

DETERMINATION OF EXTENT OF ADULTERATION OF MILK BOTH SKIMMED AND WATERED.

In case a sample is both skimmed and watered, the above formula for determining the per cent of foreign water present, holds good.

To illustrate, if we have an adulterated sample showing 2% fat, a lactometer reading of 22, and 6% solids not fat, and a control sample showing 4% fat, a lactometer reading of 32 and 9% solids not fat, it is plainly evident that the adulterated sample is both skimmed and watered since while the fat is reduced by one-half (from 4% to 2%) the lactometer is only reduced about one-third (from 32 to 22) and the solids not fat are only reduced one-third (from 9% to 6%).

Applying the above formula, we have the per cent of extraneous water =

$$100 - \frac{6 \times 100}{9} = 100 - 66\frac{2}{3} = 33\frac{1}{3}\%$$

The determination of the per cent of fat abstracted by skimming depends on the facts, that skimming does not to any extent affect the per cent of solids not fat, and that watering reduces the fat and the solids not fat in the same proportion. The problem is, therefore, one of proportion.

With 6% of solids not fat we have 2% fat.

“ 1%	“	“	“	$\frac{2}{6}$
“ 9%	“	“	“	$\frac{2 \times 9 = 3\% \text{ fat.}}{6}$

That is, the water which will reduce the per cent of solids not fat from 9% to 6% will reduce the fat from 3% to 2%, or the 33⅓% of water is responsible for reducing the fat from 3% to 2% and the sample was skimmed from 4% to 3%, that is, 1% of fat was skimmed off.

From this we may deduce the following formula:—In a skimmed and watered sample, the per cent of fat abstracted = % fat in the pure sample —

$$\frac{\% \text{ fat in adulterated sample} \times \% \text{ solids not fat in pure sample}}{\% \text{ solids not fat in adulterated sample}}$$

That is, if a sample is both skimmed and watered, to find the per cent of fat abstracted, multiply the per cent of fat in the adulterated sample by the per cent of solids not fat in the pure sample. Divide the product of this multiplication by the per cent of solids not fat in the adulterated sample and subtract the result of this division from the per cent of fat in the pure sample. The difference will be the per cent of fat abstracted.

If a sample appears to be both skimmed and watered, and one cannot tell by inspection whether the fat and solids not fat are reduced in the same proportion or not, this formula may be applied. If the milk is from a herd, and the calculation shows over .5% fat abstracted, it is fairly good proof of skimming. If the fat abstracted shows under .5%, the difference may be due to the natural variation in the per cent of fat from day to day, and one would not be safe in saying definitely that the milk had been skimmed as well as watered.

THE DETERMINATION OF THE PER CENT OF ACIDITY IN MILK.

The determination of the per cent of acid in milk is based on the facts that acids and alkalis neutralize each other in definite proportions and that certain chemicals known as indicators may be used to denote by a change of color in the liquid being neutralized, the exact point at which all the acid and all the alkali are neutralized. This is known as the neutral point. The method of determining the per cent of acid in milk consists of neutralizing the acid in a definite volume of the milk by means of an alkaline solution (usually caustic soda) of known strength and using a solution of