Comparative Study of Different Methods of Fat Determination in Milk*

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ABSTRACT

In the present study attempt has been made to find out the applicability of five different volumetric methods of milk determination viz., Gerber, Babcock, Brisk, Singh's improved method and Houston's alkaline method, taking into consideration their preciseness. For this purpose 100 milk samples each from Kankrej cows, Jersey cows and buffaloes were tested by above methods and compared with the standard Ether-extraction method.

It has been observed that practically there does not exist any difference in the methods studied for Kankrej cows, Jersey cows and buffalo milk samples. Statistical analysis of the data obtained also revealed that there is no significant variation in different methods studied. It has been also found that all the methods except Houston's alkaline method have comparatively very high correlation coefficient of more than 0.99 with Ether-extraction method for all types of milk.

INTRODUCTION

FAT is one of the important constituents of milk which plays significant role in milk and milk products. With the development of the dairy industry the testing technique is under careful study and different techniques are being evolved keeping in view the accuracy, precision, quickness and practicability in the measurement. Attempts have been made from time to time to replace sulphuric acid with alkaline or neutral reagents because of its highly corrosive nature. Recent scarcity in acid availability also emphasizes need for methods under which the acid is not required. Under the present study, therefore, a comparison is made with standard Ether-extraction method, using five different methods, some of which can replace sulphuric acid.

METHODS

In all 300 samples comprising 100 samples from individual Kankrej cows milk, 100 from individual Jersey cows milk and 100 samples from individual buffalo milk were analysed by Ether-extraction method, Gerber method, Babcock method (Anonymous, 1970), Brisk method (Rao, 1964), Singh's improved method (Mishra, 1964) and

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Houston's alkaline method (Houston, 1955), one hour after milking without addition of preservatives. Randomized block design with six treatments and 100 replications (samples) was used and statistical analysis of the data were carried out according to Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Average fat per cent values obtained from 100 samples of each Kankrej cow, Jersey cow and buffalo milk under different methods studied are presented in Table 1.

Data in Table 1 reveal that for Kankrej cow milk, Singh's improved method gives similar average values, while under other methods the average values are a bit lower compared to Ether-extraction method. Houston's alkaline and Babcock methods are 9.7 and 7.5 per cent lower compared to Ether-extraction values. For Jersey cow milk Singh's improved method gives higher values. While Babcock and Houston's methods give lower values compared to Ether-extraction method. Gerber and Brisk method give similar results compared to Ether-extraction method.

In case of buffalo milk samples, Houston's alkaline method gives lower values while Gerber, Babcock, Brisk and Singh's improved methods give similar values compared to Ether-extraction method. Statistical analysis, however, revealed that there is no significant variation amongst the methods of fat determination applied for Kankrej cow, Jersey cow and buffalo milk samples.

Correlation and Regression:

To find out the correlation and the relationship of the fat values obtained by various methods in comparison with Ether-extraction method the correlation, coefficients and regression equations were worked out. The correlation, coefficients are presented in Table 2.

TABLE—I

Average fat per cent values for Kankrej cows, Jersey cows and Buffalo milk with different methods of fat determination.

Methods / *Breed*	*Ether-extraction*	*Gerber*	*Babcock*	*Brisk*	*Singh's improved method*	*Houston's alkaline method*
Kankrej cow	5.3	5.1	4.9	5.1	5.3	4.8
Jersey cow	5.3	5.2	4.9	5.2	5.5	4.9
Buffalo	8.0	7.9	7.7	7.9	8.1	7.0

TABLE—2

Correlation coefficients of five different methods of milk fat determination with Ether-extraction method for Kankrej cow, Jersey cow and Buffalo milk samples.

Breed	*Kankrej*	*Jersey*	*Buffalo*
Methods	*Correlation coefficients (r)*		
Gerber	0.994	0.997	0.998
Babcock	0.989	0.991	0.998
Brisk	0.989	0.993	0.996
Singh's improved method	0.981	0.987	0.991
Houston's alkaline method	0.982	0.974	0.960

It can be seen from Table 2 that all methods except Houston's alkaline method have comparatively very high correlation with coefficients of about 0.99 with Ether-extraction method for all types of milk with the trend that as the fat content of milk increases the correlation between these methods and Ether extraction method increases. While Houston's alkaline method is found to have somewhat lower correlation with Ether-extraction method with the trend that as the milk fat content increases the correlation between these two methods decreases.

To find out the relationship of fat test values obtained by different methods with Ether-extraction method, the regression equations for different methods of milk fat determination with milk of different breeds studied are given below:

Kankrej Cow Milk

Gerber (Ge)	F=1.029 Ge+0.013
Babcock (Ba)	F=1.036 Ba+0.160
Brisk (Br)	F=1.014 Br+0.080
Singh's improved method (Si)	F=0.99 Si+0.030
Houston's alkaline method (Ha)	F=1.061 Ha+0.217

Jersey Cow Milk

Gerber (Ge)	F=1.030 Ge−0.042
Babcock (Ba)	F=1.049 Ba+0.221
Brisk (Br)	F=0.993 Br+0.176
Singh's improved method (Si)	F=0.993 Si−0.107
Houston's alkaline method (Ha)	F=1.044 Ha+0.205

Buffalo Milk

Gerber (Ge)	F=1.004 Ge+0.095
Babcock (Ba)	F=1.007 Ba+0.261
Brisk (Br)	F=0.984 Br+0.277
Singh's improved method (Si)	F=1.004 Si−0.092
Houston's alkaline method (Ha)	F=1.072 Ha+0.458

F= Fat test value obtained by Ether-extraction method.

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