



Practical Exercise 2

Platform tests for milk

Objective

Platform tests of milk are the commonly used tests carried out at collection and/or reception for rapid evaluation of quality of the incoming raw milk. These are carried out at the Milk Collection Centres and at Milk Processing Plants. This is important in dairy processing as single lot of milk of poor quality can spoil the whole mixed milk lot. Platform tests do not directly involve the laboratory analysis of raw milk samples. The suspected milk will be segregated and will not be mixed with bulk milk. The milk not fulfilling the compliance with previously set quality standards is subjected to rejection.

A. Organoleptic tests

Quality of milk judged by a person's senses view, smell, and taste is called organoleptic tests. The tests are the first screening of incoming raw milk at reception dock. No equipment is required for conducting the tests. Trained and experienced person yield the reliable results. The appearance of milk and lid of milk can is observed and inspected instantly after removal of lid. Judge smells the milk, observes the appearance, checks the can for cleanliness, looks for sediment, flies, etc. and tastes if necessary. For classifying the milk according to cleanliness, milk is filtered with a special milk filter. If there is any doubts the milk samples are subjected to other laboratory tests for confirming the quality.



Protocol

1. Open the can/ container of milk.
2. Immediately smell the milk.
3. Observe the appearance of the milk.
4. If still unable to make a clear judgement, taste the milk, but do not swallow it. Spit the milk sample into a bucket provided for that purpose or into a drain basin, flush with water.
5. Look at the can lid and the milk can to check cleanliness.

Observations/Judgement

- Condition of containers/cans : _____
- Appearance of milk : _____
- Colour of milk : _____
- Extraneous matter : _____
- Accept/reject milk : _____
- Comments : _____

Abnormal smell and taste may be caused by:

- *Atmospheric taint (e.g. barny/ cowy odour).*
- *Physiological taints (hormonal imbalance, cows in late lactation-spontaneous rancidity).*
- *Bacterial taints.*
- *Chemical taints or discolouring.*
- *Advanced acidification ($\text{pH} < 6.4$).*



B. Indicator test

The acidity developed in milk due to bacterial activity is measured in terms of pH value as indicated by special indicator dyes, e.g. brom thymol blue and brom-cresol purple.

Observation

Acidity of milk : _____

Accept or reject milk : _____

C. Sediment test

Milk is passed through a funnel containing a filter disc and the amount of dirt and dust collected is compared visually or by weight. The test indicates the gross impurities and dirt in milk as a result of unhygienic conditions of production.

Sediment test

Presence of sediment : _____

Accept or reject milk : _____

D. Lactometer or density test

During the organoleptic inspection, if the milk appears to too thin and watery and its colour is “blue thin”, it is suspected that the milk contains added water. Lactometer test serves as a quick method to determine adulteration of milk by adding water. The test is based on the fact that the specific gravity of whole milk, skim milk and water differ from each other.

The density or specific gravity of milk is determined by lactometer reading. At 15 °C the normal specific gravity of the milk ranges from 1.028 to 1.033. Below the value indicate the possible addition of water to the milk. It is also possible the lactometer reading can be combined with the fat test to have the total solid levels in milk. Density of fat is lower than that of milk. Results of the low fat test and higher specific gravity indicate the possible skimming of milk. Results of low fat test and low specific gravity indicate the possible addition of water in milk. Always read the temperature of the milk first; the lactometer reading varies according to temperature.



Fig.2.1. Measurement of density of milk using lactometer

Observations

1. Type of lactometer : _____
2. Temp of milk : _____
3. Lactometer reading : _____
4. Specific gravity of milk : _____

E. Clot-on-boiling test

This test is performed simply by heating a small amount (5 ml) of milk in a test tube over a flame or by immersing it in boiling water for four minutes. The result can be seen immediately. If the milk is sour or if the milk is abnormal (colostrum or mastitis milk) the milk will clot and not pass this test. Heating will precipitate the proteins in the milk if it is sour. This test is not very sensitive to slightly sour milk, but still very useful. If no coagulation occurs the milk can stand heating operations at the time of testing.



