



Univerza v Ljubljani

**Biotehniška** fakulteta

Oddelek za zootehniko



INŠTITUT ZA MLEKARSTVO IN PROBIOTIKE  
INSTITUTE OF DAIRY SCIENCE & PROBIOTICS

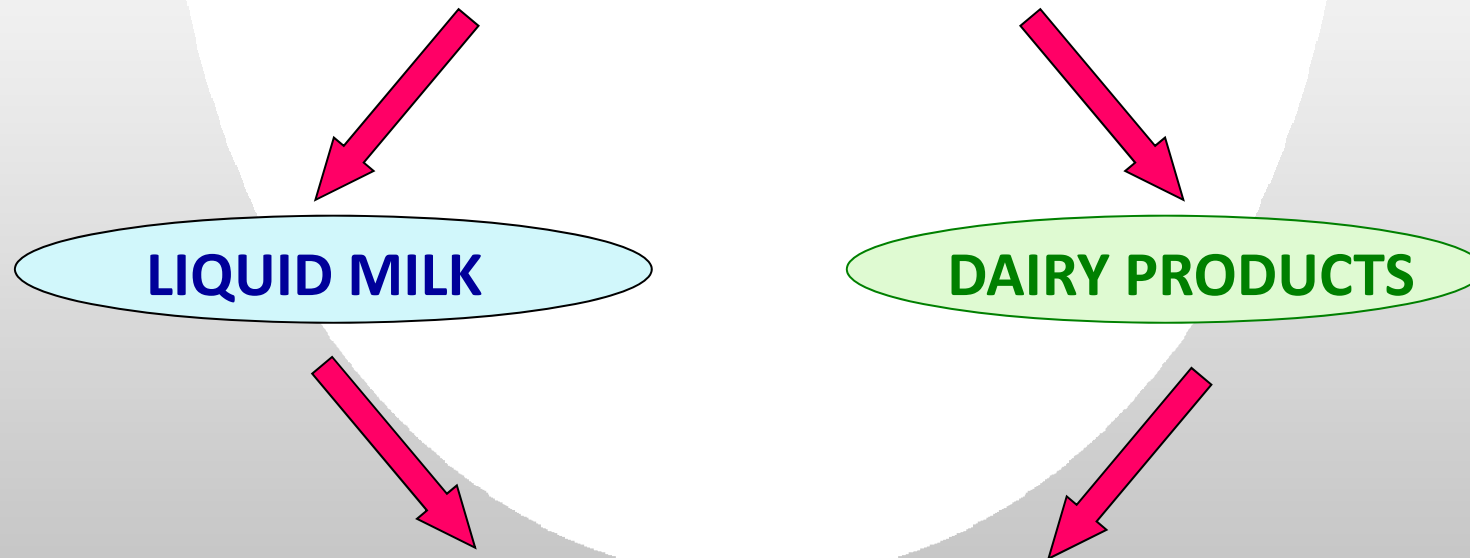
# MILK ANALYSIS

Domžale, 8-9 May 2018



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# PRODUCTION, TREATMENT, PROCESSING OF MILK



OF HIGH AND STANDARDISED QUALITY

# QUALITY OF MILK

enzyme system of milk, composition of milk fat and proteins, groups of microorganisms that compose microbial population of milk, minerals composition, content of citrate, urea

TECHNOLOGICAL

heat stability of milk, coagulation properties, promotion of growth and activity of starter cultures, development of taste and aroma, stability of product

