

Original Research Article

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Detection of Adulteration and Quality Evaluation of Market Milk and Raw Milk Collected from Market in Varanasi City

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ABSTRACT

The present investigation was conducted to assess the presence of adulterants and contaminants in market milk and raw milk around Varanasi city from branded, organized dairy farms and traditional vendors. The trial work has been approved out during the period of 1 February 2019 to 20 May 2019. Four milk samples were collected from each branded, organized dairy farm and traditional vendors milk centers 250- and 500-ml. quantity was collected and decontaminated throwaway plastic bottles with screw cap and each bottle was coded. The bottles were filled in ice box and proximately ecstatic to further testing. Samples were collected randomly encompassing Varanasi city. Out of 168th milk samples, 44.04% milk samples were found with water, 4.16% with urea, 22.02% with starch, 36.30% with sugar, 11.30% with glucose, 26.78% with salt and 7.38% with neutralizers. This study was conducted to know the extent of adulteration found in traditional vendors milk than organized dairy farm and branded milk samples. In this research, no adulteration was found in branded milk samples. But adulteration was found in traditional vendors and organized dairy farm milk samples. Branded milk was found in good quality for human health. The traditional vendors and organize dairy farm lack of suitable technical and educational information causes inferior quality of milk and indigenous milk especially in unorganized sector these are the main reasons for deterioration of milk. Also, the demand for the value-added milk is continuously increasing because of consumer awareness about health and nutrition. So, it is important to ensure the consumer about the quality, health and nutrition claims of such milk. This can be achieved by rapid analytical methods and techniques Research.

Keywords

Adulteration,
Market milk, Raw
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Organized dairy
farms and
Traditional vendors

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Introduction

Milk is defined as the whole, fresh, clean, lacteal secretion obtained from complete milking of one or more healthy animals excluding that obtained within fifteen days before or five days after calving or such periods as may be necessary to render the milk practically colostrum free and containing the minimum prescribed percentage of the milk fat and solids not fat so as to confirm the legal standards or other requirements (FSSAI, 2011). Milk is a completed food that invariably improves the country's food and nutritive security. Milk is a source of essential nutrients such as fats, proteins, carbohydrates, minerals and vitamins.

Being a major constituent of the diet, quality Assurance of milk is considered essential to the health and welfare of a community. However, the area of interest of developing nations is to provide enough food to the people rather than quality and hygiene of the food (Ellis and Sumberg *et al.*, 1998). Milk is a balanced food stuff with a very low microbial load at the time milking but various contaminants such as pathogenic organisms, antibiotics, pesticides, mycotoxins etc. enter during various stages of production and processing.

India ranks first in the world, in milk production producing 176.35 million tonnes (2017-18) accounting 21.32% of the total world milk production (NDDB 2017-18). India milk production and distribution system not improved and only 10% of the milk is handled by organising sector. Nearly 46% of milk produced in India is consumed as liquid milk and so there is every chance for adulteration. As there is rapid growth of population, scattered colonisation and urbanisation, milk consumption is increased but not the milk supply (Awan *et al.* 2014).

In the recent times, media has highlighted many instances of adulteration of milk and milk products with various kinds of adulterants. In general, every milk industry in India is facing problem of adulterated milk at reception dock. Therefore, milk collection centres need simple tests for detection of adulteration. The practice of adulteration of milk is as old as history, and is one of the major problems that stand against the progress of dairying in India and may also have detrimental effect on our export of dairy products. The image of milk has been considerably deteriorated due to its adulteration with harmful chemicals. With the analytical methods developed for most of the adulterants, unscrupulous traders are finding more innovative ways to adulterate the milk with cheaper ingredients.

A survey by FSSAI in 2012, 68% milk samples was found to be adulterated in which 31 % were from rural areas. Of these 16.7 % were packet or branded milk and rest were loose milk samples from dairies. In the urban areas, 68.9 % milk was found to be adulterated with water, detergent, urea and skim milk powder. Water is the most commonly used adulterant to increase the volume of milk.

