

is now added in the proportions indicated in the directions accompanying the preparation (\*) and well stirred into the milk. During the first few hours the treated milk is occasionally stirred. It is then left to curdle, the curdling being complete in from 18 to 24 hours, provided the temperature is maintained about 75° F. The surface of the curdled milk is now skimmed and the skimmings rejected. Three to five pounds of this preparation are now added to each 100 lbs. of pasteurized skim-milk, well stirred in and the whole maintained at a temperature of from 60° F. to 70° F. When curdled this 'starter' is ready to use.

The amount of 'starter' to be employed per 100 lbs. of cream will depend on two factors; the acidity of the cream and the acidity of the starter, the object being to have the cream as ready for the churn always at the same degree of acidity or approximately so.

Acidity in cream or milk is determined by titration with a standard alkali solution, using phenolphthalein to indicate the point when the lactic acid is neutralized. Acidity is expressed in terms of lactic acid. Having found the acidity of the cream and of the starter, the following rule is used to ascertain the amount of starter required. To every 100 pounds of cream with an acidity of .14, add 20 pounds of a starter, the acidity of which is 1.0. From this standard the proportion or percentage of starter to be used, when acidities are other than those here stated, may be readily calculated, as follows:—

#### EXAMPLE.

##### Standard—

Acidity of starter. . . . .	1.0
Acidity of cream. . . . .	.14
Percentage of starter. . . . .	20.0

##### Trial—

Acidity of starter. . . . .	.86
Acidity of cream. . . . .	.10

##### Calculation—

$$\frac{.14 \times 1.00 \times 20}{.10 \times .86} = 32.5$$

Therefore, for every 100 pounds of this cream, 32.5 pounds of the starter are added.

*The Investigation.*—In order to ascertain the correctness of the claims made for this process, and which have already been enumerated in the opening paragraph of this bulletin, six churnings were made, three with sweet cream, and three with ripened cream, equal quantities of the same cream being used for each process in three separate trials.

A quantity of cream freshly obtained from the separator was mixed and samples taken for estimation of its fat content. Equal weights were now put into separate vessels, to one of which was now added a small quantity (5 per cent) of 'starter' and set aside to ripen in the ordinary way. To the other, after cooling to 40° F., the required amount of starter, obtained by calculation from the acidity of both cream and starter, was added. The churning of this cream was at once proceeded with, that of the 'ordinary' ripened cream being made on the following day.

Every effort was made to have the details of the manufacture of the butter—*e.g.* temperature of churning, of wash water, and size of granules, &c.—the same in both processes, so that in these particulars the trials would be strictly comparative. Any differences, either in economy or quality of the products from these two processes would be due, therefore, to the treatment of the cream before churning, viz.:—that in one case the cream was not allowed to ripen, but was prepared for the churn by a pure culture, and in the other the cream was ripened in the ordinary way.

\* In this research Chr. Hansen's Lactic Ferment Powder was used.