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Studies on physico-chemical quality of milk received by in Amravati city

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Abstract

A total of 100 samples were randomly collected from milk producers, milk vendors, private dairy, hotel and restaurant and co-operative dairies of Amravati city in Amravati district (M.S.) and tested for the determination of physico-chemical quality and extent of adulteration at Post Graduate Laboratory of Animal Husbandry and Dairy Science section, College of Agriculture, Nagpur (M.S.). The results indicated that out of 100 samples the highest per cent of milk samples for specific gravity level below 1.028 were found in private dairy (70.00%) and the lowest per cent in milk producer (30.00%). For the fat level group, highest per cent of milk samples in group of 3.5 to 4.5 were found in milk producer (55.00%) and the lowest per cent were found in private dairy (35.00%), for the SNF level group, the highest per cent of milk samples level group of between 8.5 to 9 were found in milk producer (65.00%) and the lowest per cent were found in private dairy (40%). For the acidity level group, highest per cent between 0.15 to 0.20 found were found in private dairy (60.00%) and lowest in hotel and restaurant and co-operative dairies (45.00%). As indicated by specific gravity, the highest per cent of milk samples adulterated with water were found in private dairy (70.00) followed by milk vendor (60.00%), co-operative dairies (55.00%). The lowest per cent of milk samples adulterated with water were found in milk producer (30.00%).

Keywords: milk, specific gravity, fat, SNF, acidity, adulteration

Introduction

India has shown impressive growth in the milk production, achieving a largest annual production of 155.5 MT with 322 gms/day per capita availability in the year 2015-2016 in all over world. Uttar Pradesh being the top state in milk production with 26.38 MT, while in Maharashtra annual milk production is 10.15 MT in India. India is among the world's fastest growing market for milk and milk products (Anonymous 2015-2016) ^[1, 2].

Milk is a complex mixture and a liquid food, which can easily be adulterated. According to PFA-1954 (Prevention of Food Adulteration Act) definition, "Milk is the normal mammary secretion derived from complete milking of healthy milch animal without either addition thereto or extraction there from. A national survey in India has revealed that almost 70% of the milk sold and consumed in India is adulterated by contaminants such as detergent and skim milk powder, but impure water is the highest contaminant. Adulteration of milk can either be intentional, unintentional or natural. Intentional adulteration is the act of adding, removing substances to milk or altering the existing natural properties of food knowingly with sole intention of making of money. The Government of India records indicate that on an average 25 to 30% edibles food in the market is adulterated.

In Amravati city many people are coming from different areas and residing there and so naturally they are very much differ in their food habits. But milk is a common item in their diet. Various agencies are engaged to meet the milk requirements of Amravati like milk producers, small private dairies, milk vendor, hotel and restaurant etc. The recent emerging and burning issue of milk is its adulteration. Adulteration is practiced either to substitute the cheaper ingredients or to impress the buyer to think the product is more valuable or of better quality.

Hence a study on the physico-chemical and possible adulteration of milk in Amravati city was taken up with following objectives.

1. To determine the adulteration of milk
2. To evaluate the physicochemical composition of milk
3. To know the sale price of milk

Material and Methods

The present study was conducted at Animal Husbandry and Dairy Science Section, College of Agriculture, Nagpur during year 2016-2017. A total of 100 raw milk samples were collected from milk producer, milk vendor, private dairy, co-operative societies and hotel and restaurant in Nagpur city. The raw milk samples were collected aseptically as per the method recommended in BIS Handbook of Food Analysis in SP: 18 (part – XI) 1981 from various sources of milk procurement for determining the physico-chemical quality and adulteration of milk.

From milk producer, milk vendor, private dairy, hotel and restaurant and co-operative dairies milk samples were purchased and collected in sterile sample bottles (200 ml milk) aseptically. The sample bottles were labeled properly indicating the source of milk sample procurement. These samples were preserved with formalin 36 per cent is added @ 0.1 ml for 25 ml of milk and transferred to the laboratory for determining the quality of milk. The samples were tested for specific gravity, fat, SNF, acidity by BIS Handbook of Food Analysis in SP: 18 (part – XI) 1981 and adulteration like cane sugar, sodium bicarbonate, starch, urea, salt, detergent, skim milk powder by adulteration kit supplied by NDRI, Karnal.

