Identification of Adulteration Present in Milk Products

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Abstract: **Milk may contain some harmful microorganisms like bacteria along with some potentially beneficial microbes. Microbiological analysis of milk is carried out to determine the degree of bacterial contamination in milk and to understand the chemical changes brought in milk as a result of microbial action. Pasteurization is done to destroy such harmful bacteria. If pasteurization of milk is not carried out properly there will be presence of larger count of bacteria in the milk. Methylene blue Reduction test is used to detect the presence of bacteria in milk. This test works on the principle that the methylene blue indicator is present in an oxidized form, but in the presence of bacteria, leads to the reduction of this indicator in a comparatively short span of time. The blue color developed on addition of the indicator to the milk will change to white color within a short period indicates the presence of bacteria in the milk and thus denotes improper pasteurization.**

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***Keywords*: Types of adulterants and adulterations etc.**

I. INTRODUCTION

Milk contains many other nutrients and the carbohydrate lactose. An emulsion is a suspension of droplets of one liquid into another liquid. Milk is an emulsion of fat in water. Butter is an emulsion of water in fat. The solute is known as the dispersed phase and the solvent is known as the continuous phase. Other examples of emulsions include margarine, mayonnaise, cream, and salad dressing. A colloidal solution is when matter exists in a state of division in between a true solution, which is sugar in water, and a suspension, which is chalk in water. The characteristics of a colloid are small particle size, electrical charge, and affinity of the particles for water molecules. In milk, the whey proteins are in colloidal solution. Milk is a pale liquid produced by the mammary glands of mammals. It is the primary source of nutrition for young mammals before they are able to digest other types of food. Early-lactation milk contains colostrums, which carries the mother's antibodies to its young and can reduce the risk of many diseases.

II. ADULTERATION

Noun contamination, corruption, degradation, deterioration, fraudulence, infection, perversion, pollution, spuriousness.

Associated concepts: drugs, food, purity of food

See also: contaminate, defilement, detriment, dissolution

Adulteration: This term denotes the act of mixing something impure with something pure, as, to mix inerior liquor with wino; au inferior article with coffee, tea, .and the like.

Full definition of adulterate:

1] Transitive verb
2] To corrupt, debase, or make impure by the addition of a foreign or inferior substance or element; especially*:* to prepare for sale by replacing more valuable with less valuable or inert ingredients

Adulteration" is a legal term meaning that a food product fails to meet federal or state standards. Adulteration is an addition of another substance to a food item in order to increase the quantity of the food item in raw form or prepared form, which may result in the loss of actual quality of food item. These substances may be other available food items or non-food items. Among meat and meat products some of the items used to adulterate are water or ice, carcasses, or carcasses of animals other than the animal meant to be consumer.

III. MATERIALS AND METHODS

(1) Detection of Maltodextrins in Milk:

Reagents:

Trichloroacetic acid (TCA) solution: 10% (w/v) solution in distilled water.

Barium chloride solution: 2% (w/v) in distilled water.

Procedure:

- Put 20 ml of milk in a beaker, boil and cool.
- Coagulate the milk usSing 10% TCA solution.
- Filter through Whatman filter paper no. 42 and collect the filtrate.
- Add 2 ml barium chloride solution to the filtrate and mix well.
- Observe the colour.

Interpretation: Appearance of blue colour indicates the presence of maltodextrins.

(2) Detection of Skimmed Milk Powder in Milk:

Principle: The reducing groups present in the proteins of milk powder reduce molybdenum resulting in formation of blue colour.

Reagents:

- Diluted acetic acid: 4% (v/v).
- Phosphomolybdic acid solution: 1% (w/v) solution in distilled water.

Procedure:

- Take 50 ml of milk in a 60 ml centrifuge tube.
- Place the tube in the centrifuge and balance it properly. Centrifuge at 3000 rpm for 15 minutes.
- Decant the supernatant creamy layer carefully.
- Add 0.5 ml of diluted acetic acid for coagulation and then add 2 ml of phosphomolybdic acid solution. Mix the contents thoroughly.
- Heat in a water bath at boiling temperature for 15 minutes and then cool.
- Observe the colour of the curd obtained.

Interpretation: The curd obtained from pure milk shall be greenish in colour whereas the curd of sample containing skimmed milk powder shall be bluish in colour. The intensity of bluish colour depends on the amount of the skim milk powder present in the sample.

