



## STREPTOCOCCUS SUIIS

# Novel vaccine design as an alternative to antimicrobial use for preventing and controlling the swine and zoonotic agent *Streptococcus suis*

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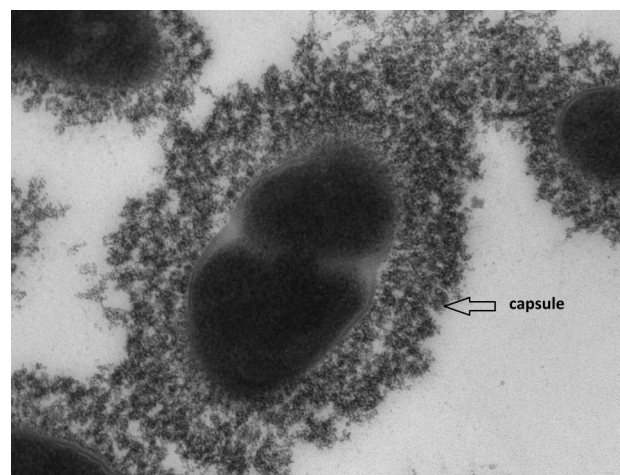
### Why is this project important?

*Streptococcus suis* (*S. suis*) related diseases are one of the most common infectious problems reported on Canadian swine farms. As well, they top the Swine Bacteria Disease Matrix produced by the Swine Health Information Center (SHIC) as the most important bacterial swine pathogen. Most importantly for producers, outbreaks of *S. suis* disease result in decreased performance and increased mortality, which have a significant economic impact. Of the virulent serotypes (subtypes of *S. suis*) recovered from diseased animals, serotype 2 is the most virulent and one of the most prevalent in swine clinical cases worldwide. *S. suis* also causes disease in humans, especially affecting pork industry workers in western countries, including Canada.

Clearly then, preventing and controlling *S. suis* infection in swine will be beneficial from both an economic and public health standpoint. Since *S. suis* cannot be eliminated by early weaning, vaccination is the industry's best hope; however, there are currently no effective commercial vaccines against the disease.

### What will be the benefit of this research?

*S. suis* has a major impact on pig health, and the antibiotics used to prevent it are ones that industry has targeted for reduced use. There is thus a pressing need to investigate and improve the efficacy of alternative solutions for the control of *S. suis* under field conditions. The only vaccination tools presently available are autogenous vaccines (vaccines that are prepared by isolation and destruction of microorganisms in infected animals from a farm and then used to provide immunity to other animals within the same farm).



*S. suis* capsule. Photo: University of Montreal

Though these vaccines offer little protection from *S. suis*, roughly 250,000 doses are used annually in Canada, at a cost to producers of \$350,000.

With an effective commercial vaccine, the industry can reduce antimicrobial use, improve animal welfare, and better respond to variations in market trends, including organic meat. Better control of *S. suis* diseases will increase the health status of Canadian farms (including “raised without antibiotic” farms), thereby boosting competitiveness.

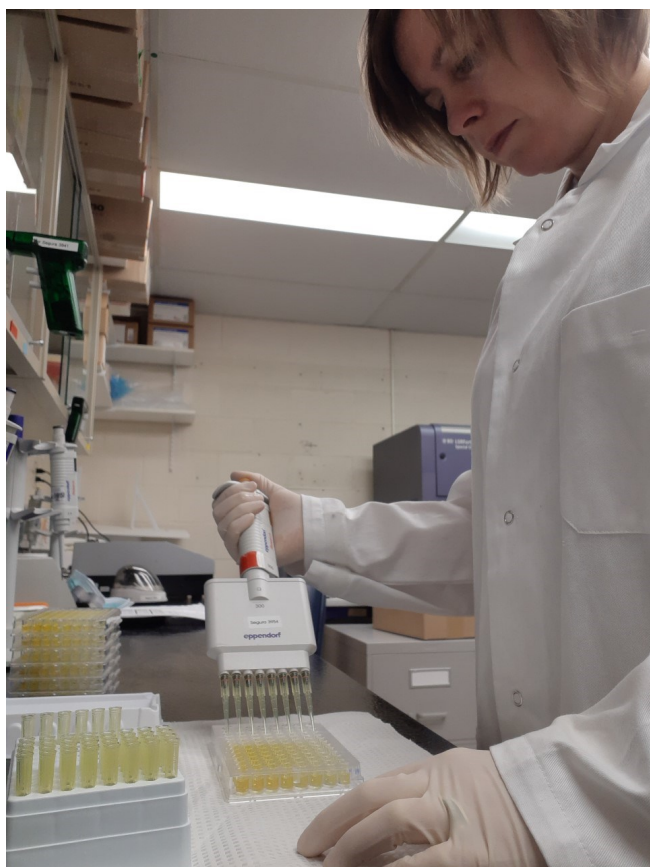
As well, reduction in antibiotic use will lower the shedding of antibiotic resistance agents into the environment. A vaccination program that lowers the incidence and severity of clinical signs in pigs will also reduce the pathogen dissemination in the environment and the risk of infection in humans.

### What has been done so far?

Scientists have recently developed a sub-unit prototype vaccine based on a patent-protected protein (Sao), which induces partial protection against *S. suis*. To increase protection, antibodies against the capsule (a kind of shield composed of sugars that *S. suis* has to protect itself), in addition to those induced by Sao, are needed. However, producing the capsule for a vaccine is difficult and costly. Researchers have produced different synthetic sugars to be combined with a protein to induce anti-capsular antibodies, which will be protective, and different prototypes are presently being tested.

As a result of this project, researchers have produced a purified capsule and standardized a serological test to measure antibodies against the capsule. The capsular polysaccharide (CPS) constitutes the outermost layer of the bacterial cell and is the main virulence factor.

Researchers have also produced up to 10 different synthetic sugar prototypes that were linked to a carrier protein (glycoconjugate) and tested. One particular synthetic prototype was proven to induce a robust protection in pigs after a challenge with a virulent *S. suis* serotype 2 strain. A patent has been deposited and is in the commercialization phase. A collaborative agreement with a pharmaceutical company is currently underway.



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*Photo right: Project research assistant Mélanie Lehoux carries out serological testing. Photo: University of Montreal*

## Collaborators

Josée Harel Mariela Segura	University of Montreal
Todd Lowary	University of Alberta
Éric Nadeau	Elanco

## Project status

Completed in 2023.

Additional resources &  
information about this project

## Farmscape interviews

- [Synthetic Sugar-Based Vaccine Offers Prospects for Improved Strep Suis Prevention](#)  
September 22, 2023
- [Synthetic Sugar Based Vaccine Offers Prospects for Broader Protection for Pigs from Strep Suis](#)  
September 15, 2023
- [Strep suis Vaccine Research Applicable to Other Bacterial Infections](#)  
May 8, 2020
- [Novel Approach Offers Potential for Effective Strep suis Vaccine](#)  
April 29, 2020
- [Effective Strep suis Vaccine Key to Reduced Antibiotic Use in Pork Production](#)  
April 22, 2020

## Additional resources

- Clark, J. (2021, June 4). S. suis vaccine development in Canada. *Farms.com*.  
<https://www.farms.com/ag-industry-news/s-suis-vaccine-development-in-canada-314.aspx>

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