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Short Communication Article

A POTENTIAL AWARENESS TOWARDS THE COMMON MILK TESTING

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Abstract

The control of milk is very essential point of concern due to adulteration in milk is very prone object of discussion nowadays in media, source of milk does not matter whether we are getting it by milkman (loose milk) or pasteurized milk. We should must be aware of the major testing for the milk which is carried out by the some laboratory as well as in home, to securing good health by avoiding the consumption of poor unhygienic milk. Testing of milk is being performed for various reasons that are; it can serve to help a dairy producer identify inefficiencies in the production of milk that, if minimized, could help improve profits. Secondly, it helps quality control personnel (in dairy plants and regulatory agencies) to monitor milk quality, assuring that final products on the shelf meet the public's expectations for a safe and nutritious food. We enlisted some of major milk test which may be performed easily in the small laboratory or at home.

Keywords: Adulteration, Milk, Starch, Detergents, Urea.

Introduction

Testing for the quality of milk is performed for various reasons. Firstly it can serve to help a dairy producer identify inefficiencies in the production of milk that, if minimized, could help improve profits. Secondly, it helps quality control personnel (in dairy plants and regulatory agencies) to monitor milk quality, assuring that final products on the shelf meet the public's expectations for a safe and nutritious food.

Types of Liquid Milk:-

Buffalo milk, cow milk, goat milk, sheep milk, mixed milk, standardised milk, full cream milk, recombined milk, toned milk, double toned milk, and skimmed milk as laid down under PFA (Protection For Abuse) Rule.

Routine Tests:

The "Milk Quality Report" shows those tests performed on a routine basis; components, added water, inhibitors, plate loop count, sediment analysis and somatic cell count. Component analysis is done on raw milk for the benefit of producers. There are no regulations requiring a specific level of any of these components (butterfat, protein and lactose) in the raw product.

Regulations do apply at retail if identified on the product label (e.g. 2% butterfat milk).

Added water is measured through the analysis of the freezing point of the milk. The freezing point is either measured in °C or °H (degrees Hortvet).

The legal limit for cow's milk is -0.508°C (-0.530°H). However as any sample approaches this temperature, producers will be warned that there is a potential problem that should be looked into. Warnings start at -0.512°C (or -0.535°H). There is currently no legal limit for goat's milk due to variations between breeds, however -0.553°C (or -0.572°H) is considered to be normal goat's milk. There is no current standard for sheep's milk.

Two different tests are used for the measurement of antibiotics; these are the Charm Rosa and the Standard disk assay. Both are commonly used in this country and are able to detect antibiotics at the legal limits. When animals are treated with antibiotics, according to the manufacturer's recommendations or in accordance with veterinary advice, there will not be any measurable level in the milk. If however, the animal is treated and not held off the milk line for the period recommended, then a whole bulk tank and even a tanker truck can be positive.

"Other tests are available at the request of producers, regulatory officials or field personnel to try to produce the best possible milk. These include preliminary incubation count (looks for milk spoilage organisms), individual somatic cell counts (to identify problem animals), bulk tank streptococcus count (to identify a streptococcus mastitis problem in a herd), bulk tank coliform count (usually identifies milk that is contaminated by coliforms), laboratory pasteurization count (looks for the number of organisms that survive pasteurization and can cause spoilage on the shelf), and psychrotrophic count (looks for bacteria that can grow at refrigeration temperature and therefore be a cause of spoilage)" [1]

Milk testing and quality control is an essential component of any milk processing industry whether small, medium or large scale. Milk being made up of 87% water is prone to adulteration by unscrupulous middlemen and unfaithful farm workers. Moreover, its high nutritive value makes it an ideal medium for the rapid multiplication of bacteria, particularly under unhygienic production and storage at ambient temperatures. We know that, in order for any processor to make good dairy products, good quality raw materials are essential. A milk processor or handler will only be assured of the quality of raw milk if certain basic quality tests are carried out at various stages of transportation of milk from the producer to the processor and finally to the consumer.

Reason behind milk testing:

Testing milk and milk products for quality and monitoring that milk product, processors and marketing agencies adhere to accepted codes of practices costs money. There should must be good reasons why we have to have a

quality control system for the milk supplier from any of the sources.

The reasons are:

i. To the Milk Producer. (The milk producer expects a fair price in accordance with the quality of milk she/he produces.)
ii. The Milk Processor. (The milk processor who pays the producer must assure himself/herself that the milk received for processing is of normal composition and is suitable for processing into various dairy products.)
iii. The Consumer. "The consumer expects to pay a fair price for milk and milk products of acceptable to excellent quality"
iv. The Public and Government Agencies. "These have to ensure that the health and nutritional status of the people is protected from consumption of contaminated and sub-standard foodstuffs and that prices paid are fair to the milk producers, the milk processor and the final consumer."

All of the above-is only possible through institution of a workable quality testing and assurance system conforms to national or internationally acceptable standards. [2]

Quality testing of milk: Pasteurised Milk [3,4]

When milk is pasteurised at 63ºC for 30 min in batch pasteuriser or 72ºC for 15 seconds in heat exchanger, continuous flow pasteurisers, all pathogenic bacteria get destroyed, there by rendering milk safe for human consumption. Simultaneously various enzymes present in milk, and which might affect its flavour, are destroyed.

