

Evaluation of Raw Milk for Common Commercial Additives and Heat Treatments

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Abstract

All examined cow's and buffalo's milk samples collected from dairy farms, dairy shops and street vendors had not subjected to adulteration by any of common commercial additives as starch, cereal flour, gelatin and skim milk powder. Concerning, the heat treatment of examined milk samples, it is clear that all dairy farms milk samples were in a raw state. But, many milk samples of dairy shops and street vendors were heat treated. Likewise, street vendors milk samples was the worst type and highly adulterated than dairy shops milk. Whereas, dairy farms milk was the best one. Furthermore, buffalo's milk was subjected to adulteration by partial skimming than cow's milk due to it rich in fat content.

Key words: Cow milk, buffalo milk, milk adulteration, common commercial additives, heat treatments

Introduction

Milk is very valuable food, readily digested and absorbed. It consists of nutrients, which are needed for proper growth and maintenance of body. Milk and milk products form a significant part of the diet and a substantial amount of our food expenditures goes on milk and other dairy products. Milk is transported from the point of production to consumers and processing plants by middlemen. Thus, they don't maintain proper hygienic conditions during this transport, which leads to increase the total viable bacterial count.

They also adulterate milk to increase their profit margin by several chemicals like urea, starch, flour, cane sugar, vegetable oils, detergents etc. Various preservatives like formalin and some antibiotics are also added in milk to increase its shelf life. This addition decreases the nutritive value of milk.

These adulterants, preservatives and drugs in milk cause very serious health related problems (Afzal et al. 2011). The extensive consumption of milk and dairy products makes these foodstuffs targets for potential adulteration with financial gains for unscrupulous producers (Nicolau et al. 2011). Therefore, it is important to protect the consumer by ensuring that adequate control measures are in place, and that the food analyst has suitable methods for the detection of milk adulteration. Labeling and authenticity regulations may differ from country to country and contribute towards the need for analytical tests to enforce such legislation (Dennis 1998).

Milk adulteration is an act of intentionally debasing the quality of food offered for sale either by admixture or substitution of inferior substances or by the removal of some valuable ingredients (Food & Drug Administration 1995). Adulterated food is dangerous for health as it may contain various toxic chemicals, it may be deprived of nutrients required for proper growth and development of human body (Marcus 1979). Milk used by the people for consumption is adulterated to such an

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extent that there is very less nutritive value in it and may also be toxic for public health their profit margin by three ways dilution, extraction of valuable components like milk fat which is removed as cream, addition of cheap substances like starch to increase the value of total solids up to a level which is acceptable by the consumers. In Pakistan, raw milk is distributed by a traditional system which involves middlemen called Gawalas. These middlemen used to adulterate milk to maximize their profit (Lateef et al. 2009).

Milk adulteration, poor hygiene, malpractices, lack of preservation technology, cooling facilities and sanitation conditions are the main causes of losses in quantity and adulteration of milk is the most pressing public health issue. Adulteration of milk is done to increase its volume and then starch and other reconstituted milk powders are added to increase its viscosity. To increase the shelf life of milk dirty ice and some chemicals like hydrogen peroxide, carbonates, bicarbonates, antibiotics, caustic soda and even the most lethal chemical formalin is also being used. Urea adulterated milk is very harmful to the girls as it hastens up the process of puberty (Tariq 2001).

Heat treatment of the produced milk may safeguard consumers from being infected with pathogens. But in fact acts as a common type of adulteration as it covers the unsanitary conditions under which milk is produced, as well as, increasing the keeping quality of milk. Also, many off flavours and denaturation of protein may be occur as a result of milk heating. These forms of adulteration have been a problem throughout the history of the market milk industry and continue to a problem today (Mansour et al. 2007).

This study was conducted to detection adulteration by common commercial additives and heat treatments in both cow's and buffalo's milk that is marketed dairy farms, dairy shops and street vendors in Assiut governorate.

Materials and Methods

Milk samples. A total 260 of raw bulk milk samples marketed in Assiut governorate were collected randomly including both cow's and buffalo's milk of governmental farms (30 samples for each were collected from 6 different farms), dairy shops and street vendors (60 samples of cow's milk and 40 samples of buffalo's milk were collected from six different localities for each). Milk samples were collected in sterile jars, and then transferred to the laboratory with a minimum of delay, where they directly examined or held in the refrigerator until time is due.

Detection of common commercial additives. Starch and Cereal flour as well as skim milk powder were

detected by (Parikh 1945). But gelatin test was detected by AOAC (1990).

Detection of heat treatments. It was detected according to Lampert (1975).

Results and Discussions

Detection of common commercial additives. Detection of starch and cereal flour. It is clearly evident that all examined cow's milk samples of dairy farms, dairy shops and street vendors were free from starch and cereal flour. These results disagree with Arora et al. (2004). The obtained results showed that all examined buffalo's milk samples collected from dairy farms, dairy shops and street vendors were free from starch and cereal flour. Positive results were reported by Arora et al. (2004). In Sudan, Ahmad (2009) collected three hundred milk samples from three different localities and observed for adulteration with starch that 35.5% of samples were found adulterated with starch. Rideout et al. (2008) mentioned that high amounts of starch may cause diarrhea due to the effects of undigested starch in colon. Its accumulation in the body may prove very fatal for the diabetic patients.

