

MILK ANALYSIS





Milk Processing Toolkit



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1.- Milk Analysis - General Information

To obtain a final well-qualified product, the milk should present some physiochemical characteristics. The characterization of the products can be performed by applying the tests presented in the Milk analysis flowchart.

2.-Milk Analysis Processing

Milk Analysis Processing



2.1.-Density

The density is a relationship between the body mass and the volume this body occupies in the space. The density test is performed in order to be used in the detection of adulteration in the milk, since the addition of water only would cause the decrease in density, whereas the skimming (fat removal) would cause an increased density in the milk, besides supplying important information for the determination of the total dry extract.

Materials

- Thermolactodensimeter (TLD)
- Test tube (250 mL)

Determination methods

The density determination is accomplished by the thermolactodensimeter because the practicability of this method.

- Place the sample to be analyzed in the clean and dry test tube, by taking the care of inclining the test tube and allowing the liquid to flow down the walls of the glass for avoiding the incorporation of the air which would reduce the density of the milk;
- Immerse TDL into the test tube and make it rotate slowly on its own axis;
- Perform the reading of both density and temperature of the milk, as soon as TDL stabilizes;
- Proceed to the correction of the influence from the temperature, by using an adequate scale. The result will correspond to the corrected milk density.

2.2.-Fat Content

Fat is the most variable component (from 2.8 to 6.5%) of the milk, and has a higher commercial value. Its determination became almost a routine in the dairies, because the easiness it is removed from the milk

Materials and reagents

- Gerber butyrometer for milk and appropriate corks;
- Shelf for butyrometer;
- Volumetric pipette (10 and 11 mL);
- Gerber centrifuge;
- Sulfuric acid (density 1.825 g/L)
- Amyl alcohol (density 0.815 g/L)

Gerber's method

- Carefully add 10 mL sulfuric acid in the butyrometer;
- Carefully add 11 mL milk to the butyrometer, by letting it to slowly flow down the glass walls in order to it does not mix with the acid;
- Add 1 mL amyl alcohol;
- Clean the neck of the butyrometer and close with cork;
- Agitate as inverting the butyrometer so the three liquids are mixed;
- Centrifuge for 4 to 5 minutes at 1200 rpm in the Gerber centrifuge;
- Remove the butyrometer of the centrifuge and adjust the meniscus to accomplish the reading.

The reading value in the scale is the result of the percent fat in the milk (% mass / volume)

2.3.-Total dry extract (TDE)

The dry extract may be defined as "all components of the milk, except water". They determine the nutritional quality and industrial yield of the milk products. The Ackermann's disk is the indirect, low cost, and more practical method to determine the total dry extract (TDE).

Material

- Ackermann's disk

Determination method

- The fat content and density are determined by conventional methods;
- The demarcation of the internal disk regarding to fat content is taken to meet the value concerning to the corrected milk density (shown in the intermediate circle);
- The reading of the value is accomplished where the arrow in the external circle is. Such as value refers to the percent total dry extract.

2.4.-Non-fat dry extract (NFDE)

The non-fat dry extract may be defined as being "all components of the milk, except water and fat". Its measure is important for verification of the water content in the milk. It is more convenient than the total dry extract because the fat can widely vary, therefore making the comparison a difficult one.

Determination methods

The non-fat dry extract is determined, by subtracting the content of fat from the total dry extract: $NFDE = TDE - \text{fat}$

2.5.-Cryoscopy

The cryoscopy measures the freezing point of the milk and it is the most effective method for the determination of faking by addition of water. The freezing point is directly related to the concentration of its water-soluble constituents (lactose and mineral salts). To determine the cryoscopy, the electronic cryoscope is used for analysis of the milk, due to its reliability, although the high cost of process is well known. For this reason, this analysis is only used for average scale.

Materials and reagents

- electronic cryoscope
- specific tubes
- freezing solution 0.422
- freezing solution 0.621

Method

- Calibrate the device with the freezing solutions before beginning the analyses. - Take out 2.5 mL milk of the sample to be analyzed and place it into the appropriate cryoscope tube.
- Clean the electrode of the equipment with absorbent paper
- Switch on the equipment
- Wait for the thermal sign of the analysis
- Read on the digital display. The result indicates either the value of the freezing point depression in Hortvet degrees and the percent water.

2.6.-Acidity

The acidity determination is a fundamentally important test for the industry because it indicates the convenience or inconvenience of using the milk. The acidity of the milk can be determined by the "Alizarol test".

Material and reagents

- Salut acidimeter
- 76% Alizarol solution

Method

- Mix 2 mL of the milk to be analyzed with 2 mL of the alizarol solution;
- Observe both the coloration and texture of the mixture;
- The acid milk presents a mixture where the coloration of the alizarol is rosy (little acid) or yellow (very acid), besides presenting clots;
- The normal milk presents a mixture with a brick-red coloration and clotless;
- The alkalinized milk (usually by increment of water or neutralizing substance) presents violet coloration.