In order to determine whether or not milk has been adequately pasteurised, one of the enzymes normally present in milk phosphatase, is measured. A negative phosphatase result indicates that the enzyme and any pathogenic bacteria have been destroyed during pasteursation. If it is positive, it means the pasteurisation process was inadequate and the milk may not be safe for human consumption and will have a short shelf life.

Reagent used:

Preparation of buffer solution: Mix 0.75g anhydrous sodium carbonate and l.75g Sodium bicarbonate in 500 ml distilled water.

Buffer-substrate solution: Place 0.l5 g of di-sodium paranitrophenylphosphate(the substrate)into a clean 100ml measuring cylinder.

Add the buffer solution to make to 100 ml mark.

Store this buffer-substrate solution in a refrigerator and protected against light. It

should not be used after one week. Prepare a fresh stock.

Procedure:

Pipette 5mls buffer-substrate solution into a test tube, stopper and warm the solution in the water bath at 37ºC. Add to the test tube 1ml of the milk to be tested, stopper and mix well and place in water bath at 37ºC. Prepare a blank sample from boiled milk of the same type as that undergoing the test. Incubate both the test samples and the blank sample at 37ºC for 2hrs. After incubation, remove the tubes and mix them thoroughly. Place one sample against the blank in a Lovibond comparator" ALL PURPOSES" using A.P.T.W. disc and rotate the disc until the colour of the test sample is matched and read the disc number.

Interpretation:

Disc Reading after 2 hrs incubation at 37ºC	Remarks
0-10	Properly pasteurised
10-18	Slightly under pasteurised
18-42	UNDER PASTEURISED
> 42	NOT PASTEURISED

Important Test for The Milk [5]

1. Detection of Starch in Milk

Reagent: Iodine Solution; Dissolve 2.6 gm of iodine and 3 gm of potassium Iodide in a sufficient quantity of water and make upto 200 ml.

Procedure

Take about 5 ml of milk in a test tube. Bring to boiling condition and allow the test tube to cool to room temperature. Add 1-2 drops of iodine solution to the test tube. Development of blue colour indicates presence of starch which disappears when sample is boiled and reappears on cooling.

Quantitative determination of starch in Milk

If test for starch is positive, quantitative estimation of starch is to be carried out for determination of SNF in milk sample.

Principle:

The sample of milk is curdled with alcohol, and made free from lactose which is naturally present in milk. The precipitated starch is washed with 50 % alcohol to free it from lactose. The ppted starch is hydrolysed to convert it into reducing sugars. Reducing sugar is determined by Lane and Eynons method and multiplied with 0.9 to get the starch content in milk.

Procedure:

Weigh approx 25 gm sample in a 250 ml beaker. Add 20 ml of alcohol to curdle the milk. Filter the ppt on a filter paper and wash the ppt with50% alcohol till the ppt is free from lactose/sugar i e when the washings give a negative test with resorcinol. Transfer the ppt to a 500 ml flask with about 200 ml water and add 10 ml Conc. HCl to hydrolyse the starch by refluxing in a boiling water bath for 2.5 hours. Cool and neutralise with 10 % Sodium Hydroxide and Sodium Carbonate towards the end using litmus paper. Make upto 500 ml with water. Shake well and filter if necessary. Determine reducing sugar by Lane and Eynons method. Calculate starch as follows

% starch = % reducing sugar x 0.9

2. Detection of added Urea in Milk:

(a) Take 10 ml of milk in a test tube. Add small quantity soybean slurry (source of urease prepared by soaking soybeans overnight or for 12 hours in water and grinding to prepare a slurry). Other sources of urease can also be used. A fresh solution of urease can also be prepared by dissolving standardized urease in water so that each 10 ml of neutralized solution will convert Nitrogen of not more than 0.1 g pure urea. To determine the alkalinity of commercial urease preparation dissolve 0.1 gm in 50 ml water and titrate with 0.1 M HCl using methyl red. Add same volume of 0.1N HCl to each 0.1 gm urease in preparing urease solution Insert a strip of moistened red litmus paper into it (without touching the milk and sides of the test tube), cover the mouth of the tube with a cork or stopper to make it air tight. Shake the tube gently. Keep it aside for 5 – 10 minutes. In the presence of urea the red litmus paper turns blue.

(b) 5 ml of milk is mixed with 5 ml of 1.6 % DMAB prepared by dissolving 1.6 gm of p – Dimethyl amino benzaldehyde in 100 ml of 10 % HCl Distinct yellow colour is observed in milk containing added urea.. The control (normal milk) shows a slight yellow colour due to presence of natural urea.

3. Test for detection and estimation of added glucose in milk and milk powder

Reagents:-

(1) Modified Barford's reagent: Dissolve 24 gm of Copper acetate in 450 ml of boiling distilled water. Add 25 ml of 8.5 % acetic acid, shake, cool to room temperature and make upto 500 ml. After sedimentation filter the reagent and store in dark coloured bottle.

