

## A NEW AERATION PROCESS FOR THE PREPARATION OF WHIPPED CREAM

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The preparation of whipped cream by the process of mechanical whipping has a number of disadvantages. Cream of relatively high butter fat content, preferably 32 per cent, is required. The cream should have been separated from the milk for approximately 24 hours and should be whipped cold. By this process the volume of whipped cream produced is twice the volume of cream used. This is known as a 100 per cent overrun.

The whipping of cream involves a reversible reaction of aeration. During the first part of the whipping air is introduced in the form of minute bubbles which accounts for the expansion of the cream volume during whipping. Continued beating of the cream then tends to decrease the expansion due to the incorporation of air to such an extent that an equilibrium is attained. Beyond the equilibrium point as much air is beaten out of the cream as is incorporated into the cream by the beating process. Oftentimes this equilibrium point is not attained without the formation of butter globules and if the process is continued much beyond the equilibrium stage butter is the inevitable result.

Mechanical devices have been manufactured and distributed to produce a higher overrun in the mechanical whipping of cream than is ordinarily the case. The ordinary whipping process is supplemented by the introduction of a stream of air under pressure through the body of the cream during the whipping operation. Essentially the same requirements for the compressed air process must be fulfilled as for the ordinary whipping method and the results obtained are noteworthy in that as much as a 200 per cent overrun can be obtained. In other words, the ordinary whipping operation is made more efficient in attaining a larger volume for the final product by shifting the previously described equilibrium in the direction of greater absorption of air throughout the body of the cream.

The process described in connection with this outline represents an entirely new principle of aeration. Cream of any age and varying in butter-fat composition between 22 and 36 per cent is treated under pressure with one of a possible series of soluble gases in a special container. The whipped cream can be delivered in large or small quantities under the gas pressure employed in charging the cream and all the advantages previously described for the improved aeration by the air pressure method are greatly augmented. Higher overruns are obtained; any portion of the cream treated can be delivered at a given time; and the butter-fat content of the cream treated can be varied over a much wider range.

Gases suited to the newly described aeration process should have the following characteristics:

1. Their solubility in water should equal that of one volume of gas per unit volume of water at ordinary temperatures.
2. The gas should be colorless, odorless, and tasteless.
3. The gas should be obtainable in a high state of purity in storage cylinders, the internal pressure of which is in excess of that required for the charging of the gas into the cream at the desired pressure.

The gases which satisfy these characteristics are four in number, namely: carbon dioxide, nitrous oxide, dimethyl ether, and dichlor-difluor-methane.

Of these, carbon dioxide leaves the whipped cream with a carbonated beverage taste. For some uses this quality is not objectionable, but for others this is not satisfactory. Nitrous oxide is the practical equivalent of carbon dioxide and has none of its objections. It is obtainable in large quantities in steel cylinders under 800 lbs./sq.in. pressure. The purity of the gas is beyond question and its physical characteristics are perfectly adapted to the process involved.

The specific operation of the process using 26 per cent cream is as follows. A half-pint of cream is placed in the pressure bottle which is provided with a siphon tube, a pressure valve of the Schrader type and a delivery nozzle. Nitrous oxide is charged into the cream with gentle shaking until the pressure has reached 80 lbs./sq.in. The pressure is then automatically cut off by the Schrader valve and the delivery nozzle is inserted on the bottle. The cream may then be delivered, intermittently or continuously, by operation of the valve until the contents are used. It is found that the overrun thus obtained is approximately 260 per cent. The drainage from this cream is no greater than that obtained from the same volume of cream whipped by the old method. If desired, the cream may be sweetened and flavored before charging with gas in the bottle. By this process almost a quart of whipped cream is obtained from one-half pint of 26 per cent cream.

It is proposed to market this cream in pressure bottles. The cream will be sweetened and flavored and charged with the necessary quantity of gas and will be distributed to the consumer by much the same process as the consumer now receives the daily supply of milk and cream. After the contents have been used, the bottle with the delivery nozzle detached is returned to the milk distributor and replaced by a full bottle. In case all the contents are not used at one time, the delivery nozzle may be removed from the bottle and the remaining contents stored in the ice box under ordinary conditions until required for further use. The delivery nozzle can be washed by the housewife in the usual fashion but the empty container is washed and sterilized by the dairy manufacturer engaged in this distribution. Cream thus charged has been kept in a refrigerator for one week without deterioration. After this time, the cream delivered has been as satisfactory as that obtained on immediate use. This process has been protected by patent application and sufficient illustrations of the principles involved have been provided to constitute general protection from infringement by imitators.