

# Casein

Casein is the major protein present in milk. Approximately 80% of the protein in milk is casein while whey proteins account for the remaining 20%.

Commercial casein is prepared from pasteurized skim milk. Acid or rennet is used to coagulate the casein. A washing step is included to remove impurities such as lactose and minerals and thereby increase shelf life of the product. The functional properties of the resulting casein will depend on the coagulation method used.

Casein isolated by coagulation is in a not native or non-micellar form and is not soluble. Additional treatments are required to convert the casein into caseinates which are soluble.

## Types

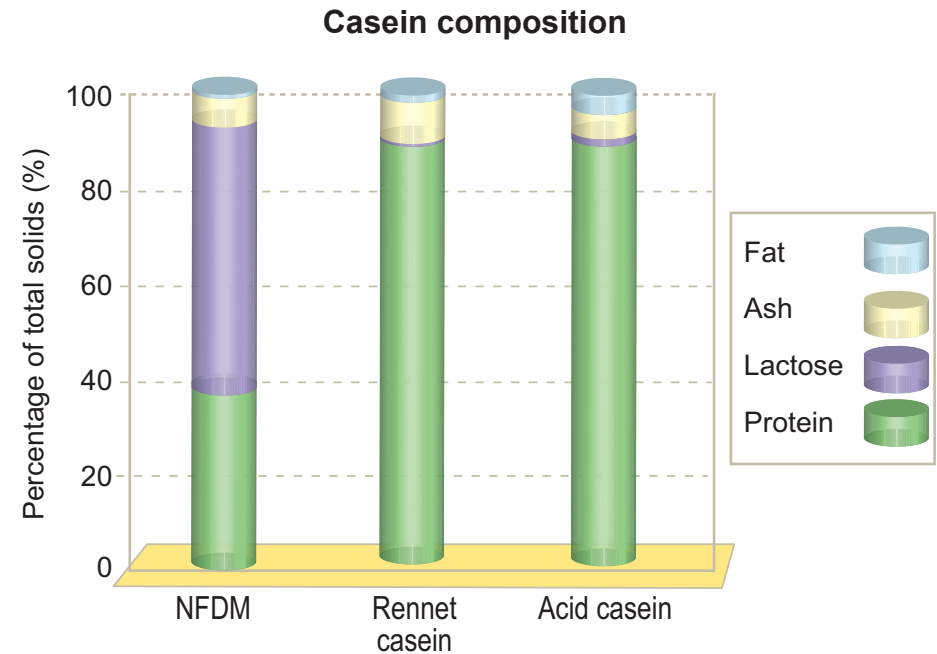
- ◆ Mineral acids
  - Hydrochloric
  - Sulfuric
  - Orthophosphoric
- ◆ Organic acids
  - Lactic
    - Produced by starter culture
    - Addition of lactic acid
  - Acetic
  - Citric
- ◆ Rennet

## Dryer

- ◆ Roller
- ◆ Spray

## Regulations

- ◆ Acid casein
  - United States Standards for Grades of Edible Dry Casein (Acid)
  - USDA, AMS - Dairy Division, July 20, 1968
  - Codex Stan A-18-1995 Rev 1-2001
- ◆ Rennet casein
  - Codex Stan A-18-1995 Rev 1-2001



### General composition of casein

| Component | Rennet        | Acid |
|-----------|---------------|------|
|           | ----- % ----- |      |
| Protein   | 80.5          | 86.5 |
| Lactose   | 0.5           | 0.5  |
| Ash       | 8             | 2    |
| Fat       | 1             | 1    |
| Moisture  | 10            | 10   |
| pH        | 7             | 5    |

### Codex specifications for casein products\*

| Component           | Rennet        |                  | Acid          |                  |
|---------------------|---------------|------------------|---------------|------------------|
|                     | not less than | not greater than | not less than | not greater than |
| Milkfat             | -             | 2.0%             | -             | 2.0%             |
| Protein (db)        | 84.0%         | -                | 90.0%         | -                |
| Casein in protein   | 95.0%         | -                | 95.0%         | -                |
| Moisture            | -             | 12.0%            | -             | 12.0%            |
| Lactose**           | -             | 1.0%             | -             | 1.0%             |
| Ash                 | 7.5%          | -                | -             | 2.5%             |
| Titrateable acidity | -             | -                | -             | 0.27%            |
| Scorched particles  | -             | 15 mg            | -             | 22.5 mg          |

