Variability in Quality of Cotton Lintine Disks Used for Determining Extraneous Material in Milk

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NOT infrequently rather striking variations in the quality of cotton lintine disks used for the milk sediment test have been observed. Casual inspection has revealed variations in thickness, in distribution of cotton within the disk, and irregularity of cut.

It seemed advisable, in view of recent efforts directed toward standardization of the procedure for determining the presence of extraneous material in milk, that the magnitude of the variations in quality of cotton lintine disks be measured (1)(2). This is a report of measurements so made.*

Members of the Committee on Applied Laboratory Methods (1943) of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS were requested to submit six boxes of disks acquired from the stock of different dairy plants in their respective areas. Disks were obtained from Pennsylvania, Oklahoma, Wisconsin, Ontario, and Michigan. The disk containers bore three different brands and distributors' names.

The boxes with few exceptions contained 100 cotton disks. All were 1.25 inches in diameter. These were weighed, after being uniformly tempered for 30 days, in groups of 100, 50, 25, 10, and 1. Each of the groups of less than 100 disks were selected from the approximate center of the pack. The weights of the groups of disks is presented in Table 1.

* This report is submitted on behalf of the 1943 Committee on Applied Laboratory Methods of the International Association of Milk Sanitarians. The assistance of Edward Parrot, and Pvt. Jerry Clark in making this study is gratefully acknowledged.

TABLE 1

WEIGHTS OF VARIOUS NUMBERS OF COTTON LINTINE SEDIMENT TEST DISKS

	Number of Lintine Disks Weighed				
Box No.	*100*	*50*	*25*	*10*	*1*
	Weight of Disks in Grams				
1.....	18.3960	9.1350	4.5535	2.0170	0.2305
2.....	21.0905	10.5443	5.3105	2.1515	0.2198
3.....	21.5279	11.2173	5.6144	2.2559	0.2233
4.....	21.2851	10.5586	5.1589	2.1390	0.2193
5.....	18.4254	9.2941	4.7584	1.8389	0.1902
6.....	19.1379	9.5336	4.7584	1.8617	0.1857
7.....	.....	8.4500	4.2305	1.7000	0.1685
8.....	18.9000	9.5076	4.8093	1.9200	0.2000
9.....	16.2581	8.0122	4.0519	1.6039	0.1518
10.....	.....	8.1534	4.0082	1.6412	0.1764
11.....	16.0000	8.0337	4.0419	1.6466	0.1631
12.....	.....	8.457	4.2236	1.6720	0.1714
	Maximum Variation, Using Lowest Value as a Base				
	34.54%	38.37%	38.90%	40.65%	51.84%

The weights of each disk within each box also were determined. The results presented in Table 2 are representative of these measurements.

TABLE 2

WEIGHTS OF SEDIMENT TEST DISKS FROM ONE BOX IN GRAMS

.2159	.2186	.2053	.2146	.2044	.2032
.2294	.2287	.2117	.2033	.2096	.2134
.2165	.2204	.1985	.2105	.2056	.2086
.2073	.2220	.2072	.2015	.2151	.2125
.2049	.2180	.2164	.2009	.2006	.2096
.2015	.2284	.2074	.2024	.2248	.2058
.2050	.2173	.2045	.2009	.2162	.2218
.2258	.2149	.2000	.2004	.2116	.2162
.2034	.2104	.2056	.2077	.2128	.2087
.2077	.2134	.2132	.1926	.2054	.2204
.2005	.2128	.2088	.2088	.2027	.2252
.2088	.2094	.2193	.2176	.2027	.2139
.2010	.2081	.2157	.2176	.2084	.2034
.2178	.2042	.2164	.2189	.2080	.2034
.2125	.1955	.2252	.2167	.2002	.2146
.2058	.2014	.2187	.2136	.2031	
.2186	.2089	.2078	.2151	.2106	

Maximum Variation, Using Lowest Value as a Base=19.10%

The thickness of a number of lots of the disks was determined by means of a machinist's micrometer having a flat pressure surface area of 0.306 square centimeter. Measurements were made of the thickness of the disks at their centers and on opposite sides equidistant from their edges. The measurements of 20 disks from each of three boxes are presented in Table 3 as representative of a larger number of measurements.

