

STUDIES ON FAT GLOBULES IN MILK*

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Fat occurs in milk as globules dispersed in an emulsified condition. The fat globules are not uniform in size. Bouchardat and Quevenne (1857) observed that the globules in cow's milk varied from 2 to 10 micron in diameter. Blythe (1882) reported the number of fat globules per cu. mm of the milk to vary from 1,102,500 to 3,700,000. Rangappa and Banerjee (1951) found that the size of fat globules in buffalo milk ranges from 3.13 to 33 micron. Puri *et al* (1952) observed that the average size of fat globules in the milk of the Indian buffalo and cow is 4.05 and 3.45 microns in diameter respectively. The size, shape and number of fat globules of milk govern the keeping quality of fat, efficiency of cream separation, churning of cream, transportation of milk and cream over long distances, cheese making and the manufacture of other products of milk. Hence an objective study was made of the size and distribution of fat in milk, the results of which are presented in this paper.

Material and Methods

The studies were made of pure milk of cows and buffaloes and of market milk. The animals for the fresh milk samples were selected at random from the College Dairy and from individual producers nearby. The animals were completely milked and one litre of the mixed milk from each type of animal was collected in a clean container. The fat contents of the milk samples were determined using the Gerber method while the size and number of fat globules were determined by the capillary method of Mahin and Carr (1923) with some modifications. Milk was diluted 250 times and counts were made in a section of the capillary tube equivalent to 50 divisions on the scale. The best of 3 capillaries made were used for the counting which was done 5 times at the different portions of the tube at random to cover nearly the entire length of the column. Thirty readings were taken for the measurement of the diameter of the fat globules in every sample.

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Results and Discussion

The results are given in Tables 1 and 2. It will be seen from Table 1 that buffalo milk had a higher fat content than cow milk while the reading for market milk was intermediate.

Table I

Properties of different types of milk

Properties		Cow milk	Buffalomilk	Market milk
Fat contents %	Range	4.2-5.2	6.4-8.5	4.5-5.6
	Average	4.95	7.35	5.28
Size of fat globules(micron)	Range	1-9	1-9	1-9
	Average	3.36	4.15	3.87
Number of fat globules (1000s/cu.mm.)	Range	2774-4208	2420-4164	2769-3556
	Average	3384	3155	3035

The average diameter of fat globules varied from 3.36 micron in cow milk to 4.15 micron in buffalo milk with an intermediate figure for market milk. Larger fat globules are associated with high fat contents in normal milk (Ling 1963). Compared to the cow milk the buffalo milk contained fat globules of a larger size though smaller in number and for that reason buffalo milk can be considered more suitable for butter manufacture. Puri *et al* (1952) had made similar observations previously.

The cow milk contained the maximum number of fat globules followed by buffalo milk and market milk.

Table 2

Frequency distribution of fat globules in the different types of milk with reference to size

Cl ^{as} interval Diameter of globules in micron	Types of milk		
	Cow	Buffalo	Market
Upto 2	7.58	3.41	5.08
2.1 to 4	11.75	9.00	10.83
4.1 to 6	7.00	10.50	8.08
6.1 to 8	3.41	6.58	5.66
Above 8	0.25	0.50	0.33

DISTRIBUTION OF FAT GLOBULES IN MILK

It is evident from Table 2 that the buffalo milk contained the highest proportion of larger fat globules and that the cow milk contained comparatively larger number of smaller fat globules. Puri *et al* (1952) had also reported similar fat globule size distribution.

Summary

Buffalo milk contained more fat than cow milk while market milk ranked intermediate. The fat globules of buffalo milk was larger than those of cow milk. Proportion of larger sized fat globules was more in buffalo milk than in cow milk. The number of fat globules per unit volume was more in cow milk than in buffalo milk.

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