\* Codex Stan A-18 1995 Rev 1-2001

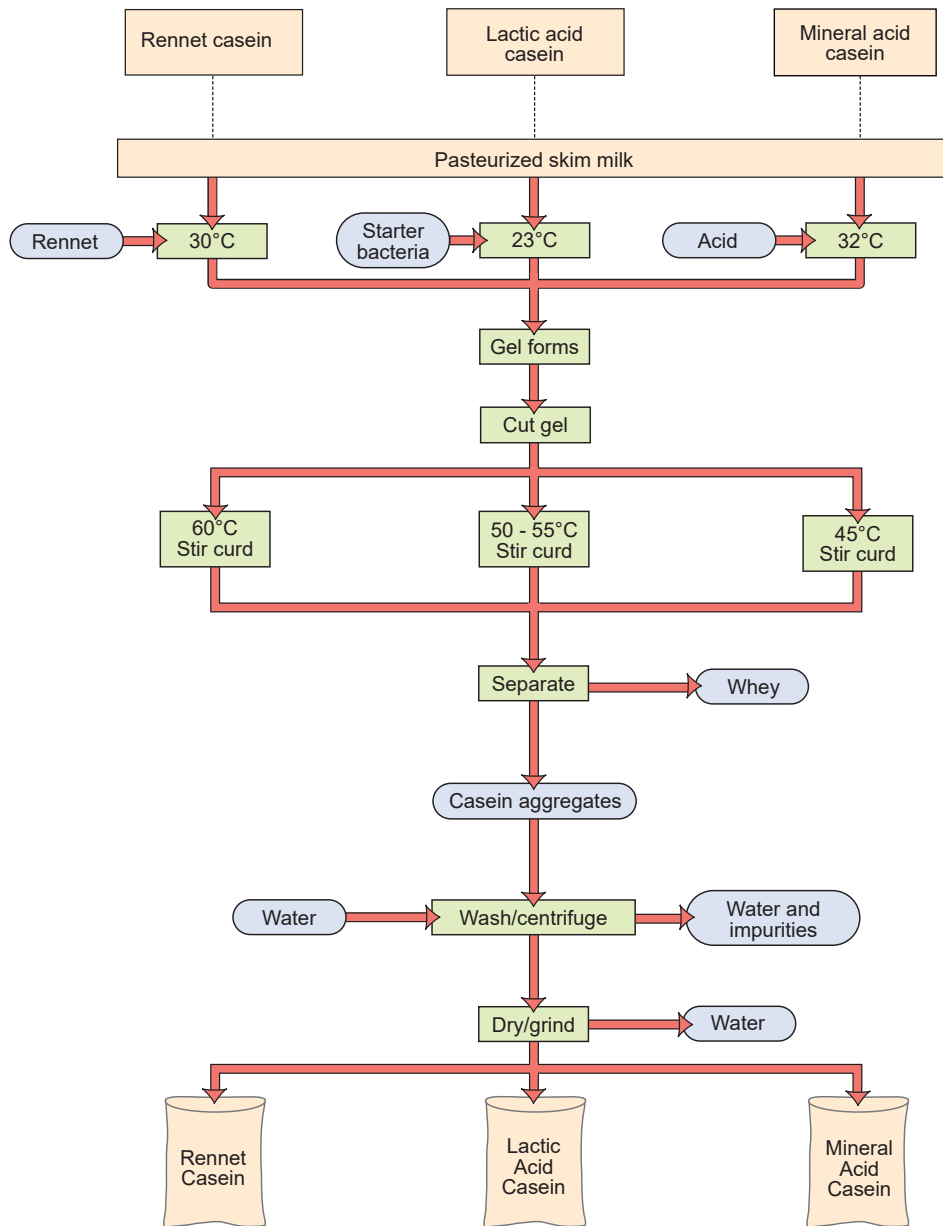
\*\* Expressed in anhydrous form

### Specifications for US Grades of acid casein\*

| Component           | Extra                        | Standard  |
|---------------------|------------------------------|-----------|
|                     | ----- not less than -----    |           |
| Protein (db)        | 95%                          | 90%       |
|                     | ----- not greater than ----- |           |
| Milkfat             | 1.5%                         | 2.0%      |
| Moisture            | 10%                          | 12%       |
| Titrateable acidity | 0.20%                        | 0.27%     |
| Scorched particles  | 15 mg                        | 22.5 mg   |
| Bacteria            | 30,000/g                     | 100,000/g |
| Coliforms           | none/0.1g                    | 2/0.1g    |

\* USDA Dairy Standards for grades of casein (acid)

## Manufacture of Casein



## Typical composition and characteristics

### Rennet casein

- ♦ Typical composition

|              |      |
|--------------|------|
| Protein (db) | 90%  |
| Moisture     | 10%  |
| Lactose      | 0.5% |
| Fat          | 1%   |
| Ash          | 8%   |

- ♦ Characteristics

Color: white to cream  
Flavor: bland  
pH 7

- ♦ Storage

<26 C, <65% rh  
12 months

### Acid casein

- ♦ Typical composition

|              |      |
|--------------|------|
| Protein (db) | 90%  |
| Moisture     | 10%  |
| Lactose      | 0.5% |
| Fat          | 2%   |
| Ash          | 2.5% |

- ♦ Characteristics

Color: white to cream  
Flavor: bland  
pH 4.6

- ♦ Storage

<26 C, <65% rh  
18 months