TABLE 3

THICKNESS OF DISKS AT THEIR CENTERS AND SIDES (IN MILLIMETERS)

Box 1			*Box 2*			*Box 3*		
	Sides			*Sides*			*Sides*	
Center			*Center*			*Center*		
1.03	1.06	1.12	0.77	0.66	0.72	0.82	0.87	0.87
1.20	1.06	1.17	0.77	0.78	0.83	0.93	0.85	0.93
0.98	0.96	1.04	0.73	0.72	0.77	0.85	0.78	0.84
1.03	0.99	1.01	0.83	0.83	0.79	0.83	0.75	0.85
1.07	1.06	1.04	0.69	0.65	0.72	0.92	0.96	0.92
1.07	1.02	1.08	0.79	0.65	0.76	0.96	0.91	0.86
1.07	1.03	1.03	0.77	0.79	0.80	0.97	1.00	0.94
1.03	0.98	1.00	0.77	0.84	0.77	0.94	0.88	0.99
1.07	1.07	1.02	0.82	0.86	0.80	0.91	0.92	0.80
1.07	1.00	1.07	0.85	0.84	0.77	0.94	0.84	0.98
1.12	1.14	1.14	0.82	0.82	0.85	0.99	0.93	0.94
1.09	1.08	0.99	0.62	0.63	0.68	1.12	1.11	1.14
1.15	1.16	1.08	0.82	0.76	0.77	1.01	1.01	0.91
1.01	0.99	1.02	0.80	0.81	0.78	0.96	0.96	0.98
1.04	0.96	1.04	0.85	0.81	0.82	0.94	0.91	0.85
1.02	1.05	0.97	0.67	0.64	0.66	0.92	0.96	0.92
1.07	0.91	1.09	0.77	0.77	0.80	0.80	0.83	0.77
1.02	0.90	1.03	0.82	0.81	0.77	0.82	0.76	0.89
1.03	0.96	1.07	0.84	0.83	0.81	0.86	0.83	0.94

Maximum variation, using lowest value as a base=92.3%

In most cases the thickness of disks from given boxes varied some 5 to 10 percent, although extremes of 25 percent were encountered. The difference in thickness of different disks from different boxes was striking, and amounted to as much as 25 to 50 percent, expressed in terms of the thinner of the disks. The extent of differences in thickness of stacks of 25 disks as taken from boxes is illustrated in Figure 1. Differences in thickness of individual disks are illustrated in Figure 2.

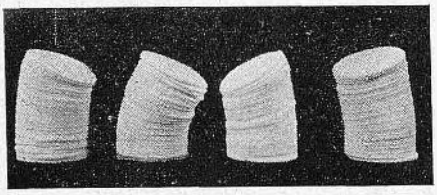

FIGURE 1

Illustration of Differences in Thickness of Stacks of 25 Cotton Lintine Disks as Taken from Containers

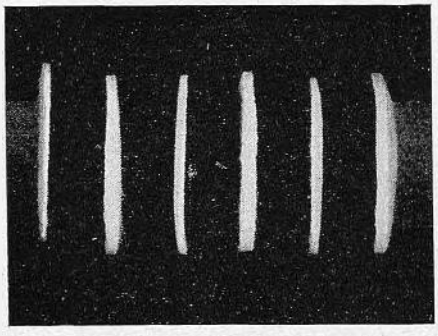

FIGURE 2

Illustration of Differences of Thickness of Individual Cottol Lintine Disks

Inspection of boxes at random indicated that in nearly every instance a number of disks could be selected having definite irregularity in diameter perhaps best expressed as being oval in shape. The deviation from round amounted to as much as 6 millimeters in some disks. The extent of the variation in diameter of selected disks is illustrated in Figure 3.

