THESIS

THE CONTROLLING OF GASSY CHEESE MILK

STARTERS

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The Controlling of Gassy Milk

By Starters.

A large number of experiments have been made with "starters", especially as to their ability to over come "off flavors" and "off conditions" in the development and making of milk into cheese and butter.

My reasons for working on this thesis were more that I might learn how to handle starters in connection with cheese making than to give any new results.

A starter, as ordinarily spoken of, is a culture of Lactic Acid Germs added to a batch of milk or cream either to hasten its ripening or to overcome some off condition by the production of Lactic Acid. However a starter properly used can be spoken of in connection with any culture used to start fermentation in milk or cream.

As a preliminary step I found, approximately, the micro-organisms present in three of our best known Commercial Starters. The work was performed with all possible precaution. Three dilutions were made in sterilized water and these dilutions plated in Lactose Agar. Below are the results:-

HANSEN'S LACTIC ACID FERMENT--One Mould Lactic Acid Germs.
POSTGATE'S BUTTER CULTURE Two Moulds " " "
DOUGLAS' BUTTER CULTURE Three Moulds " " "

EXPERIMENT.

To test the relative effects of starters and other methods of Stopping the growth of Gassy Cheese Germs.

Hansen's Lactic Acid Ferment was used in preparing the controlling starter.

Sterilized four flasks, each containing 1 Liter, of skimmed milk. Inoculated them all with U.S.D.A. Gassy Cheese Germ culture. Let them grow in the incubator for 24 hours.

Flask No.1 was heated to 60 degrees C. for 10 minutes, which is the death point of the Germ. Plated and did not get any growth. Added 4% starter and developed the acid. Upon addition of rennet I did not get a precipitation of casein. This is probably due to the calcium salts going out of combination with the casein on being heated.

Flask No.2. Added 4% Starter directly to gassy cheese milk and set it in a temperature of 25 degrees C. In three hours gas ceased to be evolved showing that lactic acid had overcome thegassy cheese germ. As check used Flask No.4.

Flask No. 3. Added .05% Salt Peter to the inoculated milk. So far as could be detected this had no effect in stopping the evolution of gas, but seemed to improve the odor.

Flask No. 4--Used as a check in determining the effects of various

processes while I used my flask of pure starter in determining when I had pure conditions again.

Conclusions from Experiment.

1st. The treating of gassy cheese milk with heat is impractical, because we cannot get a precipitation of casein within a reasonable time.

2nd. 4% good pure starter seems to check the growth of the germ and start a good pure fermentation and can therefore be used in combating the gassy cheese germ.

3rd. Salt Peter has no other effect than to help improve the flavor.

Experiment.

To test the value of a Lactic Acid Starter in the control of Gassy Cheese Germ.

To 200# of good pure milk was added, at 8:00 A.M., 4% Gassy Cheese Culture. At 1.00 P.M. I divided the milk into two equal batches, putting them into separate vats.

To vat No. 1 was added 4% Lactic Acid Starter.

To vat No. 2 nothing was done to hurry the action. The vats were worked in precisely the same manner, so far as method goes; developing the same amount of acid at each step. In vat No.2 it was necessary to wait much longer for acid to develop.

Below is a comparative table of the working results:

	Vat No.1	Vat No.2
Pounds of milk ,	1000#	1000#
Rennet test when set ,	2 1/2	2 1/2
Time set,	1:42 P.M.	2:48
Temperature set,	86°F	86°F
Amount rennet used, per 1000# milk	4 oz.	4 oz.
Amount color used, per 1000# milk,	25 c.c.	25 c.c.
Time cut	1:50 P.M.	2:52
Minutes curdling,	8	12
Temperature cooked,	106°F	106°
Hot iron test when dipped,	1/4 inch	1/4 inch
" " " " salted,	3/4-1 inch.	3/4-1 "
Time put to press	4:30 P.M.	5:45 P.M.

The results shown by the table are a quickening of the time consumed by the operation of Vat No.1 against Vat No.2.

Vat No2 took 1 hour and 15 minutes longer than did Vat No.1.

However these are not the conditions with which we are so much interested. The appearance, smell and condition of the milk, curd and finished product are the important factors.

The milk in Vat No. 1 had a better flavor than Vat No. 2.

As soon as the curds were dipped they were thoroughly matted to await the proper development of acid for grinding. The curd from Vat No. 1 when cut through with a knife

showed rather a firm compact structure. The curd from Vat 2 when cut through gave evidence of the presence of gas by the very numerous, small pin holes, circular in outline. The curd had an offensive odor which was not removed by grinding. However the curd mill is of great use in cutting up the curd and allowing the escape of the gas which seems to hold the development of acid in check.

The cheese shows the same general characteristics. In the cheese from Vat No.1 the holes are few and inclined to be flat. In a high acid cheese these holes are very few and extremely flat. The cheese from Vat No.2 shows a puffy tendency, and has a spongy feeling. When cut the same numerous round pinholes were present.

From this experiment I have shown that a good pure Lactic Acid Starter will hurry the operation, and what is much more important, will stop to a great extent the gassy cheese germ from developing, and at the same time overcome some of the evil effects already begun.

Another expirment which should have gone with my first work was as follows:

To 1 liter sterilized skimmed milk was added 4% Lactic Acid Starter. Then I added 4% Gassy Cheese Culture So far as I could determine by plating there was no further development of gassy cheese germs. This shows that if a good Lactic Acid Starter is added in time there need be no fear for "off conditions" of this sort.

Illustration of High Acid Cheese Made From Pure Milk Without a Control.

Illustration of Cheese made from Gassy Milk with a Lactic Acid Starter as Control.

Illustration of Cheese made from gassy milk without Starter as Control.