MICROBIOLOGICAL

total bacterial count,  
pathogenic bacteria

SENSORIAL

odor, taste, color,  
flavor, consistency

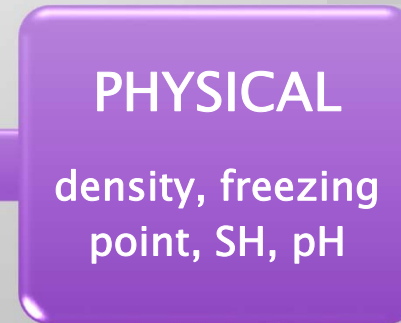
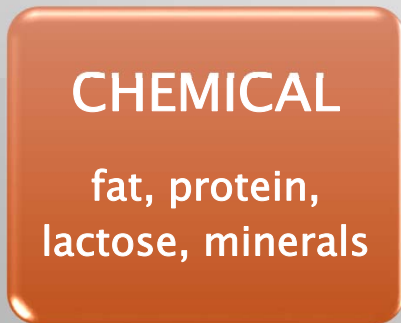
CHEMICAL

fat, protein,  
lactose, minerals

QUALITY

PHYSICAL

density, freezing  
point, SH, pH



## MILK POLLUTANTS

- heavy metals, pesticides, aflatoxins, detergents, disinfectants, antibiotics (resistance against antibiotics, prevent lactic acid fermentation)

## MICROBIOLOGICAL STATUS

- **SAFETY** (salmonella, *E. coli*, proteus, staphylococci, sulphite reducing clostridia, campylobacter)
- **SHELF-LIFE + TASTE** → TOTAL PLATE COUNT

## SOMATIC CELLS

- dead body cells and defense cells (white blood cells or leukocytes, macrophages); 100.000–250.000 SC/ml, up to 400.000, more indicate to mastitis

## RECKNAGEL PHENOMENON

- hydration of milk proteins, solidification of milk fat, lesser extent to escaping of air bubbles; density is measured at least 3–6 h after milking

## COLOSTRUM

- increased immunoglobulins

# MICROBIOLOGICAL QUALITY OF MILK

Quality class	TBC/ml
E extra quality	Up to 50.000
1. Quality class	50.001 to 100.000
2. Quality class	100.001 to 400.000
3. Quality class	400.001 to 800.000

IN THE PAST

TODAY

up to **100.000 CFU/ml** → microbiologically proper milk (trends of raw milk consumption are increasing)

# PAYMENT OF MILK

- In Slovenia milk is paid according to the deed of sale contract between milk producer and milk processor (dairy plant)
- Minimal purchase price is price of milk with at least 3.7 % of fat and 3.15 % of protein

According to the national regulation „**Pravilnik o elementih za oblikovanje odkupne cene kravjega mleka**“ (Uradni list RS, št. 107/01, 52/02 in 21/15), paragraph 3 quote elements that form the purchase price of milk as follows:

- **milk composition**, which is based on the content of fat and protein, determined in last month
- **hygiene quality of milk**, which is based on the geometric average of total bacterial count (TBC) determined in last two months, and is based on geometric average of somatic cell count (SCC) determined in last three months
- **freezing point** of milk;
- **temperature of milk** at milk taking (milk collection unit)

# According to regulations, milk must meet following criteria:

- that is milked for at least 30 days before and no less than 8 days after calving
- that has a characteristic smell, taste and color
- that freezing point is not higher than  $-0.52\text{ }^{\circ}\text{C}$ , the refractive number not lower than 39
- that contains at least 3.2 % of milk fat
- that has a density from 1.028 to  $1.034\text{ g/cm}^3$  at  $20\text{ }^{\circ}\text{C}$
- that the titratable acidity level does not exceed 7.2 SH (or pH 6.5 to 6.7),
- that withstand the alizarol test with 71.5 % alcohol
- that immediately after milking, milk is cooled to less than  $8\text{ }^{\circ}\text{C}$  or transferred to a collection center and then cooled to less than  $6\text{ }^{\circ}\text{C}$ .

In addition to these criteria, the quality of milk also consider:

- that the content of fat-in-solids (FiS) is at least 27.5%
- that the content of solids-non-fat (SNF) is at least 8.5%.

# PRESERVATION OF MILK SAMPLES

## ALLOWED

Determination of main components of milk (Milkoscan)

Determination of somatic cell count (Fossomatic)

Determination of total bacterial count (Bactoscan)

## NOT ALLOWED

Determination of total bacterial count on petri dishes

Determination of freezing point

Determination of antibiotics and other inhibitory substances

Sensory analysis