Results and Discussion

A total of 100 milk samples were tested for determining

physic-chemical quality of milk and its adulteration. All tests were carried out at average room temperature (29 °C). Raw milk received from different milk procurement levels under the different sources in Amravati city. The results obtained after testing the raw milk samples are presented in Table 1 to Table 5.

It is observed from Table 1 that 51 per cent samples showed the specific gravity level below 1.028 per cent, 39 per cent samples showed the specific gravity level between 1.028 to 1.030 per cent and 10 per cent samples showed the specific gravity level between above 1.030. Bhutekar (2016) [3] also reported that most of the samples from private dairy (60.00%) showed specific gravity below 1.028 followed by milk vendors (45.00%) and also concluded that good quality samples were found in the milk samples of milk producers.

It is observed from Table 2 that 46 per cent samples showed the fat level below 3.5 per cent, 45 per cent samples showed the fat level between 3.5 to 4.6 per cent and 9 per cent samples showed the fat level between 4.6 to 5.5 per cent. Menkudale *et al.* (2011) [9] also reported that average fat per cent 4.68, 4.55 and 5.10 in dairy farm I, dairy farm II and dairy farm III. Bhutekar (2016) [3] revealed that highest per cent of milk samples in group of 3.5 to 4.5 per cent were found in organized dairy (45.00%) and the lowest per cent found in private dairy (15.00%).

Table 1: Quality of milk in respect of specific gravity from different levels of milk procurement

Sr. No.	Sources of milk sample collection	No. of samples analyzed	No. of milk samples in each group		
			Groups of specific gravity levels		
			Below 1.028	1.028 to 1.030	Above 1.030
1	Milk producer	20	06 (30.00)	10 (50.00)	04 (20.00)
2	Milk vendor	20	12 (60.00)	08 (40.00)	00 (00.00)
3	Private dairy	20	14 (70.00)	05 (25.00)	01 (05.00)
4	Hotel and Restaurant	20	08 (40.00)	09 (45.00)	03 (15.00)
5	Co-operative societies	20	11 (55.00)	07 (35.00)	02 (10.00)
6	Total	100 (100.00)	51 (51.00)	39 (39.00)	10 (10.00)

Table 2: Quality with respect to fat content of milk from different levels of milk procurement

Sr. No.	Sources of milk sample collection	No. of samples analyzed	No. of milk samples in each group		
			Groups of fat levels (%)		
			Below 3.5	3.5 to 4.5	Above 4.5
1	Milk producer	20	06 (30.00)	11 (55.00)	03 (15.00)
2	Milk vendor	20	10 (50.00)	10 (50.00)	00 (00.00)
3	Private dairy	20	12 (60.00)	07 (35.00)	01 (05.00)
4	Hotel and Restaurant	20	08 (40.00)	09 (45.00)	03 (15.00)
5	Co-operative Societies	20	10 (50.00)	08 (40.00)	02 (10.00)
	Total	100 (100.00)	46 (46.00)	45 (45.00)	09 (9.00)

(Figures in parenthesis indicate percentage)

It is observed from Table 3 that 48 per cent samples showed SNF content below 8.5 per cent, 51 per cent samples showed SNF content between 8.5 to 9 per cent, 1 per cent samples showed the SNF content above 9. More or less similar results

were inferred by Jadhao (2012) [6]. He reported that highest samples contain SNF in the range between 8.5 to 8.99 (68.00%) and lowest samples contain SNF range between 9.0 to 9.499 (14.00%).

Table 3: Quality with respect to solids not fat (SNF) content of milk from different levels of milk procurement.

