Bacteria Gas Bubbles

Make Swiss Cheese Holes

Much like yeast causes bread dough to rise, bacteria in the pressed curd of a big Swiss cheese get in their good work while the cheese is on shelves in a warm curing room.

The carbon dioxide produced by these organisms gradually accumulates to cause bubbles in the “meat” of the cheese, gradually expanding the big wheel until its sides bulge slightly and it is said to have “opened up.”

The organisms not only cause bubbles, which are “eyes” when the big cheese is cut, but also help produce the pleasant hazelnut flavor characteristic of Swiss cheese and the mildly pliable texture that makes eating of this type of cheese such a consistently pleasant experience.

Subject of many a jest and joke, the holes in Swiss cheese are serious business to producers of it and they strive to produce just the proper “eye formation” which has so much to do not only with appearance of the cheese but also with its taste and texture.

Bacteria Starter Introduced

Clean, well-cooled milk, standardized to get the proper ratio of fat to casein, is clarified and then placed in huge shining copper kettles. Then a “starter” or “culture” is added, this meaning an introduction of the friendly bacteria some of which are to get in their gas-forming work after the curd is put into wheel form and placed on a warm shelf. Rennet is next added to curdle the milk.

When the proper stage of curdling is reached the curd is cut with a tool known as a “Swiss harp.” Later the steam below the kettle is turned on and, with stirring continued, heat brings the kettle's contents to a temperature of from 128 to 135 Fahrenheit, within 30 to 40 minutes. Excess moisture is thus expelled. The 3,200 pounds of milk has been reduced to a curd weighing approximately 200 pounds, the whey not being used in producing the cheese.

The curd is taken from the whey in the kettle by drawing a large, special type linen cheese cloth through the mass, the whey draining into the kettle and the curd staying in the cloth and being hoisted into a high-sided round hoop, into which it is pressed to further the expulsion of whey. When sufficiently firm, this curd mass is removed from the hoop, the cloth changed and this new wheel held under pressure again for 24 hours, being turned over several times to assure proper formation of the rind.

This wheel of curd is then immersed in a brine bath, where it
remains several days for thorough salting through absorption. The wheel is turned occasionally and the exposed surface salted by hand.

**Eyes Then Formed**

The brine bath is in a cold room and there, after the cheese is taken from the brine, it is held 10 days to firm up the rind and body before the eye-forming process is encouraged. The eye-forming takes place in a room heated to between 78 and 80 Fahrenheit. The interior fermentation process, with the bacteria playing their wholesome part, produces the gas and the eyes and contributes to the flavor and texture.

Cheesemakers know by thumping the sides of the wheels how the eye development is progressing. The flat sides and edges of the wheel also bulge when proper eye formation goes on inside.

Transfer to a cool room to slow down and to end bacterial action is the next step. High humidity helps prevent shrinkage. Flavoring salt is again rubbed on the wheels by hand and the wheels are turned on their shelves every other day.

The aging room is the next place for the cheese. Temperature there is between 35 and 40 degrees.

The moisture content of Swiss is about 38 per cent and the yield of cheese about 7 per cent.

There is nothing like uniform good luck in cheesemaking any more than there is in breadmaking. Too many elements enter into it between pasture and kettle and while a science it has not been mastered to the point that every cheese comes out of grading A No. 1. Price varies according to quality in the wholesale trade, yet price is not always a correct indication of quality in the retail trade. Here it is best to know cheese.

There are many kinds of bacteria in milk and the action of the various organisms make it possible to produce a variety of cheese from the same type of milk. One must see that the necessary bacteria for the type of cheese desired are favorable during the manufacture and curing of the cheese. If the desired bacteria are not present, they must be added to get the desired type of cheese. In the manufacture of Swiss cheese the addition of cultures of the desired additional organisms is necessary, while for limburger cheese no cultures are generally added to the milk.

**Cheese Laboratory at Monroe**

So many technical problems are constantly bobbing up and so surprising can be the behavior of milk at times that makers value the cooperation of governmental agencies in their work.

Yearly the Wisconsin College of Agriculture conducts a 2-week course for Swiss cheesemakers in the county normal school building at Monroe.
All year around a cheese laboratory is maintained manned by Robert E. Hardell, federal Swiss cheese manufacturing specialist here until 1936 when he was returned to Ohio, and by Charles A. Buck, state college of agriculture milk sanitation specialist.

Cooperating also with the farmers and makers in their problems is John Frey, dairy inspector representing the state department of agriculture and markets.

Dealers and maker-producer groups give financial support to the program of maintaining government specialists in the field.

Made Old Natural Way

Natural Swiss and natural limburger are the genuine, old-fashioned dairyland product, produced by cheesemakers from milk, by special methods, and available, after ageing, for the discriminating palate of the true cheese lover.

High quality standards have been established in the different cheese types, all comparing favorably with the imported makes. Factories and methods have been improved, sanitary rules are respected and study and experience have helped to perfect the product. Water coolers are used in the milk house so the milk may be delivered cool and sweet to the factory. The eye formation is now controlled by the maker who develops his own pure culture of bacteria to make bigger holes in Swiss cheese.

Skill in making, absolute cleanliness, time and care are important elements. There are no new styles, names or labels, for the honest to goodness cheese made in the natural way. Swiss must be made in the large wheels to get the desired texture, flavor and eyes. Brick is now coated in paraffin and limburger made of the whole milk, is wrapped in paper and tinfoil. All are wholesome nutritive, healthful, just good cheese—perfect natural food.

Mixed and Heated

Processed cheese is a product finally prepared in a grinding and mixing plant, varied qualities of natural cheese being ground up, heated and stirred, with certain ingredients added, to make it a standardized product that can be poured out to harden into loaf or small package moulds. This form is handy for merchandising and has excellent keeping qualities due to what happens to it in the heating and mixing process. Promoted as cheese, the processed and packaged product proves attractive to the consumer.