Materials and Methods

Place of work

This study was directed in the Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh. The trial work has been approved out during the period of 1 February 2019 to 20 May 2019.

Collection of milk samples

The market milk and raw milk samples were collected from different branded, organized

dairy farm and vendors of Varanasi city. Four milk samples were collected from each branded, organized dairy farms, traditional milk vendors milk centres 250 and 500 ml quantity was collected from local market Varanasi city of Uttar Pradesh state, in fresh and decontaminated throwaway plastic bottles with screw cap and each bottle was coded. The bottles were filled in ice box and proximately ecstatic to further testing. All milk samples will be occupied from above 168th branded, organized dairy farm and traditional milk vendors samples four replication for judging the adulteration and quality properties of milk.

Preparation of chemicals and media

All the chemicals used in the present study, Department of Animal Husbandry and Dairying lab, were ready consulting to standard procedures. A standard milk adulteration chemical media was used for detection of adulterants, neutralizers, preservatives and thickening agents, alizarine, formalin, urea, starch, neutralizers, detergents, sodium chloride, skimmed milk powder, sugar (sucrose), glucose (dextrose) and hydrogen peroxide maltose, ammonium sulphate, proteins, pond water and boric acid.

Methods of adulteration analysis in market milk and raw milk

Synthetic milk constituents

Detection of added urea in milk by qualitative method

This process is based on the principle that urea forms a yellow complex with DMAB in a low acidic solution at room temperature.

Reagent

DMAB reagent (1.6%, w/v): dissolve 1.6 g

DMAB in 100 ml ethyl alcohol and add 10 ml concentrate HCL.

Procedure

Mix 1 ml of milk with 1 ml of 1.6% DMAB reagent. Dissimilar yellow colour is observed in milk containing added urea. The control (normal milk) displays a slight yellow colour due to presence of natural urea. The limit of detection of method is 0.2%.

Detection of ammonium compounds in milk

Reagents

Added the 2% sodium hydroxide, 2% sodium hypochlorite and 5% phenol solution.

Procedure

Take 1.0 ml of milk add 0.5 ml of 2% sodium hydroxide, 0.5 ml of 2% sodium hypochlorite and 0.5 ml of 5% phenol solution. Heat for 20 seconds in boiling water bath, bluish colour turns deep blue in incidence of ammonium sulphate. The expansion of pink colour shows that the sample is free from ammonium sulphate.

Detection of nitrates (pond water) in milk

Reagent

Diphenylamine (2%, w/v, in sulfuric acid): weigh 2 g of diphenylamine and dissolve It in sulfuric acid to obtain final volume of 100 ml.

Procedure

Take 2 ml of milk in a test tube. Solution the tube with the milk and drain the milk after the test tube. Add two-three drops of the substance along the side of the test tube. Note the developed colour. Deep blue colour determination be formed in incidence of

nitrate in the milk sample. Pure milk sample determination not develop any colour.

Detection of neutralizers in milk by Rosalic acid method

Reagents

Rosalic acid solution (0.05%, w/v): first prepare 60% (v/v) ethyl alcohol solution by mixing 60 ml ethyl alcohol (95%) and 40 ml distilled water. Weigh 50 mg of rosalic acid powder and dissolve it in small quantity of 60% ethyl alcohol and make up the volume to 100 ml with 60% ethyl alcohol.

Procedure

Take 2 ml milk sample in a test tube and add 2 ml rosalic acid solution. Mix the contents. Unknown alkali is present in milk, a rose red colour seems while clean milk shows only a brownish colour.

Thickening agents

Detection of starch in milk by qualitative method

Reagent

Iodine solution: dissolve 2.6 g of iodine and 3 g of potassium iodide in a sufficient quantity of water and make up to 200 ml.

Procedure

Take about 5 ml of milk in a test tube. Take to boiling condition and permit the test tube to cool to room temperature. Add the 1-2 drops of iodine solution to the test tube. Development of blue colour designates incidence of starch which disappears after sample is boiled and reappears on cooling. The limit of recognition of method is 0.02%.

