

VETOQUINOL. YOUR PARTNER
IN THE PREVENTION OF *SALMONELLA* NEWPORT INFECTIONS

**Are *Salmonella* outbreaks
sucking away dairy profits?**



new



***Salmonella* Vetovax™ SRP®**

Keep milk production flowing.

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Salmonella Vetovax™ SRP®

SALMONELLA NEWPORT BACTERIAL EXTRACT VACCINE



Salmonella Vetovax™ SRP®:

an innovative technology designed to address *Salmonella* Newport outbreaks and **keep milk production flowing**

Salmonella Vetovax™ SRP® is a vaccine using the patented siderophore receptor and porin (SRP) technology, made from *Salmonella* Newport bacterial extract, that has been shown to be effective for vaccination of healthy cattle 6 months of age or older against infection caused by *Salmonella* Newport.

Limiting *Salmonella* infections is important to mitigate zoonotic risk and improve the health status and productivity of dairy herds. Clinical salmonellosis is urgently addressed, while subclinical infections commonly go unnoticed.¹ Subclinical *Salmonella* infections make diagnosis difficult, as overt clinical signs are absent, and fecal shedding occurs intermittently. Productivity losses in the form of reduced milk yield and lagging reproductive performance are masked as infected animals often appear healthy.²

Salmonella Vetovax™ SRP® — a new vaccine using the innovative SRP® technology helping to prevent *Salmonella* Newport infections, reduce fecal shedding,³ and increase milk production in the context of subclinical *Salmonella* infections⁴ — is now available from Vetoquinol.

The *Salmonella Vetovax™ SRP®* vaccine represents an effective strategy to control *Salmonella* Newport outbreaks in dairy operations and a great way to keep milk production flowing.

The *Salmonella* impact on profitability

- Prevalent pathogen, especially in large herds, with extended survival in the environment⁵
- Significant zoonotic pathogen: salmonellosis may result in food-borne exposure of humans to *Salmonella* through milk or meat products⁶
- Losses in feed efficiency, weight gain, milk production and increased cull rates are linked to subclinical *Salmonella* infections⁷
- Causes a number of diseases such as acute neonatal diarrhea, pneumonia, gastroenteritis in adult animals, and septicemia
- A cause of abortions in cows and heifers

What is SRP® Technology?

- **SRP** > Siderophore Receptor and Porin technology
- **Porins** > protein pores in the cell wall that allow essential nutrients to enter the cell
- **Siderophore receptors** > specialized porin proteins that transport iron-siderophore complexes through the cell wall during times of iron deprivation
- **SRP® technology** > siderophore receptor and porin proteins, extracted from the bacterial cell wall and used as vaccine antigens

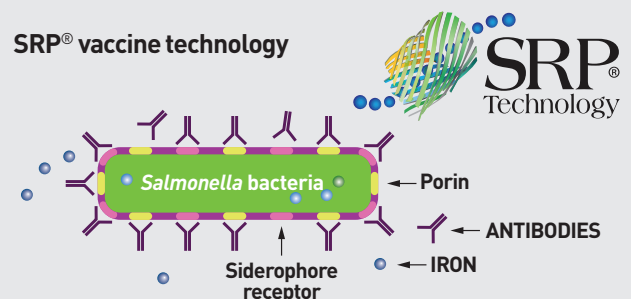
How does it work

- Most pathogenic bacteria require iron for growth and metabolism
- To survive inside a host, a bacterial pathogen **must** competitively acquire protein-bound iron from the host
- When bacteria encounter a low iron environment, such as inside an animal host, they secrete small proteins called **siderophores** which take iron away from the host binding proteins
- At the same time, bacteria express pore-like **siderophore receptors** in their outer membrane. These specialized proteins recognize iron-siderophore complexes, transporting them through the cell wall
- Siderophore receptors belong to a family of proteins called “**porins**”

The *Salmonella Vetovax™ SRP®* vaccine stimulates the immune system to produce antibodies to siderophore receptors and porins in the bacterial cell wall.⁸

- SRP proteins are highly conserved among the many strains of *Salmonella*
- Antibodies to the SRP proteins may be able to bind effectively, for many strains

SRP® vaccine technology



Salmonella Vetovax™ SRP® Vaccine Trial at Kansas State University

- 180 cows enrolled from a 1,200 Holstein cow herd in Northern Kansas
- *S. Agona* isolated in trial cows
- Clinical salmonellosis apparent in neonatal calves, but not in cows
- Randomized in pairs: heifers and dry cows included
- 75 animals vaccinated with **Salmonella Vetovax™ SRP®**
- Vaccine booster 21 to 35 days after primary dose
 - ⌚ Booster 14 to 21 days before parturition
- Paired set of 75 controls given placebo
- All cows and heifers that were purchased after initiation of the study and not enrolled in the study were vaccinated by the herd manager with the **Salmonella Vetovax™ SRP®** vaccine.