Green county, however, gives all possible emphasis to the original, untampered-with cheese, possessing the natural qualities given by age-old milk conversion methods handed down from cheesemaker to cheesemaker as a fine art.

Its vitamin, mineral and protein qualities are unsurpassed in
dairy foods and it is tasty, easily digested and beneficial to the human system.

**Natural Soil Factors**

Natural factors have favored the development of Swiss and limburger making in Green county.

The soils are mostly of limestone origin, imparting certain mineral qualities to the milk and flavor to Swiss cheese as well as being adapted to the raising of bluegrass and other native pasture growths and to hay crops. Underlying the limestone are excellent water supplies, even natural flowing wells and springs being found on some farms. Corn, too, is easily raised.

Pastures are particularly important, furnishing most of the cattle feed during the summer season. Corn silage and hay crops are important during the winter.

The Wisconsin Swiss cheese region is characterized by well-organized farms with substantial buildings and dwellings. The chief sources of income are milk, hogs and poultry.

The large cattle herds and general use of spreaders keep the farm lands well fertilized, for the farmer has learned it takes manure to make land that yields the crops.

The topography is gently rolling to decidedly rolling or hilly. The elevation ranges from 900 to 1,400 feet and the mean summer temperature is less than 70 degrees, with the cool nights so essential for cheesemaking. The average length of the season between killing frosts is less than 150 days.

**Limburger Cheese With Personality Plus**

Limburger is the cheese with the personality plus.

The reason for the arresting impression limburger makes is hydrogen sulphide and that's only on the surface.

Remove the rind and you have a dairy product of rare mellowness—smooth, rich, nutritive and highly beneficial to the gastric processes in the human system.

Natural limburger, invented by the Belgians near the city of Limburg, comes in half-pound, 1-pound and 2-pound cakes, wrapped in heavy paper and tinfoil.

The finest of milk is required for limburger and it is delivered from farms to factories twice a day in the hot summer and once a day during the cooler months.

At the factory milk intended for limburger is placed in clean vats and treated to rennet, a curdling agent, at a temperature of 94 degrees Fahrenheit. During the making of the curd and whey the heat is increased to 98. The manufacturing process requires about an hour and a half.
The temperature is not nearly so high as that used in making Swiss cheese (130 degrees in that process) and is not sufficient to kill off many of the milk's organisms, allowing them to live to give the cheese its special characteristics as it ripens. The heat does expel excess moisture, and after this is accomplished the curd is put into moulds and whey drains off.

**Ripens From Outside In**

Acid is produced in the curd and this is only neutralized after a considerable lapse of time, and as a rule the process is only completed by the aid of ammonia which is formed on the surface. The ripening process starts at the surface and works inward by degrees. This is one reason for the small size of the pieces for the ripening is accelerated by giving the cheese a large surface in relation to its bulk. At the same time a ripening action due to the rennet takes place throughout the whole mass, even though it may not be very obvious.

Practically all the casein undergoes conversion. This aids the fat in imparting a high degree of mellowness in the cheese.

**Salty Water Used**

To permit the growth of bacteria which split the protein of the cheese the ripening cellar should have a temperature of 58 to 65 degrees Fahrenheit and a relative humidity of about 95. A favorite way to achieve this is to build the factory on sloping ground, with the curing room dug into the slope. During their stay in the ripening room the cheeses must be rubbed frequently with salty water, to keep mould from starting while the enzymes are working and changing the original hard, whitish substance into the yellow buttery substance so prized by limburger devotees.

The moisture in limburger cheese is approximately 45 per cent. The yield is between 10.5 to 14 pounds per 100 pounds of milk. This is dependent on the amount of fat and casein in the milk and the moisture in the cheese and the fat loss in the whey. Fat loss in the whey is nominal.

Limburger, rye bread and a bottle of brew constitute a lunch that appeals to an epicure.

**Milk Must Have Best Care**

Cleanliness is all-important in the limburger factory as well as on the farm.

The successful cheesemaker closely watches his milk intake and rejects any milk found abnormal. He inspects the cans in which it is conveyed and consults with farmers about their methods of handling.
Serving free cheese sandwiches to Cheese Day multitude on public square at Monroe
He is careful, too, in his own handling of the milk and in the way the finished cheese is handled in its earlier stages of development. Missteps as to sanitation and cleanliness mean that both he and the farmers lose money.

**Relative Food Values**

Here's an interesting table of food values by calories, to show the nutritive qualities in Swiss and limburger cheese.
- Swiss cheese, from 105 to 117 calories, per ounce.
- Limburger, from 100 to 110 calories per ounce.
- Porterhouse steak, 70 calories per ounce.
- Sirloin steak, 61 calories per ounce.

**Cheese Three Times Daily**

Native Swiss people and those of Swiss descent who live in the Green county area often have cheese on the table three times a day.

It is natural enough for them, for the people of Switzerland have a record of highest annual per capita consumption of cheese in the world.

- The per capita record is 23 pounds!
- The United States record is 4.14 pounds, way down the scale.

In between Switzerland and the United States come the Dutch with 13.5 pounds; French with 13.5; Danes with 13.2; Germans with 9.5; British with 9 and Scandinavians with 7 pounds.

**Population of Green County**

The 1930 population of the county was 21,870.

Monroe's population by the federal census count was 5,015.

Brodhead, the only other community in the county ranking as a city, had a population of 1,533.

Villages and their populations are: New Glarus, 1,010; Monticello, 644; Albany, 728; Brooklyn (in Green county) 272, in Dane 134, total 406; Browntown, 291.

Green county is 24 miles square and has 16 townships.