Detection of cane sugar in milk by qualitative method: modified Seliwanoff's method

Reagent

Resorcinol solution (0.5%): weigh 0.5 g of resorcinol in about 40 ml of distilled water. Add 35 ml of concentrated HCL (12 n) to it and make up the volume to 100 ml using distilled water.

Procedure

Take 1 ml of milk in a test tube. Add 1 ml of resorcinol solution and mix. Place the tube in boiling water bath for 5 min. Remove the tube and detect the colour. Presence of deep red colour indicates occurrence of sucrose, or a ketose sugar. In pure milk samples no such red colour is developed and sample remains white in nature. The limit of detection of method is 0.1%.

Detection of glucose in milk by qualitative method

Reagents

Modified Barford's reagent: dissolve 24 g of copper acetate in 450 ml of boiling distilled water. Add 25 ml of 8.5% acetic acid, shake, cool to room temperature and bottle. Make up to 500 ml. After sedimentation filter the reagent and store in dark coloured. Phosphomolybdic acid: take 35 g ammonium molybdate and 5 g sodium tungstate in a large beaker; add 200 ml of 10% NAOH solution and 200 ml water.

Boil strongly (20-60 min) thus as to eliminate closely entire of ammonia. Chickened elimination of ammonia with the help of red litmus paper. Cool, thinned with water to near 350 ml. Add 125 ml concentrated $H_2 PO_4$ (85%) and dilute additional to 500 ml.

Procedure

Take 1 ml of milk sample in a test tube. Add 1 ml of modified Barford's reagent. Heat the mixture for exact 3 min in a boiling water bath. Quickly cool under tap water. Add one ml of phosphomolybdic acid reagent to the disorganized solution. Detect the colour. Instant development of deep blue colour after addition phosphomolybdic acid reagent indicates the presence of added glucose in the milk sample. In case of pure milk, only faint bluish colour can be observed due to the dilution of Barford's reagent. The limit of detection of method is 0.1%.

Statistical analysis

Data related to adulteration and quality evaluation of market milk and raw milk were statistically analyzed using the one-way analysis of variance (SPSS version 21.0) for completely randomized design. All statement of significant differences was based on the 0.05 probability level. Significant differences among treatment, within the experiment, were analyzed using the SPSS statistical software program.

Results and Discussion

Adulteration in market & raw milk samples

A total 168 milk samples were tested for adulteration by chemical reagents. Out of 168 milk samples 56 milk samples were collected from branded, 56 milk samples from organized dairy farm and traditional vendor 56 milk samples were collected from Varanasi city.

Adulteration in branded full cream milk samples

All 28 milk samples from branded were found

to be negative for urea, ammonium fertilizer, nitrate fertilizers, starch, salt, neutralizer and hydrogen peroxide.

Adulteration in branded toned milk samples

All 28 milk samples from branded were found to be negative for urea, ammonium fertilizer, nitrate fertilizers, starch, salt, neutralizer and hydrogen peroxide.

Adulteration in organized dairy farm cow milk samples

All 28 samples from organized dairy farm were found to be negative for urea, ammonium fertilizer, nitrate fertilizers, starch & neutralizer and hydrogen peroxide, while 4 milk samples were positive for urea, 7 milk samples positive for starch and 13 samples were positive for water, 9 milk samples were positive for sugar, 3 milk samples were positive for glucose, 5 samples was found positive for salt and 6 milk samples were positive for neutralizers.

Out of total analysis organized dairy farm cow milk samples, 14.28% samples were detected positive for urea, 25.00% for starch, 46.42% samples were detected for water, 32.14% for sugar, 10.71% for glucose 17.85% samples detected for salt and 21.42% were detected positive for neutralizers.