Overview of the results (see figures 1-2)

- Both vaccinates and controls showed decreased *Salmonella* fecal shedding
- Decreased somatic cell count (SCC) in vaccinates vs. controls
 - ⌚ 179,000 vs 439,000 at 30-60 days in milk (DIM) ($P < 0.01$)
- Mean parity adjusted average daily milk yield was greater in vaccinates
 - ⌚ Additional 1.14 kg/cow/day in the first 90 DIM ($P < 0.01$)
- Vaccinated cattle had higher concentrations of circulating antibodies at both samplings: 7-14 and 28-35 DIM ($P = 0.01$)

General conclusions

Vaccinating dairy cows with **Salmonella Vetovax™ SRP®** resulted in higher adjusted average daily milk yield (+1.14 kg), a decrease in SCC, and a significant increase in circulating antibodies. Since *Salmonella* bacteria are present on most dairy operations, this serologic response is positive. Vaccination with **Salmonella Vetovax™ SRP®** resulted in a significant increase in milk yield which may lead to improved profitability for dairy operators.

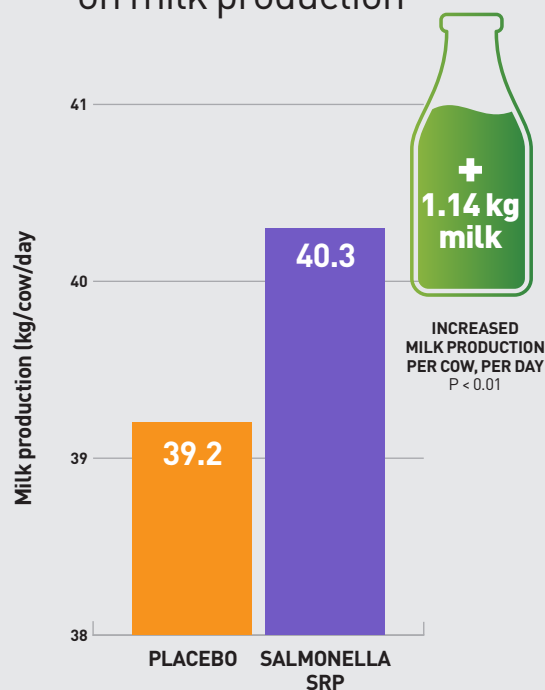
Source for the data provided here

HERMESCH, D.R., THOMSON, D.U., LONERAGAN, G.H., RENTER, D.R., WHITE, B.J. (Sept. 2008). Effects of a commercially available vaccine against *Salmonella enterica* serotype Newport on milk production, somatic cell count, and shedding of *Salmonella* organisms in female dairy cattle with no clinical signs of salmonellosis, *AJVR*, 69(9): 1229-1234.

SRP® vaccines differ from whole-cell bacterins and core antigen vaccines. They are a purified bacterial extracts containing predominantly SRP proteins; other cellular components and extraneous proteins are removed during manufacturing. Antibodies produced to the SRP vaccine bind to siderophore receptors and porins on the bacterial cell membrane. Siderophore receptor and porin proteins are highly conserved among serotypes, which may result in a broadened protection from the *Salmonella* Newport bacterial extract vaccine.

