

To Identify an Adulteration Present in Milk

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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. 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. This paper identifies various types of adulteration present in the milk.

Keywords: Types of adulterations and adulterants 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 contains relatively large amount of

fat. Addition of carbohydrate to milk increases its solid content. There by reducing the amount of fat present in the milk. Starch is one such component that is added to adulterate milk. The test to detect starch in milk uses iodine solution, addition of which turns the milk solution to blue black color due to the formation of starch –Iodo complex, in the presence of starch

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 inferior liquor with wine; an 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 NITRATES (POND WATER) IN MILK:

Sodium and potassium nitrates are oxidizing agents and hence act as preservative. Pond water also contains appreciable quantities of nitrates and such water is usually admixed with milk by rural milk producers or vendors.

1] Take 10 ml milk in a beaker and add 10 ml mercuric chloride solution (2.5% in 1% HCl) Mix well and filter through what man No 42 filter paper.

2] Take 1 ml filtrate in a test tube and add 4 ml of diphenyl amine sulphate or diphenylbenzidine reagent Development of blue colour indicates the presence of nitrates.

2] MILK AND MILK DRINKS SAMPLES:

Six commercial bovine milk samples from the national market were used (fresh, pasteurized, UHT, omega-3 UHT, condensed and milk powder) and four dairy beverage samples of cappuccino, chocolate, banana and strawberry flavors. Fresh milk sample was obtained from a farm in the neighborhood of Sibiu and the other milk/milk drinks samples were obtained from commercial sources (brands A, B, C, D, E, F and G). Nutritional values of the samples were obtained from the information given by the manufacturer. The milk powder sample was reconstituted with deionized water following the instruction given by the manufacturer.

Where necessary, total protein content was determined from nitrogen content by Kjeldahl method (crude protein: N x 6.38).

3] SAMPLE PREPARATION:

The procedure consists of a pre-treatment of samples with trichloroacetic acid (TCA) to precipitate casein and major whey proteins [10]. Precipitation was done with 20% TCA for 10 minutes at r.t. The precipitate was removed by centrifugation at 5000 g for 10 minutes at r.t. The supernatant was filtered on 5 µm low protein adsorption filter. Three dilutions were obtained (1/10, 1/100 and 1/1000 respectively) using the Tris buffer pH 7.2 with 0.1% sodium azide. All the reagents were of analytical grade purity.

4] GMP DETECTION:

Qualitative determination of GMP in selected samples was performed using the Immunostick GMP visual assay. Immunochromatographic sticks (purchased from OPERON S.A., Spain) which contain monoclonal antibodies specific for GMP and anti-GMP antibodies were dipped into solution samples diluted 1/1000. Development of a red band in addition to the control blue band on the reactive strips after 5 minutes was considered a positive result.

5] DETECTION BY MEASURING ANALYTICAL CONSTANTS:

The adulteration of vegetable fat in milk can be detected by extracting the fat either by Rose- Gottlieb method or fat extracted in butyrometer (special butyrometer having both end open) and measuring its physico- chemical characteristics such as Butyrometer (BR) reading, Reichert – Meissl and Polenske values.

6] BAUDOQUIN TEST:

Hydrogenated vegetable oil (vanaspati) is a common adulterant in milk fat. Its presence in milk fat can be detected by the fact that sesame oil (minimum 5%) is added in Vanaspati by the law. Thus the presence of this oil in milk fat indicates the presence of vanaspati or sesame oil. To 5 ml melted milk fat in a test tube, add 5 ml conc. HCl and 0.4 ml furfural solution (2% distilled not earlier than 24 hr. in alcohol.) Shake vigorously for 2 minutes and allow the mixture to separate. The development of red or pink colour in acid layer indicates the presence of sesame oil, which is confirmed by adding 5 ml water and shaking again. If colour in acid layer persists, sesame oil/ vanaspati is present.

IV. CONCLUSION

Adulterated Milk and Milk Products are dangerous to health of any leaving organism. Leaving organism has must essential Knowledge of adulteration of Milk.

This study concluded that low income group respondents were least educated, had low awareness about their rights and responsibilities and food adulteration. So this group needs to be armed with lot of information and training on the issues of food adulteration and ways to raise their voice when felt cheated. They had limited income, so they could not reach the standard items of their choice. On seeing such condition of consumer, our government has made sincere efforts to curb the fraudulent practices by enactment of various laws.

It is highly unlikely that more legislation or increasing fines and jail terms alone will help reduce adulteration, particularly given the corruption that exists in the enforcement area and the low conviction rate. Greater consumer vigilance and action alone can help improve the situation. But such efforts are not fruitful unless consumers themselves are aware of their rights and responsibilities. Under these circumstances, consumer literacy is the need of the hour with special attention to low income groups who suffer the most.

REFERENCES

- [1]. Albrink MJ, Ullrich IH. 1986. Interaction of dietary sucrose and fiber on serum lipids in healthy young men fed high carbohydrate diets. *Am J Clin Nutr* 43:419-428.
- [2]. Allen JC, Keller RP, Archer P, Neville MC. 1991. Studies in human lactation: Milk composition and daily secretion rates of macronutrients in the first year of lactation. *Am J Clin Nutr* 54:69-80.
- [3]. Amiel SA, Caprio S, Sherwin RS, Plewe G, Haymond MW, Tamborlane WV. 1991. Insulin resistance of puberty: A defect restricted to peripheral glucose metabolism. *J Clin Endocrinol Metab* 72:277-282.
- [4]. Anderson DM, Williams FH, Merkatz RB, Schulman PK, Kerr DS, Pittard WB. 1983. Length of gestation and nutritional composition of human milk. *Am J Clin Nutr* 37:810-814.
- [5]. Anderson GH, Atkinson SA, Bryan MH. 1981. Energy and macronutrient content of human milk during early lactation from mothers giving birth prematurely and at term. *Am J Clin Nutr* 34:258-265.