Adulteration of water, sugar and salt found in higher percentage than other adulteration in organized dairy farm milk samples. The reasons for this use of adulterants that, it may be easily available in market and cheaper than other adulterants. Sugar and salt added in milk to mask the effect of added water (Sharma *et al.*, 2015).

Table.1 Resources of milk samples

Name of Brands Milk	Name of Organized Dairy Farm	Name of Traditional Vendors Milk
Amul	B.H.U. dairy farm	Vendor 1
Gyan	Surbhi dairy farm	Vendor 2
Kashi	Siyaram dairy farm	Vendor 3
Parag	Nature dairy farm	Vendor 4
Mother dairy	Alok dairy farm	Vendor 5
Paras	Maa Amby dairy farm	Vendor 6
Suddh	Dudh ganga dairy farm	Vendor 7

Table.2 Total number of samples

Name of resources	Samples	Replication	Total samples
Branded full cream milk samples	7	4	28
Branded toned milk	7	4	28
Organized dairy farm cow milk	7	4	28
Organized dairy farm buffalo milk	7	4	28
Traditional vendors cow milk	7	4	28
Traditional vendors buffalo milk	7	4	28

Adulteration in organized dairy farm buffalo milk samples

All 28 samples from organized dairy farm were found to be negative for urea, ammonium fertilizer, nitrate fertilizers, starch & neutralizer and hydrogen peroxide, while 3 milk samples were positive for urea, 8 milk samples positive for starch and 15 samples were positive for water, 12 milk samples were positive for sugar, 4 milk samples were positive for glucose, 9 samples was found positive for salt and 7 milk samples were positive for neutralizers.

Out of total analysis organized dairy farm buffalo milk samples, 10.71% samples were detected positive for urea, 28.57% for starch, 53.57% samples were detected for water, 42.85% for sugar, 14.28% for glucose 32.14% samples detected for salt and 25.00% were

detected positive for neutralizers. Adulteration of water, sugar and salt found in higher percentage than other adulteration in organized dairy farm milk samples. The reasons for this use of adulterants that, it may be easily available in market and cheaper than other adulterants. Sugar and salt added in milk to mask the effect of added water (Sharma *et al.*, 2015).

Adulteration in traditional vendors cow milk sample

All 28 samples from traditional vendors milk samples were found to be negative for urea, ammonium fertilizer, nitrate fertilizers neutralizer and hydrogen peroxide, while 12 milk samples positive for starch and 21 samples were positive for water, 19 samples were positive for sugar, 7 milk samples were positive for glucose, and 14 samples was found positive for salt.

Table.3 Detection of adulteration in branded full cream milk samples

Adulterants	fertilizers			Starch	Water	Sugar	Glucose	Salt	Neutral izers	H ₂ O ₂
	Urea	NH ₃	NO ₃							
A ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₅	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₅	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₅	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₅	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₆	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₆	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₆	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₆	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₇	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₇	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₇	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₇	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
Samples +ve	00	00	00	00	00	00	00	00	00	00
Percentage	00	00	00	00	00	00	00	00	00	00

Table.4 Detection of adulteration in branded toned milk samples

Adulterants Samples	Fertilizers			Starch	Water	Sugar	Glucose	Salt	Neutralizers	H ₂ O ₂
	Urea	NH ₃	NO ₃							
A ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
A ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₉	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₉	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₉	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
G ₉	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₁₀	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₁₀	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₁₀	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
K ₁₀	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₁₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₁₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₁₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PG ₁₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₁₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₁₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₁₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
MD ₁₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₁₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₁₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₁₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
PS ₁₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₁₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₁₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SD ₁₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	Ve	-ve
SD ₁₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
Samples +ve	00	00	00	00	00	00	00	00	00	00
Percentage	00	00	00	00	00	00	00	00	00	00

