TO KILL TWO BIRDS WITH ONE STONE…A MULTIVALENT VACCINE FOR MASTITIS AND JOHNE'S DISEASE

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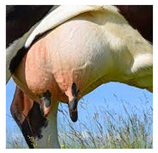
TWO MAJOR CHALLENGES FOR DAIRY COWS

MASTITIS

Inflammation of the mammary gland

Staphylococcus aureus (SA)

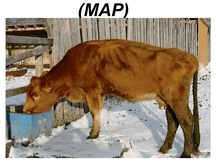


- 60 % of prevalence in Canadian dairy herds.
- Reduction of milk productivity.
- Leading cause of antibiotic use.
- Antibiotic residues in Milk.
- Annual costs ~900 million CAD (1).

JOHNE'S DISEASE

Chronic intestinal inflammatory disease

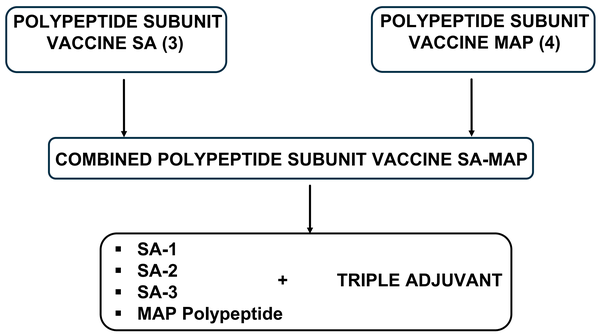
Mycobacterium avium subsp. paratuberculosis (MAP)



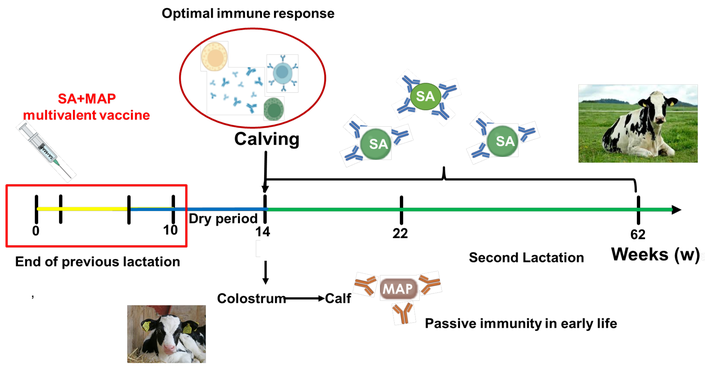
- 42% prevalence in Canadian dairy herds.
- Reduced milk production in infected animals.
- High risk of early culling.
- No treatment available.
- Annual cost ~33-54 million CAD (2).

OUR GOALS

THE MULTIVALENT VACCINE



THE VACCINATION SCHEDULE



EVALUATE THE IMMUNE RESPONSE

SOME OF OUR INTERESTING AND PROMISING RESULTS

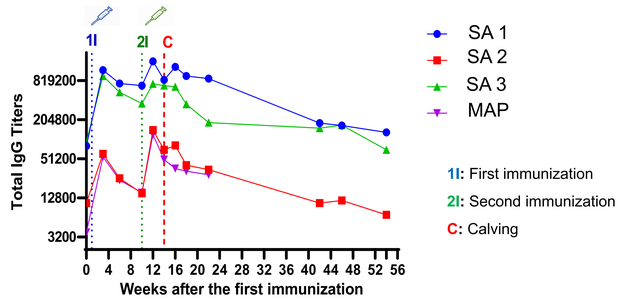


Figure 1. Evaluation of the duration of humoral immune responses.
Each dot represents the mean IgG titers of the cows in the study (n=10).

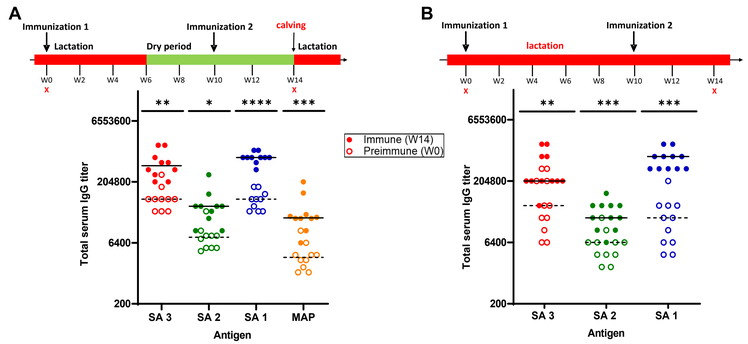


Figure 2. Schedule and total IgG titers of the SA-MAP multivalent vaccine (A) and the SA monovalent vaccine (B).
*: P<0.05, **: P<0.01, ***: P<0.001, ****: P<0.0001. Each point is a study cow (n=10). Horizontal lines represent the medians.