FIGURE 1

Effect of *Salmonella* SRP vaccination on milk production

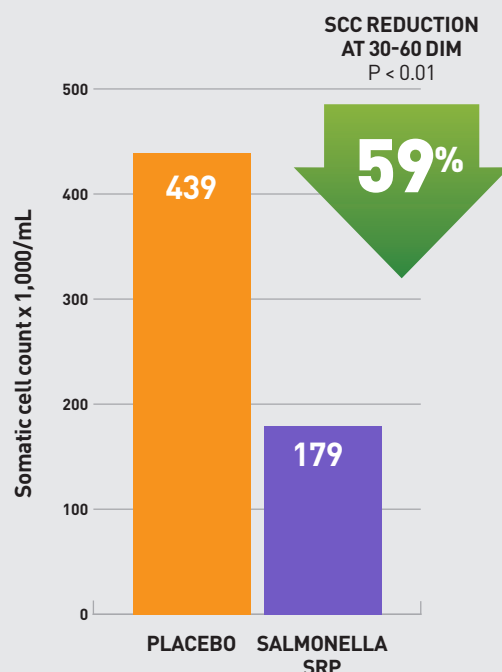


Cows administered SRP vaccine showed a 1.14 kg increase in milk production per day.

Source: Kansas State University study

FIGURE 2

Effect of *Salmonella* SRP vaccination on somatic cell count (SCC) (cells/mL)



From 30 to 60 days after calving, SRP vaccinates had a significantly lower somatic cell count.

Source: Kansas State University study

Salmonella Vetovax™ SRP® new

SALMONELLA NEWPORT BACTERIAL EXTRACT

Siderophore receptors and porins

Veterinary use only

VLN365/PCN 2811.00



Indication

This product has been shown to be effective for vaccination of healthy cattle 6 months of age or older against infection caused by *Salmonella* Newport. The duration of immunity is unknown. For more information regarding efficacy and safety data, consult the productdata.aphis.usda.gov website under *Salmonella* Newport Bacterial Extract.

Dosage and administration

Shake well before use. Administer 2 mL (1 dose) subcutaneously. Revaccinate in 2 to 4 weeks. Dry cows and bred heifers should be vaccinated twice before calving; whole herd vaccination may be done at any stage of lactation. The need for annual booster vaccination has not been established for this product; consultation with a veterinarian is recommended.

Cautions

Store at 2 °C to 8 °C (35 °F to 46 °F). **DO NOT FREEZE.** Use entire contents when first opened. Do not vaccinate within 60 days of slaughter. Transient swelling may occur at the injection site. In case of allergic response administer flunixin meglumine and/or epinephrine. Contains an emulsified adjuvant. Contains formaldehyde and polymyxin-B as preservatives. Do not mix with other products. For use by, or under the supervision of a veterinarian.

Warning

In case of human exposure, contact a physician.

Patent information

www.epitopix.com/patents

Technical inquiries

1 800 363-1700

Manufactured by:

EpiTopix, Willmar, MN, USA 56201

Distributed by:

Vetoquinol N.-A. inc.,
2000, chemin Georges, Lavaltrie (Québec) Canada J5T 3S5



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REFERENCES

- 1 FOSSLER, C.P., WELLS, S.J., KANEENE, J.B. *et al.* (2004). Prevalence of *Salmonella* spp on conventional and organic dairy farms, *J Am Vet Med Assoc.* 225:567-573.
- 2 HERMESCH, D.R., THOMSON, D.U., LONERAGAN, G.H., RENTER, D.R., WHITE, B.J. (Sept. 2008). Effects of a commercially available vaccine against *Salmonella enterica* serotype Newport on milk production, somatic cell count, and shedding of *Salmonella* organisms in female dairy cattle with no clinical signs of salmonellosis, *AJVR*, 69(9): 1229-1234.
- 3 *Ibid.*
- 4 *Ibid.*
- 5 NATIONAL ANIMAL HEALTH MONITORING SYSTEM. *Salmonella* and *Campylobacter* on U.S. dairy operations, 1996-2007. *APHIS Info Sheet*, July 2009, #N562.0709.
- 6 LONERAGAN, G.H., *et al.* *Salmonella* in Cull Dairy Cattle of the Texas High Plains. *89th Annual Meeting of the Conference of Research Workers in Animal Diseases*, Dec. 7-9, 2008, Chicago, Ill.
- 7 *Ibid.*
- 8 HERMESCH *et al.*, *op. cit.*

| Product | VTQ | CDMV | VP | WDDC | AVP |
|--|--------|--------|---------|--------|---------|
| Salmonella Vetovax™ SRP® 100 mL (<i>Salmonella</i> Newport bacterial extract) | 458808 | 125789 | 1150355 | 139102 | 1153620 |