Table.5 Detection of adulteration in organized dairy farm cow milk samples

Adulterants Samples	fertilizers			Starch	Water	Sugar	Glucose	Salt	Neutr alizers	H ₂ O ₂
	Urea	NH ₃	NO ₃							
B ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₁	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SB ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SB ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SB ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SB ₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve
SY ₃	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
SY ₃	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve	-ve
SY ₃	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	+ve	-ve
SY ₃	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
N ₄	-ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
N ₄	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	+ve	-ve
N ₄	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
N ₄	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve	-ve
AK ₅	+ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve
AK ₅	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
AK ₅	+ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
AK ₅	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
MA ₆	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve	-ve
MA ₆	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	+ve	-ve
MA ₆	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	+ve	-ve
MA ₆	-ve	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve
DG ₇	+ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve	-ve
DG ₇	+ve	-ve	-ve	-ve	+ve	-ve	+ve	+ve	+ve	-ve
DG ₇	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
DG ₇	-ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
Sample +ve	04	00	00	07	13	09	03	05	06	00
Percentage	14.28	00	00	25.00	46.42	32.14	10.71	17.85	21.42	00

Table.6 Detection of adulteration in organized dairy farm buffalo milk samples

Adulterants Samples	Fertilizers			Starch	Water	Sugar	Glucose	Salt	Neutr alizers	H ₂ O ₂
	Urea	NH ₃	NO ₃							
B ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
B ₈	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve	-ve
SB ₉	-ve	-ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	-ve
SB ₉	-ve	-ve	-ve	+ve	-ve	-ve	+ve	-ve	-ve	-ve
SB ₉	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	+ve	-ve
SB ₉	+ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
SY ₁₀	-ve	-ve	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve
SY ₁₀	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	+ve	-ve
SY ₁₀	-ve	-ve	-ve	+ve	-ve	+ve	-ve	-ve	-ve	-ve
SY ₁₀	+ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve	-ve
N ₁₁	+ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
N ₁₁	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
N ₁₁	-ve	-ve	-ve	-ve	-ve	-ve	+ve	+ve	+ve	-ve
N ₁₁	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
AK ₁₂	-ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
AK ₁₂	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve	-ve
AK ₁₂	-ve	-ve	-ve	-ve	+ve	-ve	-ve	+ve	-ve	-ve
AK ₁₃	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve
MA ₁₃	-ve	-ve	-ve	+ve	-ve	+ve	-ve	-ve	+ve	-ve
MA ₁₃	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
MA ₁₃	-ve	-ve	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve
MA ₁₃	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	+ve	-ve
DG ₁₄	-ve	-ve	-ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve
DG ₁₄	+ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
DG ₁₄	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	+ve	-ve
DG ₁₄	-ve	-ve	-ve	-ve	+ve	-ve	-ve	+ve	-ve	-ve
Samples +ve	03	00	00	08	15	12	04	09	07	00
Percentage	10.71	00	00	28.57	53.57	42.85	14.28	32.14	25.00	00

Table.7 Detection of adulteration in traditional vendors cow milk sample

Adulterants Samples	Fertilizers			Starch	Water	Sugar	Glucose	Salt	Neutr alizers	H ₂ O ₂
	Urea	NH ₃	NO ₃							
V ₁	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₁	-ve	-ve	-ve	-ve	+ve	-ve	+ve	-ve	-ve	-ve
V ₁	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₁	-ve	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve
V ₂	-ve	-ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	-ve
V ₂	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₂	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V ₂	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve	-ve
V ₃	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₃	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V ₃	-ve	-ve	-ve	+ve	+ve	-ve	-ve	+ve	-ve	-ve
V ₃	-ve	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve
V ₄	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₄	-ve	-ve	-ve	+ve	-ve	-ve	+ve	-ve	-ve	-ve
V ₄	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₄	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve	-ve
V ₅	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₅	-ve	-ve	-ve	+ve	-ve	-ve	+ve	+ve	-ve	-ve
V ₅	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V ₅	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₆	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve
V ₆	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₆	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve	-ve
V ₆	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₇	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve	-ve
V ₇	-ve	-ve	-ve	-ve	+ve	-ve	+ve	-ve	-ve	-ve
V ₇	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V ₇	-ve	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve
Samples +ve	00	00	00	12	21	19	07	14	00	00
Percentage	00	00	00	42.85	75.00	67.85	25.00	50.00	00	00

