

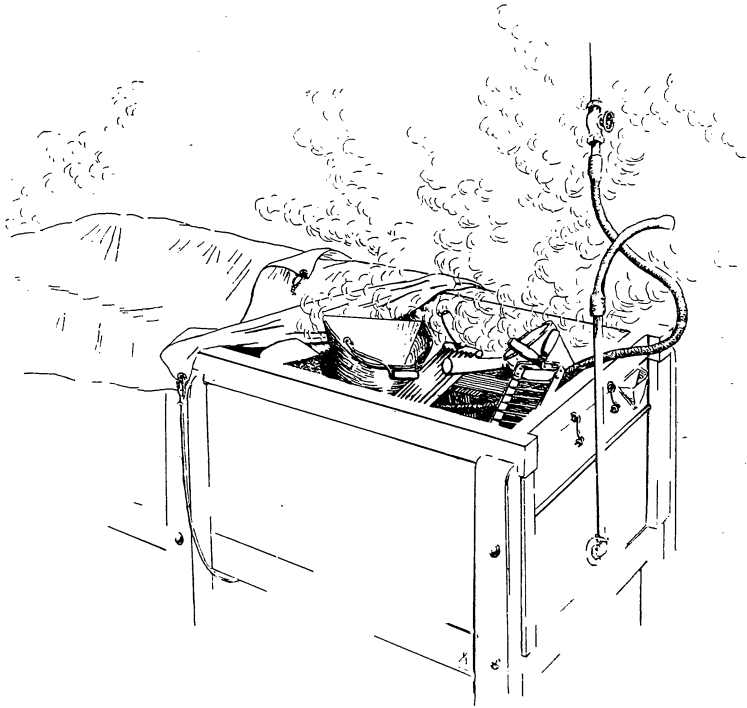
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RUSTY SPOT AND A REMEDY.

F. H. HALL, H. A. HARDING AND G. A. SMITH.

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POPULAR EDITION*

OF

BULLETIN NO. 225.

RUSTY SPOT AND A REMEDY.

F. H. HALL.

A scattered but serious trouble. For many years, in widely separated localities in New York State and elsewhere, cheesemakers have suffered from rusty spot. This trouble of cheddar cheese has been one very hard for makers to explain and harder still to eliminate. It might suddenly appear as a striking outbreak in a factory or group of factories, and perhaps as suddenly disappear; or it might gradually develop to a troublesome degree and remain in the factory for years with peculiar, unexplainable fluctuations and temporary disappearances. The spots are generally most prevalent in the spring and fall, but in some factories they have showed to a greater or less degree throughout whole seasons. The earliest reported outbreak was in St. Lawrence County, near Gouverneur, in 1883, when the trouble spread from one factory in which it had suddenly appeared and affected nearly all others in that section. Other serious outbreaks have been those at Hailesboro, Constableville, Harrisburg and Silver Springs, while cases of it have been reported from other places in St. Lawrence, Jefferson, Lewis, Oneida, Oswego, Allegany and Cattaraugus counties.

* This is a brief review of Bulletin No. 225 of this Station, on Control of Rusty Spot in Cheese Factories, by H. A. Harding and G. A. Smith. Any one specially interested in the detailed account of the investigations will be furnished, on application, with a copy of the complete bulletin. The names of those who so request will be placed on the mailing list to receive bulletins regularly, either popular edition or complete edition, as desired. Bulletins are issued at irregular intervals, as investigations are completed, not monthly.

The trouble may be unnoticed at the factory until it has affected the value of a considerable quantity of cheese; for the spots do not appear in the milk, curd or newly made cheese. The "make" of several days may go upon the shelves before any cheese is marketed, and the first indication of anything wrong come from the commission man who "cuts" the price because the cheese when sampled shows bright red or reddish yellow spots as though the curd had been sprayed with red ink or cheese color. The spots vary from almost microscopic in size to blotches as large as a dime.

These spots are not to be confused with "table stain," which is a pink discoloration of the rind and bandage due to the growth of a mold, especially in damp curing rooms. This latter trouble can be controlled, quite easily as compared with rusty spot, by washing the storage shelves to get rid of the mold, burning sulphur in the room and providing good ventilation. The even pink color on the bandage is entirely distinct, in both origin and appearance, from the reddish points and blotches on the surface of the gas holes and elsewhere throughout the cheese, which characterize rusty spot.

