

more simple method should be devised of estimating approximatively the qualities of this fluid. The several modes of milk-testing which have been suggested are well known, the principal being—1st, the lactometer, or cream test of Sir Joseph Banks; 2nd, the hydrometer, or specific gravity test; 3rd, the lactoscope of M. Danné; and 4th, the microscope.

It may be necessary to make a few remarks on the use of these several instruments, and first, of the lactometer.

A glass tube of about eleven inches long, and half an inch in diameter, is filled with milk to within a short distance of the top, the surface of the fluid being made to coincide with a transverse line drawn on the tube, and marked zero; the capacity of the tube from this line downwards is divided into one hundred equal parts or degrees. When the tube thus filled has been suffered to remain undisturbed for a definite time, say twelve hours, or twenty-four hours, the quantity of cream which shall have separated spontaneously during that time is ascertained by an inspection of the instrument held in a proper light, as the inferior limit of the stratum of cream is generally defined with a sufficient clearness to enable one to read off accurately the per-centage of this ingredient which has become separated from the milk within the time specified. In using this instrument, it is necessary to observe certain precautions: the milk should be quite fresh, but the tube should not be filled till the milk has cooled down to the temperature of the place where it is destined to remain while at rest; the entire mass of milk should always be well stirred up immediately before the sample to be tested is taken out; the lactometer when filled should be left undisturbed for about twelve hours if the weather be warm, for twenty-four if it be cold.

Milk which has been thus tested is said to show a certain per-centage of cream, and the higher the number of degrees indicated by the lower edge of the cream-stratum, the more of this ingredient is the milk supposed to possess. As far as this goes, nothing can be more simple and satisfactory, if it were only true, but it can be shown that the indications of the instrument in question are fallacious, and calculated to lead to the most erroneous conclusions, especially in the case of those milks in regard to which it is most important that the information supplied by this test should be as accurate as possible—for example, in those cases in which milk is supplied by contract in large quantities to public institutions. The fact is unquestionable that contractors are in the habit of supplying a liquor which they call milk, at a price so excessively low that they must either add a large proportion of water, or sustain a serious loss; and the managers of large institutions are often satisfied to accept this so-called milk at the price agreed upon, provided the lactometer shows a certain per-centage of cream. In reference to the effect which the addition of water to milk exercises on the indications of the lactometer, Dr. Hassall, who has made the analysis of very numerous specimens of milk, makes the following remarks:—

“It is stated,” he says, “that the addition of a small quantity of warm water to milk increases the amount of cream: the belief in the accuracy of this statement is entirely erroneous: it merely facilitates and hastens, in a most remarkable manner, its formation and separation, as is shown by what follows:

“Six lactometers were filled, one with pure milk, the remainder with the same milk diluted respectively with 10, 20, 30, 40, and 50 per centages of water.

“In 20 minutes, the lactometer containing pure milk showed but half a degree of cream; in 40 minutes it showed 4°; and at the end of 12 hours it showed 9°.

“The instrument containing 50 per cent. of water showed in 20 minutes 6° of cream; in 40 minutes 6½°; and at the end of 12 hours 5°.

“The rapidity with which the cream was thrown up on the other 4 tubes, viz., those containing 10, 20, 30, and 40 per centage of water, was proportionally great; the two extreme cases have been quoted merely in order to exhibit more prominently the results which were obtained.