Table.8 Detection of adulteration in traditional vendors buffalo milk samples

Adulterants Samples	Urea	fertilizers		Starch	Water	Sugar	Glucose	Salt	Neutr alizers	H ₂ O ₂
		NH ₃	NO ₃							
V8	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V8	-ve	-ve	-ve	-ve	+ve	-ve	+ve	-ve	-ve	-ve
V8	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V8	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V9	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V9	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V9	-ve	-ve	-ve	+ve	+ve	-ve	+ve	+ve	-ve	-ve
V10	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V10	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V10	-ve	-ve	-ve	+ve	+ve	-ve	-ve	+ve	-ve	-ve
V10	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V11	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V11	-ve	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve
V11	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V11	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve	-ve
V12	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V12	-ve	-ve	-ve	+ve	-ve	-ve	+ve	+ve	-ve	-ve
V12	-ve	-ve	-ve	-ve	+ve	+ve	-ve	-ve	-ve	-ve
V12	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V13	-ve	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve
V13	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V13	-ve	-ve	-ve	+ve	-ve	-ve	-ve	-ve	-ve	-ve
V13	-ve	-ve	-ve	-ve	+ve	+ve	-ve	+ve	-ve	-ve
V14	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V14	-ve	-ve	-ve	-ve	+ve	-ve	-ve	+ve	-ve	-ve
V14	-ve	-ve	-ve	+ve	+ve	+ve	-ve	+ve	-ve	-ve
V14	-ve	-ve	-ve	-ve	+ve	+ve	+ve	-ve	-ve	-ve
Samples +ve	00	00	00	10	25	21	05	17	00	00
Percentage	00	00	00	35.71	89.28	75.00	17.85	60.71	00	00

Out of total analysis traditional vendors cow milk samples, 42.85% for starch, 75.00% samples were detected for water, 67.85% for sugar, 25.00% for glucose and 50.00% samples detected for salt. Adulteration of water, sugar and salt found in higher

percentage than other adulteration in traditional vendors milk samples. The reasons for this use of adulterants that, it may be easily available added water (Sharma *et al.*, 2015). On the basis of the present investigation, it may be concluded that Out of

168 milk samples, 44.04% milk samples were found to be with water, 4.16% with urea, 22.02% with starch, 36.30% with sugar, 11.30% with glucose, 26.78% with salt and 7.38% with neutralizers. Total 28 milk samples from branded were found to be negative for urea, ammonium fertilizer, nitrate fertilizers, starch, salt, neutralizer and hydrogen peroxide. Total 28 milk samples from analysis organized dairy farm cow milk samples, 14.28% samples were detected positive for urea, 25.00% for starch, 46.42% samples were detected for water, 32.14% for sugar, 10.71% for glucose 17.85% samples detected for salt and 21.42% were detected positive for neutralizers.

Out of 28 milk samples from analysis organized dairy farm buffalo milk samples, 10.71% samples were detected positive for urea, 28.57% for starch, 53.57% samples were detected for water, 42.85% for sugar, 14.28% for glucose 32.14% samples detected for salt and 25.00% were detected positive for neutralizers. Out of 28 milk samples from analysis traditional vendors cow milk samples, 42.85% for starch, 75.00% samples were detected for water, 67.85% for sugar, 25.00% for glucose and 50.00% samples detected for salt.

Out of 28 milk samples from analysis traditional vendors buffalo milk samples, 35.71% samples were detected positive for starch, 89.28% for water, 75.00% for sugar,

17.85% for glucose and 60.71% samples detected for salt. Adulteration of water, sugar and salt found in higher percentage than other adulteration in traditional vendors milk samples. These results are only indicative and require further experimentation to arrive at some more consistent conclusion.

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