- [6]. Archer SL, Liu K, Dyer AR, Ruth KJ, Jacobs DR, Van Horn L, Hilner JE, Savage PJ. 1998. Relationship between changes in dietary sucrose and high density lipoprotein cholesterol: The CARDIA Study. *Ann Epidemiol* 8:433–438.
- [7]. Aronow WS, Ahn C. 1998. Risk factors for new coronary events in older African-American men and women. *Am J Cardiol* 82:902–904.
- [8]. Arslanian S, Kalhan S. 1992. Effects of growth hormone releasing hormone on insulin action and insulin secretion in a hypopituitary patient evaluated by the clamp technique. *Acta Endocrinol* 127:93–96.
- [9]. Assel B, Rossi K, Kalhan S. 1993. Glucose metabolism during fasting through human pregnancy: Comparison of tracer method with respiratory calorimetry. *Am J Physiol* 265:E351–E356.
- [10]. Azar GJ, Bloom WL. 1963. Similarities of carbohydrate deficiency and fasting. II. Ketones, nonesterified fatty acids, and nitrogen excretion. *Arch Intern Med* 112:338–343.
- [11]. Bell JD, Margen S, Calloway DH. 1969. Ketosis, weight loss, uric acid, and nitrogen balance in obese women fed single nutrients at low caloric levels. *Metabolism* 18:193–208.
- [12]. Benito R, Obrador A, Stiggelbout A, Bosch FX, Mulet M, Muñoz N, Kaldor J. 1990. A population-based case-control study of colorectal cancer in Majorca. I. Dietary factors. *Int J Cancer* 45:69–76.
- [13]. Bier DM, Leake RD, Haymond MW, Arnold KJ, Gruenke LD, Sperling MA, Kipnis DM. 1977. Measurement of “true” glucose production rates in infancy and childhood with 6,6-dideuteroglucose. *Diabetes* 26:1016–1023.
- [14]. Bloom WL, Azar GJ. 1963. Similarities of carbohydrate deficiency and fasting. I. Weight loss, electrolyte excretion, and fatigue. *Arch Intern Med* 112:333–337. DIETARY CARBOHYDRATES: SUGARS AND STARCHES 325 Bolton-Smith C, Woodward M. 1994a. Coronary heart disease: Prevalence and dietary sugars in Scotland. *J Epidemiol Community Health* 48:119–122.
- [15]. Bolton-Smith C, Woodward M. 1994b. Dietary composition and fat to sugar ratios in relation to obesity. *Int J Obes Relat Metab Disord* 18:820–828.
- [16]. Bolton-Smith C, Woodward M, Smith WCS, Tunstall-Pedoe H. 1991. Dietary and non-dietary predictors of serum total and HDL-cholesterol in men and women: Results from the Scottish Heart Health Study. *Int J Epidemiol* 20:95–104.
- [17]. Bossetti BM, Kocher LM, Moranz JF, Falko JM. 1984. The effects of physiologic amounts of simple sugars on lipoprotein, glucose, and insulin levels in normal subjects. *Diabetes Care* 7:309–312.
- [18]. Boushey CJ, Beresford SA, Omenn GS, Motulsky AG. 1995. A quantitative assessment of plasma homocysteine as a risk factor for vascular disease: Probable benefits of increasing folic acid intakes. *J Am Med Assoc* 274:1049–1057.
- [19]. Bowman SA. 1999. Diets of individuals based on energy intakes from added sugars. *Fam Econ Nutr Rev* 12:31–38.
- [20]. Brand JC, Colagiuri S, Crossman S, Allen A, Roberts DCK, Truswell AS. 1991. Lowglycemic index foods improve long-term glycemic control in NIDDM. *Diabetes Care* 14:95–101.
- [21]. Brito MN, Brito NA, Migliorini RH. 1992. Thermogenic capacity of brown adipose tissue is reduced in rats fed a high protein, carbohydrate-free diet. *J Nutr* 122:2081–2086.
- [22]. Britten P, Basiotis PP, Davis CA, Anand R. 2000. Is intake of added sugars associated with diet quality? Online. *Nutrition Insights* No 21. USDA Center for Nutrition Policy and Promotion. Available at <http://www.usda.gov/cnpp/insights.htm>. Accessed June 8, 2001. Brooks GA, Mercier J. 1994. Balance of carbohydrate and lipid utilization during exercise: The “crossover” concept. *J Appl Physiol* 76:2253–2261.
- [23]. Brosnan JT. 1999. Comments on metabolic needs for glucose and the role of gluconeogenesis. *Eur J Clin Nutr* 53:S107–S111.
- [24]. Bruning PF, Bonfrèr JMG, van Noord PAH, Hart AAM, de Jong-Bakker M, Nooijen WJ. 1992. Insulin resistance and breast-cancer risk. *Int J Cancer* 52:511–516.
- [25]. Burley VJ. 1997. Sugar consumption and cancers of the digestive tract. *Eur J Cancer Prev* 6:422–434.
- [26]. Burley VJ. 1998. Sugar consumption and human cancer in sites other than the digestive tract. *Eur J Cancer Prev* 7:253–277.