Wisconsin State Microbe Proposal

Why should Wisconsin adopt *Lactococcus lactis* (*L. lactis*) as the state microbe?

This microbe is essential in key aspects of the Wisconsin state identity. Adopting *L. lactis* as the state microbe would provide an opportunity to showcase Wisconsin's dairy and agriculture industry.

L. lactis Background

Cheesemaking

By converting lactose to lactic acid, *L. lactis* is used in certain cheeses' fermentation, curd formation, and flavor profiles (Song, 2017).

- Vital in the production of Cheddar, Colby, Brie, cream cheese, and many more (Todar, 2010).
- Influences fermented dairy products including buttermilk and sour cream (Todar, 2010).

Additional Influences

- Used in pickling of vegetables and sauerkraut production (Todar, 2010).
- Produces an antibiotic, nisin, used as a natural preservative (Todar, 2010).

Key Points

L. lactis plays a crucial role in the making of cheese, pickled vegetables, and maintaining general food safety.

These industries have great influence on the history of Wisconsin and our economy.

This microbe should be adopted as a state symbol.

Impact on Wisconsin

History of Cheesemaking

Cheese is central to the WI state identity.

- Began in the early 1800s.
- Boomed in the mid- to late-1800s with improvement of manufacturing process and increase in demand (Wisconsin Historical Society (WHS)).
- WI was the first state to grade cheese on quality (WHS).
- Immigrants brought many relevant cheese types here, including Cheddar and Brie.
- Several cheeses have been developed in WI, including Colby.

Cheesemaking and the WI Economy

In general, agriculture is a major economic driver in the state of Wisconsin.

- Accounts for 11.8% of the state's employment (State of Wisconsin (SoW), 2023).
- Contributes to $104.8 billion of the state economy annually (SoW, 2023).

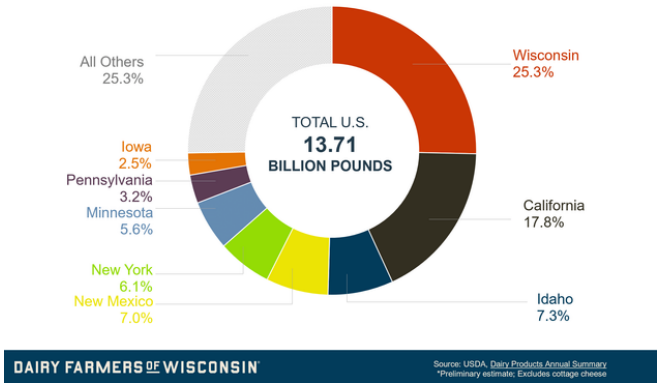

Figure 1. Cheese production in the U.S. (Dairy Farmers of Wisconsin)

Figure 2. Exhibit related to the approval of the New Jersey state microbe (New Jersey Isn't Boring Blog, 2019).

Wisconsin is the top cheese producer in the United States (Fig. 1).

- Dairy industry contributes $45.6 billion to the Wisconsin economy annually (SoW, 2023).
- In 2021, WI produced 3.47 billion pounds of cheese (SoW, 2023).
- Largest producer of Cheddar cheese.
    - Produced over 7 million pounds in 2020 (USDA, 2021).

Other State Microbes

In 2009, the Wisconsin Assembly passed legislation to adopt *L. lactis* as the state microbe, but it was not acted upon by the Senate. In this time, several other states have adopted state microbes.

Oregon

- In 2013, became the first state to designate a state microbe (The Oregonian).
- Adopted brewer's yeast (Saccharomyces cerevisiae) as the craft brewing industry brings in billions of dollars to Oregon every year (Beer Serves America).

New Jersey

- First discovered in NJ in 1943, *Streptomyces griseus* was approved as the state microbe in 2019 (NPR, 2018).
- Produces the antibiotic streptomycin that is used to treat several diseases.
- Following its approval, the Liberty Science Center opened an exhibit titled “Microbes Rule!” (Fig. 2) (Liberty Science Center, 2018).
    - Highlights the essential role microbes, especially *S. griseus*.

Illinois

- *Penicillium rubens* was grown to produce high levels of a broad spectrum antibiotic, penicillin (USDA, 2022).
- As the strain was constructed in Illinois, it was voted to become the official state microbe in 2021.