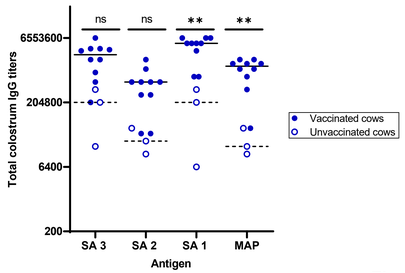


Figure 3. Comparison of total colostrum IgG titers.

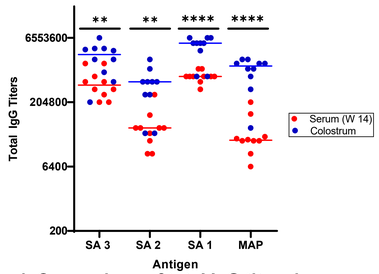


Figure 4. Comparison of total IgG titers in serum and colostrum.

*: P<0.05, **: P<0.01, ***: P<0.001, ****, P<0.0001). Each point is a study cow (n=10).Horizontal lines represent the medians.

- **Around two weeks before calving, all antigens induced high antibody titers in serum (Fig.1).**
- **For all antigens, antibody titers were significantly higher at calving compared to pre-immune time (Fig. 2 A).**
- **The humoral immune response to SA proteins in serum is similar in the multivalent SA-MAP vaccine and the previous monovalent SA vaccine (Fig. 2).**
- **MAP antibody titers were significantly higher in vaccinated cow colostrum than in unvaccinated cow (Fig 3).**
- **MAP antibody titers were significantly higher in colostrum than in serum at calving (Fig. 4).**

REFERENCES

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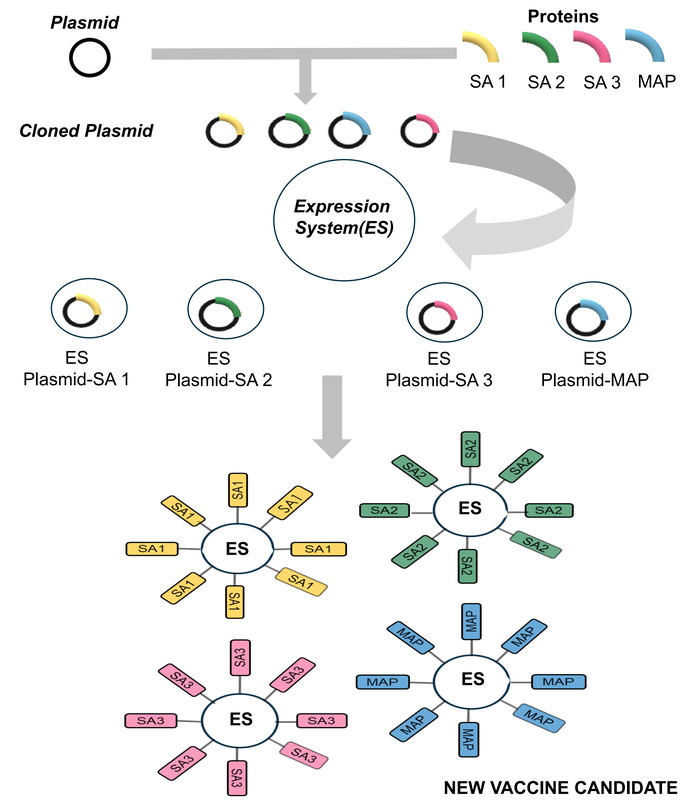
OUR NEXT OBJECTIVE

ESTABLISH AN HETEROLOGOUS EXPRESSION SYSTEM FOR SA-MAP ANTIGENS.

EXPRESSION SYSTEM TRANSFORMATION



NEW VACCINE CANDIDATE

SOME CONCLUSIONS

- The addition of a MAP antigen does not impair the humoral immune response to SA antigens observed in a previous unpublished study.
- It is possible to immunize before calving and reach an equivalent humoral response to an immunisation schedule during lactation.
- The high immune response obtained at the beginning of lactation may reflect a better protection against SA mastitis, and could provide passive immunization to calves against MAP.

PERSPECTIVES

Establish an optimal expression system for SA and MAP proteins could allow us to:

- Improve our antigen production system.
- Obtein a vaccine candidate more sustainable and market attractive.

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