(2) Phosphomolybdic acid: To 150 gm of pure molybdic acid in an erlenmeyer flask add 75 gm of anhydrous sodium carbonate. Add 500 ml water in small portions with shaking, heat to boiling or until all the molybdic acid has been dissolved. Filter and add 300 ml of 85% phosphoric acid to filtrate, cool and dilute to 1 litre.

(3) **Acetate buffer** : 1 N Sodium acetate and 1N acetic acid in equal volume having 4.75 pH.

Procedure:-

To 1 ml of milk sample or 1 ml of reconstituted milk powder in a test tube add

equal vol of acetate buffer and filter. To 0.2 ml of filterate add 2.8 ml water and 2 ml of reagent.

(1) Heat the tube in boiling water for 4 minutes. After cooling for 2 minutes add 3 ml of reagent (2) and mix the contents. Development of deep blue colour indicates the presence of glucose. Filter the contents of the tube through Whatman No 42 filter paper. Collect the filtrate in a colorimetric tube, after discarding first 1 ml. Measure the absorbance in a photoelectric colorimeter, using red filter or determine absorption maxima in a spectrophotometer between

620- 780 um against blank prepared identically from a pure milk sample. The concentration of glucose in the sample can be determined with the help of a standard curve prepared from milk samples containing known amounts of added glucose i.e., 0.5, 1.0, 2.0, 5.0 percent glucose in milk.

4. Test for detection of Sodium Chloride in milk:

Take 2.0 ml of milk and add 1.0 ml of 5% potassium chromate, 2.0 ml of 0.1N silver nitrate. Appearance of red precipitate indicates the absence of dissolved chloride in milk and appearance of yellow colour indicates presence of dissolved chloride.

5. Test for Quarternary ammonium compounds in milk (detergents)

Quarternary ammonium compounds (QAC) may be present in milk due to some residual detergent solution remaining after bottle washing. The following method detects about 5 mg / Kg in milk and is included in B.S 1741: Part II . Indicator solution:- Prepare a stock solution by dissolving 0.05 gm eosin in 100 ml acetone. Shake 10 ml of stock solution with 90 ml of tetrachloroethane and 1 gm citric acid and filter before use.

Buffer :- Dissolve 25 gm citric acid in 100 ml water and adjust to pH 3.5 with 50 % Sodium Hydroxide solution (approx 15 ml required).

Procedure

To a centrifuge tube add 1 ml milk, 5 ml water, 1 ml indicator solution and 0.2 ml buffer and shake hard for 10 seconds. Centrifuge for 5 minutes at 3200 rpm. If QAC is present the bottom layer assumes a red or pink colour. Samples containing about 1 mg / kg of QAC show a faint pink colour. If the colour is deep pink or red, the amount of QAC can be approximately determined by titration with a standard anionic detergent solution

6. Test for Skimmed milk Powder in Natural milk (Cow, buffalo, goat, sheep)

Principle

The method is based on the fact that the coagulum obtained from reconstituted skim milk powder by addition of acetic acid, gives intense blue colour on boiling with Phosphomolybdic acid due to certain reducing groups present in the proteins of milk powder which are able to cause reduction of molybdenum blue resulting in formation of blue colour.

Reagents :-

(1) Acetic acid – 4 %

(2) Phospho molybdic acid - 1% solution in 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 4 % acetic acid for coagulation and then add 2 ml of 1 % phosphomolybdic acid. Mix the contents thoroughly and heat in a water bath at boiling temperature for 15 minutes and
then cool.

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

7. Test for presence of Hydrogen Peroxide:

Dissolve 1 gm V2O5 in 100 ml of 6% H2SO4 (6+94). To 10 ml of sample add 10- 20 drops of reagent and mix. The development of pink or red colour indicates presence of H_2O_2

Discussion:

Milk have very important role in most of the population across the world and milk is being made up of 87% water due to this it is prone to adulteration by unscrupulous middlemen and unfaithful farm workers. We know that, in order to make good dairy products, good quality raw materials are essential then it is possible to milk processor or handler will only be assured of the quality of raw milk after certain basic quality tests at various stages of transportation of milk from the producer to the processor and finally to the consumer.

Due to the adulteration in milk is very prone object of discussion nowadays in media especially in the festive season and it also depends upon need on deeds, source of milk does not matter whether we are getting it by milkman (loose milk) or pasteurized milk or in milk product. We should have must be aware of the major testing for the milk which is carried out by the some small laboratory as well as in home (we motioned above), to securing good health by avoiding the consumption of unhygienic milk as well as adultered milk. Milk is being performed for to help a dairy producer identify inefficiencies in the production of milk that, if minimized, could help improve profits and it also helps quality control personnel (in dairy plants and regulatory agencies) to monitor milk quality, assuring that final products on the shelf meet the public's expectations for a safe and nutritious food.

Testing milk and milk products for quality and monitoring those milk products, processors and marketing agencies adhere to accepted codes of practices costs money.

So, we should must have too aware of these common tests of milk to maintain good health of own self, to the family as well as to the community.

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