Wisconsin's Culture: Exploring the Historical and Economic Significance of *Lactococcus lactis* in the State

Catalysts for Science Policy (CaSP)

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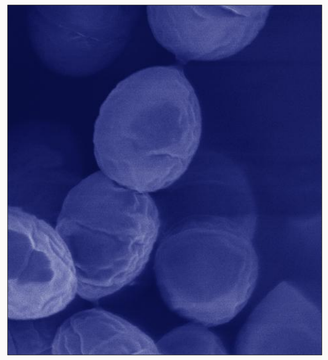
Overview

Wisconsin, America's Dairyland, is one of the top producers of dairy and cheese products within the United States. Our state has nearly 1,200 licensed cheesemakers and creates over 600 different types of cheese, double the number produced in any other state. Wisconsin produces 25% of the nation's cheese, totaling almost 3.5 billion pounds in 2021.[1]

However, there is one cheesemaker that is often neglected by the public — *Lactococcus lactis.* *L. lactis* is a bacteria that is used in the production of buttermilk and in many popular cheeses. Cheesemakers incorporate this bacterium in their cheesemaking to ferment lactose, or milk sugar, into lactic acid, a natural food preservative that gives certain cheeses a more complex taste.



***L. lactis* has a rich history with Wisconsin** and is vital to the manufacturing of cheeses such as Cheddar, Colby, cottage cheese, and cream cheese, as well as other dairy products such as buttermilk, sour cream, and kefir.

Above and Left: *L. lactis* under microscope, colorized; courtesy of Kenneth Todar

Wisconsin's History with *Lactococcus lactis*

Cheesemaking in Wisconsin is thought to have started in 1830s–1840s with Charles Rockwell and Anne Pickett. Rockwell, a struggling farmer, moved to the Fort Atkinson area in 1837 to produce cheese. Parallel to Rockwell, Pickett established the first "cottage industry cheese factory" for the state in 1841, using milk from her neighbors' cows. By this time, bacteria used in cheesemaking, such as *L. lactis,* came from the environment or from the previous batch's whey.[2]

From the mid-19th to 20th century, many European immigrants settled in Wisconsin and brought with them many different types of cheeses, some of which incorporate *L. lactis* in their manufacturing, such as Brick or Cheddar. Due to strides in microbial industrialization, pure cultures of *L. lactis* are added to cheeses. **Thanks to the diversity of cultures, both human and microbial, Wisconsin has maintained its place as the number one cheese producer in the United States.**[3]

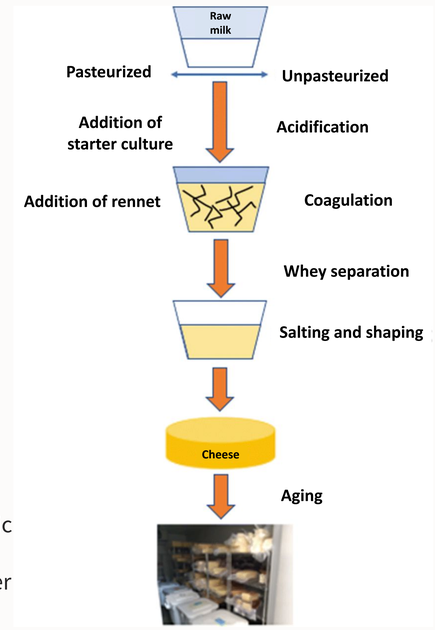
Above: Anne Pickett, photo courtesy of the Wisconsin State Historical Society

Lactococcus lactis plays an essential role in Wisconsin's **economy, culture, and state identity**

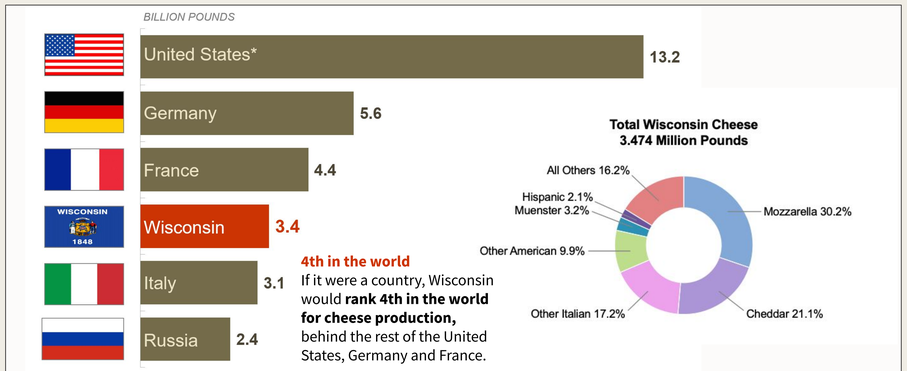
Use in Cheesemaking

One of the first steps in cheesemaking is 'ripening the cheese'. **During this process, lactose is converted to lactic acid via the addition of cheese microbes such as *L. lactis*.** This change in acidity helps the milk split into curds and changes the flavor and profile of the cheese. *L. lactis* also produces the natural preservative nisin, protecting product from spoilage.

Cheese cultures containing *L. lactis* are typically considered mesophilic, indicating that they are suited to work best in moderate temperatures such as 90°F. Most cheeses that use mesophilic cultures are hard cheeses such as Monterey, Cheddar, and Jack. Mesophilic cultures are more common than thermophilic cultures, which work better with warmer temperatures.[4]



Economic Impact



Cheesemaking accounts for 11.8% of state's employment and contributes $104.8 to the state economy. Wisconsin is also the largest producer of Cheddar cheese, which uses *L. lactis* in its manufacturing.[5]

References

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