(3) Detection of Gelatin in Milk:

Principle: The type and colour of the precipitate formed by picric acid and mercuric nitrate in presence of gelatin differ from the precipitate formed in absence of gelatin in milk.

Reagents:

- Mercuric nitrate solution: Dissolved mercury in twice its weight of nitric acid and dilute to 25 times its volume with distilled water.
- Picric acid solution: Saturated solution of picric acid in distilled water.

Procedure:

- Take 10 ml of sample, add 10 ml mercuric nitrate solution and shake the mixture.
- Add 20 ml distilled water, shake again and let it stand for 5 minutes and filter. If much gelatin is present, filtrate will be opalescent and a clear filtrate cannot be obtained.
- To a portion of filtrate in a test tube, add equal volume of saturated aqueous picric acid solution.
- Observe the colour and type of the precipitate formed.

Interpretation: Yellow precipitate is produced in the presence of considerable amount of gelatin. Smaller amounts of gelatin are indicated by cloudiness.

Notes:

- The test is applicable to milk products also.
- In applying this test to sour, fermented, cultured, or very old samples of milk, cream or butter milk, sterilized cream or evaporated milk or cottage cheese, care should be exercised to recognize precipitate produced by picric acid when added to the mercuric nitrate filtrates from these materials in absence of gelatin. Such samples with or without rennet and entirely free from gelatin, give on standing distinct precipitate when treated as above. In every case, however these precipitates differ in character than those produced by picric acid with gelatin.

Gelatin picric acid precipitate is finely divided, more apt to remain in suspension, settles only slowly and adheres tenaciously to the bottom of the container, from which it is rinsed with difficulty. Precipitates produced by picric acid in the absence of gelatin are flocculent, separate readily (leaving serum practically clear) do not adhere to walls of container and are easily removed by rinsing with distilled water. When gelatin is present in sample gelatin picric acid precipitate will remain in suspension long after flocculent precipitate has settled, but on standing overnight the characteristic sticky deposit will be found adhering tenaciously to bottom and sides of the test vessel. If gelatin is present in relatively high concentration (1%), picric acid precipitate will be voluminous and will settle rather quickly.

(4) Detection of Foreign Fat in Milk by Butyrorefractometer Reading:

Principle: Fat is extracted from milk and its refractive index is determined and compared with that of the pure milk fat. This test can be done with the fat extracted during determination of fat in milk with the Rose-Gottlieb method.

Procedure:

- Stabilize the temperature of the refractometer to within 40ºC ± 0.1ºC by using a thermostatically controlled water bath with a provision to circulate water through the refractometer.
- Calibrate the refractometer with a glass plate of known refractive index by placing it on the prism with a drop of alpha bromonapthalene as the contact liquid. (In the absence of butyro refractometer, use Abbe refractometer which can be standardised with distilled water. The refractive index of distilled water at 20ºC is 1.3330 and at 40ºC is 1.3306).
- Take the Butyro-refractometer reading (BRR) at 40ºC of the fat extracted during determination of fat in milk sample by Rose-Gottlieb method.

Interpretation: If the BRR differs from the prescribed limit of variability, presence of foreign fat in the milk may be suspected. Butyrorefractometer reading of 1-100 corresponds to the refractive index between 1.4220-1.895 and the refractive index can be read to the fourth decimal place.

Note: The tests based on determination of BRR of milk fat cannot detect presence of hydrogenated fat, palm kernel oils and coconut oil as their BRR are close to those of milk fat.

(*5) Detection of Carbonates in Milk by Rosalic Acid Test:*

Principle: Rosalic acid gives rose red colour in alkaline conditions due to presence of carbonates.

Reagents:

- Rosalic acid solution: 1% (w/v) in ethyl alcohol
- Ethyl alcohol - 95% (v/v)

Procedure:

- To 10 ml of milk add equal volume of ethyl alcohol in a test tube.
- Add a few drops of rosalic acid solution.
- Observe the colour of the solution.

Interpretation: If alkali is present a rose red colour appears whereas pure milk shows only a brownish colour.

Note: This test does not indicate presence of carbonates in milk if the developed acidity in milk has neutralized the added carbonates.

IV. CONCLUSION

Adulterated Milk and Milk Products are dangerous to any leaving organism. Knowledge of adulteration of any food is essentional for each and every leaving organism.

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