easy digestion
- Exotic and characteristic flavor
- Medicinal properties

An alternative to cow milk

- Personal preference
- Geographic location
- Weather cond
- Vegetation
- Religion



A “cure” to cow milk allergy

- Cow milk allergy (CMA):
 - 6-7% Americans
 - 10-15% Orientals and Oceania
- Vomiting, diarrhea, malabsorption, bronchitis, asthma, migraine
- Caused by Lactalbumin and β -lactoglobulin- both species specific
- Up to 90% CMA patients can be “cured” by switching to goat milk
- (Lactose intolerance)

Easy digestion

- Homogeneous (small diameters) fat globules
- Naturally higher concentration of short chain fatty acids
- Fragile and soft milk curd



Goat Milk

Exotic and characteristic flavor

- Unique
- Ever more popular in fancy hotels and cooking shows



Exotic and characteristic flavor

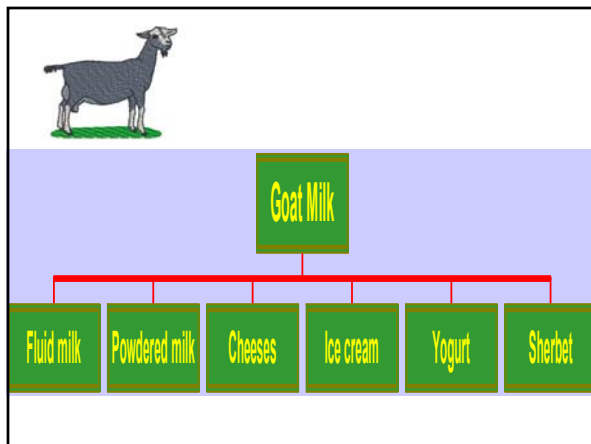
- Goat milk and dairy products, particularly cheeses, are being considered as “a reminder of holidays spent in the Mediterranean countries.”



Goat Cheese & Wine

Medicinal benefits

- Distinct alkalinity
- Buffering capacity, particularly Nubian goats
- Hypo-allergenicity- low α_{s1} -casein in goat milk
- Short-chain fatty acids used for malabsorption patients
- (Goat milk anemia - lack of iron)



Powdered Goat Milk



Go Specialty: Buried Goat Cheese



Research Interests

- Somatic cell counts
- Antibiotic residue
- Milk quality
- Cheese quality
- Cheese yield predictive models
- Conjugated linoleic acid

Conjugated Linoleic Acid

- CLA
- Abundant in milk fat and red meat
- Anti-carcinogenic – breast cancer, prostate
- Reducing body fat
- **Magical #: 3.5 g/d**

New Product Development

- Goat milk smoothies
- Goat milk ice cream for diabetes



Goat Milk Powder Pills



Promoting Dairy Goat Products

- In Martha Stewart TV Show, she used goat cheese to make a specialty dish in the mid 1990s
- In March 2004, Chef's Cooking Institute in Oklahoma City used goat cheese for demonstration

The
Power
of
Newspaper



Ever Popular Goat cheeses!

- 80 entries of goat milk cheeses in the American Cheese Society Championship this year, up 23 entries two years ago (The Cheese Reporter, 2004).

**IS THERE A MARKET FOR
GOAT MILK CHEESES IN
MID-WEST STATES?**



In southern Kansas



In Central Kansas



In southern Oklahoma



In Southeastern Oklahoma



In western Oklahoma

In Kansas City, Missouri

The proper citation for this article is:

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