# Quadrant II – Transcript and Related Materials

**Programme: Bachelor of Science (Third Year)**

**Subject: Zoology**

**Course Code: ZOD 102**

**Course Title: Applied Zoology**

**Unit: 7- Dairy**

**Module Name: Milk products: composition, preparation and uses – cream, butter, curd**

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**Notes**

**Introduction**

Dairy is the production and marketing of milk and its products. Dairy animals include cows, bulls, buffalo, sheep and goat.

Composition, preparation and uses of cream

Cream is the fatty layer that arises at the top of milk when stands undisturbed for some time. It can defined as the portion of milk rich in milk fat.

Cream is a product of cow or buffalo milk or a combination and contains a minimum of 25% milk fat.

Cream contains all the milk constituents. Milk fat in cream may vary from 18 to 85 %. Cream can be classified as market cream for consumption of manufacturing cream meant for manufacturing of dairy products

- The types of cream include;
- Table cream
- Light cream containing 20-25% milk fat
- Coffee cream
- Whipping cream containing 30-40% milk fat

- Heavy cream
- Plastic cream - containing 65-85% milk fat

**Composition of cream**

- Chemical composition is as follows-

| | Cream with 30% fat | Cream with 50% fat |
|---|---|---|
| Water | 64.0% | 44.43% |
| Fat | 30.0% | 50.00% |
| Protein | 2.4% | 1.69% |
| Lactose | 3.5% | 2.47% |
| Minerals | 0.4% | 0.37% |
| SNF | 6.3% | 4.53% |

Preparation of cream

Separation of cream is based on the principal that milk fat is lighter than the skim milk portion. At a temperature of 16oC the average density of skim milk is 1.036 and of milk fat is 0.93. Therefore when milk is subjected to either gravity or centrifugal force the two components i.e. cream and skim milk separate due to differing densities.

Methods of preparation

1. Gravity methods

When milk is allowed to stand for some time, the fat tends to rise

The rate of rise of cream is influenced by size of fat globules (the larger the faster), temperature, clumping and addition of adhesives.

2. Centrifugal methods (commercially)

When milk enters the rapid moving bowl of cream separator, is subjected to tremendous centrifugal force, 3000- 6000 times greater than gravitational force.

The differing densities of cream and skim milk causes skim milk to move towards the periphery and fat moves towards center and separated with separate outlets.

Uses of cream
Direct consumption and table/ coffee/ whipping cream
Preparation of special dishes
Production of plastic, frozen and cultured (sour) creams
Manufacture of butter, cheese, ice cream, butteroil and ghee.
Creaming cottage cheese

Composition, preparation and uses of Butter
Butter if the fat concentrate obtained by churning cream, gathering fat into compact mass.
Butter leads amongst the milk products manufactured.
The art of butter making has a long history.

Butter is a product of cow or buffalo milk or combination from cream or curd, with/without salt and annatto or carotene as coloring matter
Butter contains not less than 80% by weight of milk fat.
Diacetyl can be added as flavoring agent (not more than 4ppm)
Calcium hydroxide, sodium bicarbonate, sodium polyphosphate can be added not more than 0.2 %.

Classification
Different kinds butter differ with the type of cream used and variation in manufacturing process.
Types of butter include:
Pasteurized cream butter- made from pasteurized sweet cream. Has milder flavor.
Ripened cream butter- made from cream with pleasant delicate aroma developed before churning by ripening.

Unripened cream butter- made from unripened cream. Has mild flavor.
Salted butter- salt added
Unsalted butter- no salt added
Sweet cream butter- acidity of churned cream does not exceed 0.2 %

Sour cream butter- made from cream and has more than 0.2% acidity
Fresh butter- not undergone cold storage (less than 3 weeks)
Cold storage butter- stored at -18$^{o}$C
Dairy butter (USA)- made in farm from unpasteurized sour cream which has not been standardized for acidity (has sour flavor)
Creamery butter- made on dairy of creamery and has a more uniform quality.

Composition of butter
Table/ creamery butter should not contain less than 80% fat, not more than 1.5% curd and not more than 3% common salt.
Chemical composition is as follows-
Butter fat- 80%
Moisture- 16.3%
Salt- 2.5 %
Curd- 1%

**Preparation of butter**
Before the preparation of butter, the grading, sampling, weighing and testing of cream is essential.
Butter starter culture containing lactic acid producers such as Str. Lactis and/or Str. Cremoris, together with aroma (diacetyl) producers such as Str. diacetilactis in adequate proportions added to standardized, pasteurized and cooled (20- 22oC) cream at 21oC for 15- 16 hours.
Churning of cream involves agitation at suitable temperature until fat globules adhere forming larger mass.
The fat in milk/cream exists as a stable emulsion
Higher the percentage of fat, lower the is the churning period.
Optimum fat level ranges between 30- 35%.
Optimum temperature of churning ranges from 9- 11oC.
When the cream is churned the buttermilk is removed.
Washing with chilled water is done to remove buttermilk adhered to butter to reduce curd content.
Further, salt is added to enhanced taste

Butter can be removed from the churn either manually, by gravity or mechanical means (compressed air)

Uses of butter
Direct consumption
In preparation of sauces
Cooking medium
Baking and confectionary industries
Ice cream and ghee manufacturing

Composition, preparation and uses of curd
Curd is a product of cow or buffalo milk or a combination.
To prepare curd a starter culture containing Streptococcus thermophilus and Lactobacillus casei are added to processed milk.
Curd should have the same percentage of fat and soilds-not-fat as the milk from which it is prepared.
Indian curd, also known as dahi is classified-
For churning into indigenous (desi) butter (mhakhan)
For direct consumption (further classified as: )
Whole milk dahi
Skim milk dahi
Sweet dahi
Sour dahi
Sweetened dahi

Composition of curd
Curd
Water - 82.78%
Fat - 7.7%
Protein- 3.4%
Lactose- 3.6%
Lactic acid- 0.8%
Minerals- 0.7%

Calcium- 0.12%
Phosphorus- 0.9%

Preparation of curd
To prepare curd the milk is boiled and cooled to 20-22oC and starter culture, 1-2 % of milk amount is added to milk and left untouched for 8-10 hours. The developing curd is placed in refrigerator or cold storage till consumed

Uses of curd
Whole milk curd
Can be directly consumed with salt/sugar or as beverage
Preparation of products such as srikhand and chakka
Preparation of desi butter
Skim milk curd
Direct consumption, especially heart patients due to low fat content.