Protocol

1. Boil a small amount of milk in a test tube.
2. Observe the clot formation, coagulation or precipitation.
3. When the developed acidity of milk is more than 0.20% Lactic acid, COB test is positive.

F. Alcohol test

Alcohol test is used for rapid determination of an elevated acidity or alteration of salt balance due to admixing of colostrums to milk. It is carried out by mixing equal quantities (2 ml) of milk and of a 68% ethanol solution (made by mixing 68 ml of 96% alcohol with 28 ml distilled water) in a test tube. If acidity of milk is more than 0.21% acid, the milk will be coagulated. The milk will not be suitable for heat processing like pasteurization. Hence, alcohol test is recommended for each and every incoming milk-can and container, whenever the milk is to be pasteurized. If the result of the alcohol test indicates a too high acidity, a milk sample can be taken to the laboratory for a more detailed testing by the titratable acidity test.

Protocol

1. Mix equal amounts of milk and 68% of ethanol solution in a small test tube. For routine testing 2 ml milk is mixed with 2 ml 68% alcohol.
2. Observe the coagulation, clotting or precipitation in milk.
3. The first clotting due to acid development can first be seen at 0.21-0.23% lactic acid.

G. Alcohol-Alizarin test

The procedure for carrying out the test is the same as for alcohol test but this test is more helpful. Alizarin is a colour indicator changing colour according to the acidity of milk. The Alcohol-Alizarin solution can be bought readymade or be prepared (0.4 g alizarin powder) in 1 lit of alcohol (61%).



Protocol

1. Mix equal amounts of milk and 68% of ethanol solution in a small test tube. For routine testing 2 ml milk is mixed with 2 ml 68% alcohol.
2. Observe the coagulation, clotting or precipitation in milk and change in colour of milk.

Observations/Results for alcohol-alizatin test

Parameter	Normal milk	Slightly acid Milk	Acid milk	Alkaline Milk
pH	6.6 – 6.7	6.4 – 6.6	6.3 or lower	6.8 or higher
Colour	Red brown	Yellowish-brown	Yellowish	Lilac
Appearance of milk	No coagulation no lumps	No coagulation	Coagulation	No coagulation

H. Titratable acidity test

Test measures the concentration of lactic acid in the milk. Higher acidity (more than 0.18 % lactic acid) indicates that milk quality is poor and it cannot be heated and processed as during heat processing milk will be curdled. Sodium hydroxide solution is added to the milk by titration. More the sodium hydroxide solution required for neutralization higher the acidity of the milk.

Materials

- Small conical flask or beaker
- Pipette (1 and 10 ml)
- Burette (0.1 ml graduations)
- Phenophtalein indicator solution (0.5% in 50% alcohol)Sodium hydroxide solution (1/9 N)

Procedure

1. Take 10 ml of the milk into conical flask or beaker
2. Add 1 ml Phenophtalein indicator in the milk and mix thoroughly.



3. Titrate the milk against 1/9 N NaOH using burette under continuous mixing, until a faint pink colour appears.
4. The volume of Sodium hydroxide solution required for titration is divided by 10 expresses the percentage of lactic acid.

I. Gerber test to determine fat content in milk

Test is used to determine fat content of milk. Some milk is added to a butyrometer together with sulphuric acid and amyl-alcohol. A special centrifuge and a water bath are needed for this test. The test does not give an accurate result when the fat content of the milk is less than 3.2%.