Detection of gelatin. The obtained data revealed that, all analyzed cow's and buffalo's milk samples collected from dairy farms, dairy shops and street vendors were free from gelatin.

Detection of skim milk powder. The results indicated that all examined cow's milk samples collected from dairy farms, dairy shops and street vendors had not contained skim milk powder. But Madkour and Moussa (1989) recorded positive results. Also, all examined buffalo's milk samples collected from dairy farms, dairy shops and street vendors were negative for presence of skim milk powder. But Madkour and Moussa (1989) reported higher positive results. Milk sold in a state of Turkey was analyzed for chemical examination includes milk powder; it was found that 4% of samples had additional milk powder (Tasci 2011). Generally, our examined cow's and buffalo's milk samples collected from dairy farms, dairy shops and street vendors had not subjected to adulteration by any of common commercial additives as starch and cereal flour, gelatin and skim milk powder.

Detection of heat treatment. It is clearly evident from Table 1 that all examined dairy farms cow's milk samples (30 samples) were in raw state. Similar results were reported by Moustafa (1978), Mohamed (1981), Deeb (1996), Abdel-Hameid (2002). Whereas, dairy shops samples showed that 9 (15%) out of 60 samples proved to be heat treated. Higher results were recorded by Moustafa (1978), Mohamed (1981). On the other hand, Deeb (1996) reported negative results. Moreover, 16 (26.7%) out of 60 street vendors samples proved to be

heat treated. Lower results were recorded by Moustafa (1978). On the other hand, Deeb (2000) reported that all examined milk samples were in raw state.

Table 1, Positive results of heat treatments of the examined cow's milk samples

Items	Street farms		Dairy shops		Dairy vendors	
	+ve/30	%	+ve/60	%	+ve/60	%
Heat treatment	-	-	9.0	15.0	16.0	26.7

+ve: Number of positive samples.

Table 2, Positive results of heat treatments of the examined buffalo's milk samples

Items	Street farms		Dairy shops		Dairy vendors	
	+ve/30	%	+ve/40	%	+ve/40	%
Heat treatment	-	-	3.0	7.5	9.0	22.5

+ve: Number of positive samples.

Table 2 revealed that all examined dairy farms buffalo's milk samples (30 samples) were in raw state. Higher results were recorded by Mohamed (1981), Abdel-Hakim (1986), Deeb (2000). Whereas, dairy shops samples showed that 3 (7.5%) out of 40 samples were heat treated. Higher results were recorded by Abdel-Hakim (1986), negative results were reported by Abdel-Hameid (2002). Furthermore, 9 (22.5%) out of 40 examined street vendors samples proved to be heat treated. Lower results were recorded by Moustafa (1978), Abdel-Hameid (2002) and higher data revealed by Abdel-Hakim (1986).

On the other hand, Fig. 1 pointed to adulteration of milk by detection of heat treatment in dairy farms, dairy shops and street vendors in both cow's and buffalo's samples. Generally, the results illustrated that dairy farms milk samples were better than dairy shops milk samples as well as street vendors, this may be due to the using of strict hygienic measures and veterinary supervision. While the street vendors milk samples were the worst due to absence of these control measures.

The results in both cow's and buffalo's milk pointed out that, heat treated milk samples noticed among samples collected from dairy shops and street vendors. A finding may be used to increase the shelf-life and keeping quality of milk (Mansour et al. 2007) and to cover its low quality and the bad sanitary measures under which milk is produced. This finding indicates another common type of adulteration.

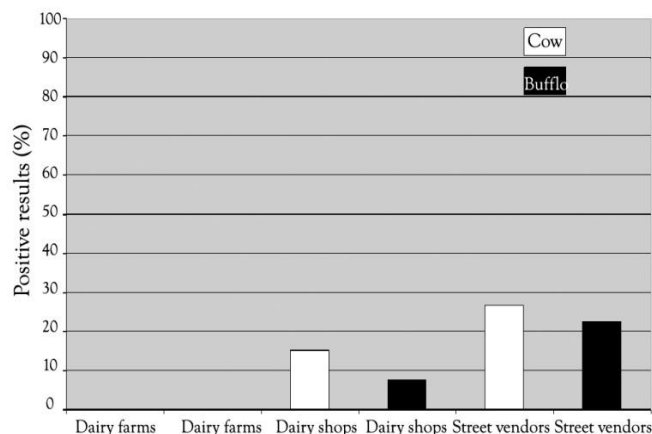


Figure 1. Heat treatments of the examined cow's and buffalo's milk

Conclusions

The obtained results in this investigation allow concluding that milk marketed in Assiut governorate is produced and handled under neglected sanitary measures. The relaxing milk control measures may give chance to greedy retailers and producers to adulterate produced milk to increase their gain. Because each of the aforementioned tests has its limitation measures, only one or more facts of the total quality picture, a combination of more than one method is better than any single one for the detection of an unsatisfactory sample.

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