These large spots attract the attention of intending purchasers and the cheese is rejected for table use; although, so far as known, the flavor and texture of the cheese are both entirely unaffected. But if the eye be displeased, the sale of the goods is prevented, and the cheese can be disposed of only at a loss, to less discriminating trade like lunch counter and saloon owners.

With profits in cheesemaking as low as they are frequently, any such cut in price is a serious thing to factory men; and it was realized that the trouble must be overcome in some way.

The first step in scientific combating of a trouble is to ascertain its origin. Probable causes must be considered from all points of view and the correct one discovered by eliminating those which fail at some point to meet the conditions.

The spots were once thought to be due to iron rust from handling the milk in rusty cans; but chemical examination showed only traces of iron—no more than in normal cheese. Irregular

distribution of cheese-color was advanced as a cause; but the spots were bad in factories where no color at all was used. Poor salt also shared the charges of guilt; but factories using the best grades of salt suffered, and the trouble came and went while the same barrel of salt was in use. The fact that the spots do not appear when the cheese is first made, but develop later and grow in size for several days indicates the action of some form of life.

This factor has been proven the true one, first in Canada in 1896, and, later, by very careful tests made in the Station bacteriological laboratory and dairy. By these tests it was proven that bacteria, *Bacillus rudensis*, were always present in cheese showing rusty spots; and that by growing this bacillus in cultures until a quantity was obtained and then introducing the cultures into pure milk used in making cheese, the product would show the reddish spots.

Experiments in repression. Since living forms cause the spots, these must be destroyed or held in check if the trouble is to be controlled. Two general methods for destroying these minute forms of life are in general use,—employing germicidal substances or using heat.

It was first thought possible to disinfect a factory with formalin, which is a gas having very great power to destroy germs; but computation showed that the cost would be almost prohibitive, while it would be practically impossible to make many factories tight enough to get thorough results from the gas.

Heat was next considered, and a method of applying this agency worked out which has proven very successful in combating the trouble in five factories located in three counties in New York State. In four of these factories the outbreaks of rusty spot were so controlled that no financial loss occurred, and in the fifth factory the loss was slight.

Method of treatment. As soon as the outbreak is noticed it is well to use cheese-color quite freely, as the spots, if small, can usually be concealed by the use of annatto, and the cheese marketed without loss. This is in no sense an injury to the consumer, since neither flavor nor texture of the cheese is affected by either the spots or the color.

The first thing required is a thorough cleaning up of the factory. Hot dilute potash will cut the grease from the floor and a fresh coat of whitewash will brighten up the ceiling and walls. When the cheese is in press and everything cleaned up for the day, the curd mill and every rake, pail, broom, knife, conductor, cloth or anything which will come in contact with the milk on the following day is placed in the vat and a heavy canvas stretched tightly over the top.

Live steam is turned into the vat fast enough to bring the temperature of the vat at the corners up to 180° F. within five minutes. The steam should be continued at least fifteen minutes after this temperature is reached so that the steam will have plenty of time to penetrate into every crevice of the tools. When the time is up the steam is shut off and the canvas cover quickly removed.

In a couple of minutes the tools can be picked up and in most cases they will be so hot as to dry without any need of wiping. In case this is necessary it should be done with a new cloth or with one which has been recently boiled to avoid reseeding the tools.

The weigh-can should be inverted and a steam hose passed in through the faucet. This should be steamed for the same length of time as the vat. In case more than one vat is in use the steaming must be repeated in each vat. The next morning the hoops and followers with their cloths should be treated in the same way, except that it is desirable to have a separate place for treating them on account of the large amount of fat which is removed by the heat. The entire treatment should be repeated three times each week.

The tools are cleaned and freshened by this steaming in a very satisfactory manner and it is believed that this process will be found very useful as a means of combating many of the other milk troubles. No practical difficulties have ever been encountered in carrying out these recommendations in the different factories and any factoryman who will give this method of treatment a careful trial will be surprised to find how quickly and easily the operations can be performed.

The efficiency of this method would probably be much increased by heating the whey in order to prevent the return of large numbers of the germs to the farms. We have never been able to give this point an extensive practical test, since after we had heated the whey in the vats a number of times the latter leaked so rapidly as to make it advisable to desist.