Materials

- Gerber butyrameters (0-6% or 0-8% BF)
- Rubber stoppers for butyrometers
- 10.94 or 11 ml pipettes for milk
- 10 ml pipettes or dispensers for Gerber Acid
- 1 ml pipettes or dispensers for Amyl alcohol
- Stands for butyrometers
- Gerber sulphuric acid (sp. gr. 1.82)
- Amyl alcohol

Protocol

1. Mix well the fresh milk (approx. 20°C) and warm low temperature of stored milk to approx. 20°C before mixing.
2. Transfer 10 ml sulphuric acid to the butyrometer
3. Add 10.75 ml of well mixed milk into the butyrometer slowly.
4. Add 1 ml of Amyl alcohol and insert stopper.
5. Shake the butyrometer gently till the curd dissolves and place the butyrometer in the water bath (65°C) for warming



6. Place the butyrometer in the centrifuge with the stem (scale) pointing towards the centre of the centrifuge and centrifuge at 1100 rpm for 5 min.
7. Take the butyrometers after centrifugation.
8. Put the butyrometers in a water bath (65°C) for 3 min.
9. The fat column should be read from the lowest point of the meniscus of the interface of the acid-fat to the 0-mark of the scale and read the butterfat percentage.

J. 10 min Resazurin test

Resazurin test is the most widely used test for hygiene and the potential keeping quality of raw milk. Resazurin is a dye indicator. Under specified conditions Resazurin is dissolved in distilled boiled water. The Resazurin solution can later be used to test the microbial activity in a given milk sample. The 10 min Resazurin test is useful and rapid, screening test used at the milk platform. The 1 hr test and 3 hr tests provide more accurate information about the milk quality, but after a fairly long time. They are usually carried out in the laboratory.

Materials

- Resazurin tablets
- Test tubes with 10 ml mark
- 1 ml pipette or dispenser for Resazurin solution.
- Water bath thermostatically controlled
- Lovibond comparator with Resazurin disc 4/9

Protocol

1. The solution of Resazurin as prepared by adding one tablet to 50 ml of distilled sterile water. Resazurin solution must not be exposed to sunlight, and it should not be used for more than eight hours because it loses strength.
2. Mix the milk and with a sanitized dipper put 10 ml milk into a sterile test tube.
3. Add one ml of Resazurin solution, stopper with a sterile stopper, mix gently the dye into the milk and mark the tube before the incubation in a water bath, place the test



tube in a Lovibond comparator with Resazurin disk and compare it colourimetrically with a test tube containing 10 ml milk of the same sample, but without the dye (Blank).

Observations

Resazurin disc No.	Colour	Grade of milk	Action
6	Blue	Excellent	Accept
5	Light blue	v. good	Accept
4	Purple	Good	Accept
3	Purple pink	Fair	Separate
2	Light pink	Poor	Separate
1	Pink	Bad	Reject
0	white	Very bad	Reject

K. Detection of Adulteration:

a) Detection of starch

- Take 3 ml milk in a test tube.
- Boil the milk sample.
- Cool it and add a few drop of iodine solution (1%).
- Appearance of blue colour indicates the presence of starch.
- Blue colour disappears when the sample is boiled.

b) Detection of cane sugar

- Take 1 ml milk in test tube.
- Add 1ml HCl.
- Add 0.1g resorcinol powder and mix well.
- Place the test tube in boiling water for 5-10 min.



- Appearance of red colour indicates the presence of cane sugar in milk sample.

c) Detection of neutralizers

- Take 1 ml milk in test tube.
- Add 5 ml alcohol.
- Add a few drops of rosolic acid solution (1%) and mix well.
- Appearance of rose red colour indicates the presence of carbonate.

Activities

- Perform the various platform tests by taking pure raw milk, old acidic milk, and raw milk with added adulterants.
- Visit a milk collection centre/ dairy plant reception doc and observe and note down the activities performed by the analysts.

REVIEW QUESTIONS

1. Define platform tests?
2. What is the need of platform tests in a milk reception doc?
3. How are water addition/ skimming of milk checked?
4. What is the importance of 10 min Resazurin test?
5. What is importance of alcohol test?
6. Define developed acidity of milk.