Sr. No.	Sources of milk sample collection	No. of samples analyzed	No. of Milk samples in each group		
			Groups of SNF levels (Per cent)		
			Below 8.5	8.5 to 9	Above 9
1	Milk producer	20	06 (30.00)	13 (65.00)	01 (5.00)
2	Milk vendor	20	11 (55.00)	09 (45.00)	00 (00.00)
3	Private dairy	20	12 (60.00)	08 (40.00)	00 (00.00)
4	Hotel and restaurant	20	09 (45.00)	11 (55.00)	00 (00.00)
5	Co-operative Societies	20	10 (50.00)	10 (50.00)	00 (00.00)
6	Total	100 (100.00)	48.00 (48.00)	51 (51.00)	01 (1.00)

(Figures in parenthesis indicate percentage)

Table 4: Quality with respect to acidity content of milk from different levels of milk procurement.

Sr. No.	Sources of milk sample collection	No. of samples analyzed	No. of Milk samples in each group		
			Groups of acidity levels (Per cent)		
			Below 0.15	0.15 to 0.20	Above 0.20
1	Milk producer	20	10 (60.00)	10 (40.00)	00 (00.00)
2	Milk vendor	20	08 (50.00)	11 (55.00)	01 (05.00)
3	Private dairy	20	07 (35.00)	12 (60.00)	01 (05.00)
4	Hotel and restaurant	20	09 (45.00)	09 (45.00)	02 (10.00)
5	Co-operative Societies	20	11 (55.00)	9 (45.00)	00 (00.00)
6	Total	100 (100.00)	45.00 (45.00)	51 (51.00)	04 (04.00)

(Figures in parenthesis indicate percentage)

It is observed from Table 4 that 45 per cent samples showed acidity content below 0.15 per cent, 51 per cent samples showed acidity content between 0.15 to 0.20 per cent, 4 per cent samples showed the acidity content above 0.20. The

results of the present study were similar to results reported by Bashir *et al.* (2013). They recorded that the acidity of milk was recorded as 0.18 per cent in house hold milk, 0.21 for milkman and 0.19 in restaurant milk.

Table 5: Quality with respect to sale price levels of milk from different levels of milk procurement.

Sr. No	Sources of milk sample collection	No. of samples anaed	Price of milk in each group per litre		
			Groups of milk types (Rs.)		
			Below 35	35 to 40	Above 40
1	Milk producer	20	06 (30.00)	11 (55.00)	03 (15.00)
2	Milk vendor	20	10 (50.00)	10 (50.00)	00 (00.00)
3	Private dairy	20	12 (60.00)	07 (35.00)	01 (05.00)
4	Hotel and restaurant	20	08 (40.00)	09 (45.00)	03 (15.00)
5	Co-operative Societies	20	10 (50.00)	08 (40.00)	02 (10.00)
6	Total	100 (100.00)	46 (46.00)	45 (45.00)	09 (09.00)

(Figures in parenthesis indicate percentage)

It is observed from Table 5 that 46 per cent samples showed sale price below Rs. 35, 45 per cent samples showed sale price between Rs.35 to Rs. 40, 9 per cent samples showed the sale price above Rs. 40.

Adulteration

It was a good report for people of Amravati city that nobody added adulterants like cane sugar, urea, starch, etc in their milk samples, except that they are adulterating milk with water. Nearly similar results were reported by Singh and Singh (2008) ^[11] in Sikohabadtown and reported that nobody added sugar, urea, starch and salt in milk, except that they are adulterating milk with water other than milk producers, good milk samples were sold by milk producers and most of the milk samples from other sources except milk producers were adulterated with water and prescribed the legal standards. Likewise, Mayuri (2015) ^[8] and Bhutekar (2016) ^[3] also observed the same results.

Conclusion

By looking at the above study, the prescribed samples from the milk producer have been completed all prescribed legal standard with respect to physico-chemical properties of milk given by PFA and BIS. Adulteration in food with different material is not good for human health, but it is pleasure to note that there are no any other adulterants used for adulteration except water in all samples.

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