

I will endeavor to present in a brief manner some of the more important facts now known concerning the constitution of milk, and to trace the influence of some of the different constituents upon the separation of cream.

Milk when fresh is a thin emulsion of butter fat in a watery solution of albuminous matter, milk sugar and mineral matter. Under the microscope it appears to be a clear liquid in which is suspended an immense number of small fat globules that are more or less collected into groups. These globules vary considerably in size, the smallest being about one ten-thousandth of an inch in diameter and the largest about one two-thousandths of an inch. The average diameter in cows' milk is about one five-thousandth of an inch. Twenty-five fat globules, placed side by side in contact with each other, would span a distance just about equal to the thickness of a sheet of writing paper. The size of the globules varies considerably with different cows and with different breeds. It is characteristic of the fat globules of Jersey and Guernsey milk to be large and quite uniform in size; of the Ayrshires to be quite small and variable; while the Holstein globules are small but quite uniform in size. The number of globules in a given volume of milk varies greatly according to their size and to the per cent of fat; the average number would be about 2,000,000,000 in one quart. Milk containing large globules will cream more rapidly and efficiently than milk with small globules. Uniformity in the size of globules is also desirable, as globules of the same size will reach the surface in about the same time.

The average composition of milk is approximately as follows:

	Per cent	
Fat.....	3.5	
Milk Serum	Nitrogenous matter.....	4.3
	Milk sugar.....	4.5
	Ash.....	7
	Water.....	87.0
	100	

The first portion of milk drawn at any milking contains much less fat than the last portion. Numerous analyses of such milk show that the first milk drawn from the udder rarely contains more than 2 per cent of fat, and often falls below 1 per cent, while it is not uncommon for the "stripplings" to contain 8 to 10 per cent of fat. The phenomenon has been explained by a partial creaming of the milk in the udder of the cow previous to milking, also by the fat being more retarded in the small vessels of the udder than are the other portions of the milk, and by the secretion of the fat being stimulated by the act of milking. Perhaps each of these contributes somewhat to the result. Dr. Babcock is of the opinion that much of the fat is elaborated during the milking and that in its passage through the small vessels of the udder the fat is retarded and consequently more of it is obtained at the end of the milking.

I have stated that under the microscope the fat globules of the milk appear to be more or less collected into groups that are not easily broken up. The groups are quite different character from those formed in the churning process, as the globules composing them retain their spherical form and are rarely distorted or united with each other; in the grouping formed in

churning, the globules are to a greater extent distorted and are more or less incorporated with one another.

The cream which separates upon standing from a perfect emulsion is composed of the same constituents as the original emulsion, and differs from it only in the relative amount of serum and fat which it contains. The separation of the cream is purely a physical phenomenon, depending upon the difference between the specific gravity of the fat and that of the serum, and upon the resistance which the serum offers to the movement of the fat globules. The greater the difference in the specific gravity of the serum and the fat, other conditions being the same, the more rapidly will the cream rise, and the less volume it will occupy after a given time. The more viscous the cream, the more resistance will it offer to the separation of the cream and the greater will be the volume of cream after a given time.

When first drawn from the cow, milk is a perfect emulsion, and I shall assume that it continues in that condition throughout the creaming process, and on this basis shall consider the circumstances which influence the creaming. The difference in the specific gravity of the fat and the milk serum, which is the cause of the separation, depends mostly upon the nature and amount of solids, not fat, that the milk serum holds in solution; for we may safely assume that the slight change which occurs in the composition of the fat will not materially affect its specific gravity. One per cent of solids not fat increases the specific gravity of the milk serum .00875; consequently the greater will be the difference in the specific gravity of the milk serum and the fat, and the greater will be the tendency of the fat to rise. But, on the other hand, the viscosity of the serum, and consequently the resistance of the movement through it, increases with the amount of the solids, not fat, more rapidly than the specific gravity. It follows that the higher the per cent of solids not fat in the serum the more slowly and the more imperfectly will the cream separate. The conditions, however, are somewhat modified by the size of the fat globules, for the resistance of the serum is much less with the large globules than with the small ones. Large fat globules and small amount of solids not fat are therefore favorable to the creaming, whether we regard the time required or the thoroughness with which it is accomplished, while small fat globules and a high per cent of solids, not fat, are opposed to creaming.

ARTHUR BARRETT.

GREETINGS FROM ANN ARBOR.

ANN ARBOR, Mich., Dec. 31, 1893.—To the "standard of Truth"—the welcome DESERET NEWS—we all send hearty new year's wishes—that it may be prospered and continue in casting its golden rays of right about it, is our hope. The NEWS happened to be late this week, and an hour after its regular time of arrival several of the boys had popped their heads in, asking, "Has the NEWS arrived?"

Christmas saw the ground dry, the weather balmy, our hearts happy. Instead of overcoats we noticed many

of "our brethren" coming from the postoffice with packages under their arms. Your correspondent was obliged to get his room mate help him carry his presents from the office, an obligation happily carried out. We were not slighted at all by our Utah friends during this annual gift offering.

The "Utah Debating Society" elected new officers last week, viz: J. Z. Stewart (of Logan) president, Jos. E. Page (of Paysou) secretary. The meetings are very interesting, and that they are a great benefit to the boys is clearly evinced by the speeches and debates so ably given. The "Utah Club Court" is doing good work. New cases are heard each week, giving splendid, practical experience to the "laws."

Mrs. L. Henry, of Fillmore, has been cordially welcomed in our midst. She is the oldest of our ladies here, and therefore has acquired the title Grandma from many of us.

The officers of the "Utah Club Court" are Mr. Halverson (of Ogden) judge; Jos. E. Page, clerk; J. J. McClellan, assistant clerk.

Some fifteen of our members were invited to a party given them by Miss Phillips on Thursday evening last. Games were played, music that gave pleasure was given, and at about 11:30 p. m. an elegant dinner was spread before us. Oranges ("as big as your hat"), four of the most delicious varieties of cake, and sandwiches such as but few can make (except our "mothers") were the main factors which pleased our palates. And the final Candy pulling in real earnest, making more than one hand smart and nearly blister. We were royally entertained and informed our kind hostess so before withdrawing.

Ernest Partridge and Joseph L. Horne have returned from their visit with college friends "up north," and now many times give us sweet music from the mandolin and guitar.

January 8th all branches of the U. of M. open and all will be work. Some of the "laws" are writing their "theses"—while others read Shakespeare, etc. The "lits" (literary students) are writing essays, speeches, or reading the poets, and the others are reading books not allied with their studies—to get a rest—served.

Once again a glorious new year to our NEWS, and our greetings to friends and dear ones! May '94 ease up the panic '93 has so cruelly given us.

Q. U. E. F. N.

WHAT ARE we to understand from the following, taken from the columns of the good old Presbyterian Mail and Express of New York?

It is reported that the bill for the admission of Utah as a state, which recently passed the House of Representatives at Washington without a division, has occasioned the deepest anxiety among the representative Christian laborers in that Territory. Men like Drs. McMillan, Wishard and McNice do not see how a truly Christian nation can be so indifferent as not to enter a vigorous protest against the passage of this bill by Congress.

"A truly Christian nation" would seem to have a mighty hard time in satisfying all observers, wearing every manner and color of sectarian spectacles, as to its right to the proud title.