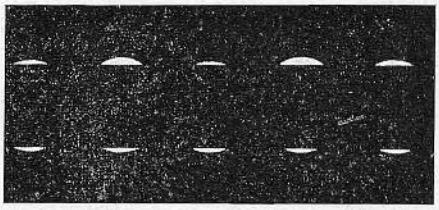

FIGURE 3

Illustration of differences in diameters of cotton lintine disks. Photo made by aligning one edge of disks along straight edge, and placing black paper strip over centers of disks. Differences in extent of protruding upper edge indicate differences in diameters.

Whether or not the variations in the qualities of the disks as measured are significant is perhaps dependent upon the type of tester used and the form of the irregularity. Upon placing disks in water there is a distinct difference in the rate at which they become wetted. Disks of irregular thickness when wetted did not recover to a uniform thickness, indicating that the irregularities were not compensated for by swelling. When the off-the-bottom type of sediment tester is employed, irregularities in the diameters of the disks appear to be of significance. Disks that are not round do not appear to fit properly in the depressed disk seat of the sampler. Probability exists that some by-passing of milk and material occurs when the disks are irregular in shape and do not seat properly. Despite the rapid swelling properties of most disks when wetted with milk, it frequently has been observed that disks of different weights and of uneven thickness fail to reseat properly upon the screen of an off-the-bottom type of tester in which milk is drawn past the disk into the barrel when the down discharge stroke is made. The rapidity or completeness of reseating of disks in this type of tester is probably af-

fected also by the pressure exerted when the discharge stroke is made. The sediment-retaining properties of disks of different thickness and of different weights were compared by use of water containing varied but measured amounts of graded peat moss plus Tergitol wetting agent, in a series of 10-gallon milk cans. An off-the-bottom type of sediment tester was employed. The variables of degree and time of stirring of the sedimented water, the method and rate of withdrawal of sample, and related factors were made uniform insofar as possible. The results of the tests indicated that the maximum variations in the quality of the disks as measured in these studies were sufficient to result in differences in sediment-retaining properties recognizable macroscopically. These observations were confirmed by use of the pressure type sediment tester. Lesser differences in the quality of the disks (weight and thickness) could not easily be demonstrated to have an effect on retention of the extraneous material as determined macroscopically.

As a result of these studies it appears that there are available upon the market sediment disks having marked differences in important properties of weight, thickness and regularity of cut, and that under specific conditions of use these irregularities can have significant effect upon retention of extraneous material when a sediment test of milk is performed. In view of the efforts to attain uniformity in the procedure of making sediment tests of milk, immediate attention should also be given the attaining of greater uniformity in the quality of sediment test disks. It appears probable disks of different but specific qualities are desirable to meet with the requirements of different sediment testers now available.

REFERENCES

1. Committee Report. Report on Studies on Measurement of Sediment in Milk. *J. Milk Tech.*, **5**, 281 (1942).
2. Weckel, K. G. The Status of Regulations and Practices in Determining Extraneous Material in Milk. *Ibid.*, **6**, No. 3 (1943).

Winter Course in Dairy Manufacturing at University of Wisconsin

This year the Winter Course in Dairy Manufacturing at the University of Wisconsin will start on September 25 instead of a date in October and will run for 18 weeks. The course will carry an extra week of instruction in dairy sanitation. It is now possible for a student to take all four dairy manufacturing courses which are offered in the second semester. The latter are open only to students who have had the first semester's work.

The total estimated average cost for the 18 weeks of the Winter Course is $261.00, including meals, room, tuition, fees, books, and all other necessary expenses.

Send inquiries to Professor H. C. Jackson, Department of Dairy Industry, University of Wisconsin, Madison 6, Wisconsin.

USPHS Restaurant Sanitation Ordinance

The Restaurant Sanitation Ordinance recommended by the United States Public Health Service (or one based thereon) is in effect in 11 entire States and the District of Columbia, as well as in 108 counties and 178 municipalities located in 25 other States. It has been adopted as State regulations in 22 States. A list of these can be obtained by writing to the Sanitary Engineering Division, Milk and Food Section, U. S. Public Health Service, Washington, D. C.