

VETOQUINOL. YOUR PARTNER  
IN THE PREVENTION OF CLINICAL MASTITIS

Choose the first —and only—  
***Klebsiella mastitis vaccine***



new



***Klebsiella Vetovax™ SRP®***

Keep cows in the herd longer.

vetoquinol.ca





## ***Klebsiella Vetovax™ SRP®*** : an innovative technology designed to address coliform mastitis and **keep your cows in the herd longer**

***Klebsiella Vetovax™ SRP®*** is a vaccine using the patented siderophore receptor and porin (SRP) technology, made from *Klebsiella pneumoniae* bacterial extract, that has been shown to be effective for vaccination of healthy cattle 22 months or older against mastitis caused by *Klebsiella pneumoniae*.

**D**airy farmers are justified in seeing mastitis as the utterly devastating disease that it is. According to Pamela Ruegg, “mastitis is the most common and costly health concern for dairy producers”<sup>1</sup> and “results in around 65-85% of the industry’s overall use of antibiotics.”<sup>2</sup> Mastitis is most frequently caused by bacteria. Cows become exposed through many sources (feces, bedding, milking equipment, water, other animals, etc.). Identifying the correct pathogen is crucial in determining the right course of action.

### **Not all sources of mastitis are alike...**

Bacteria that cause mastitis come from two sources: contagious pathogens (such as *Streptococcus agalactiae* and *Staphylococcus aureus*) and environmental pathogens such as coliform bacteria and environmental *Streptococci* (other than *Strep. agalactiae*). Methods of control differ by pathogen, which is why it is important to identify the different bacteria causing a herd issue and address them accordingly. This document focuses on a specific and innovative new vaccine against coliform mastitis caused by *Klebsiella pneumoniae* bacteria.

Since “Gram-negative clinical mastitis (CM) is more severe than Gram-positive mastitis due to its effect on milk yield, discarded milk, treatment costs, death, and culling,”<sup>3</sup> the lack of effective treatments historically made *Klebsiella* CM especially troublesome. ***Klebsiella Vetovax™ SRP®*** — a new vaccine using the innovative SRP® technology against mastitis caused by the coliform bacteria *Klebsiella pneumoniae* — is now available from Vetoquinol.

### Key features of *Klebsiella* mastitis

- Environmental coliform mastitis
- Very prolific in organic bedding (especially sawdust)
- Bacteria often causes a rapid infection
- Very frequently undetected by the farmer/robot before disease starts
- Causes a local and systemic toxemia
- Infection almost always destroys the quarter
- Infection often kills the animal
- >50% of cows with *Klebsiella* CM exit the herd<sup>4</sup>

### Why vaccinate?

- Difficult to prevent and treat
- Costly disease: average milk loss of 700 to 1,400 kg/case<sup>5</sup>
- Vaccines can help save on treatment costs
- Vaccination reduces the need for antibiotics in treating disease

**Choosing the right vaccine is highly recommended.** “Whereas core antigen (J5) vaccines are available, coliform mastitis, especially *Klebsiella* mastitis, continues to cause problems for dairy producers.”<sup>6</sup> ***Klebsiella Vetovax™ SRP®*** is a new technology high-quality vaccine that addresses coliform clinical mastitis directly by going beyond traditional bacterins to help you keep cows in the herd longer.

## Overview of the study conducted by Iowa State University

- ▶ 429 cows
- ▶ 378 milking
- ▶ Free stall barn houses all lactating cows with manger headlocks
- ▶ Currently bedded with manure solids (not heat treated)
  - ▶ ~30% dry matter coming off the separator.
  - ▶ Stalls are re-bedded 3x/week.
- ▶ J5 Vaccination
  - ▶ 4x/lactation [-45, -28, 25, and 90 DIM]

It is important to note that the herd had an ongoing *Klebsiella* mastitis issue even with frequent J5 vaccination.

## General conclusion of the study conducted by Iowa State University

The prevalence and incidence of *Klebsiella* mastitis was significantly reduced in Kleb-SRP vaccinated cows compared to placebo vaccinated controls. Prevalence, the portion of individuals that tested positive during the study, was reduced by 71% in vaccinates compared to controls. Milk production increased in Kleb-SRP vaccinated cows by 2.0 pounds per cow per day compared to placebo cows. In conclusion, vaccination with a *Klebsiella pneumoniae* vaccine based on the SRP® technology provided statistically significant protection from *Klebsiella* mastitis.

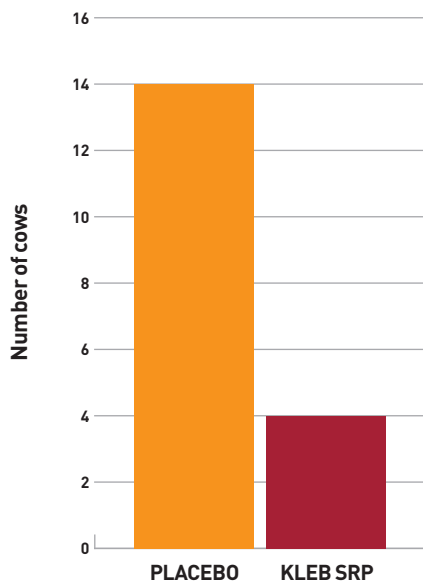
### Source for the data provided here

GORDEN<sup>1</sup>, P., KLEINHENZ<sup>1</sup>, M., YDSTIE<sup>1</sup>, J., SLINDEN<sup>2</sup>, L., STRAUB<sup>2</sup>, D., PETERSON<sup>2</sup>, M., BURKHARDT<sup>2</sup>, D. (2017), Application of Siderophore Receptor Proteins and Porins (SRP®) Technology for Controlling *Klebsiella* Mastitis in a Commercial Dairy Herd, *NMC Annual Meeting Proceedings*, 169-170. <sup>1</sup> Iowa State University, Field Services, Ames, Iowa, USA; <sup>2</sup> EpiTopix, LLC, Willmar, Minnesota, USA.

### REDUCED PREVALENCE OF *KLEBSIELLA* MASTITIS



### Prevalence of *Klebsiella* mastitis in cows vaccinated with *Klebsiella* SRP vaccine versus placebo



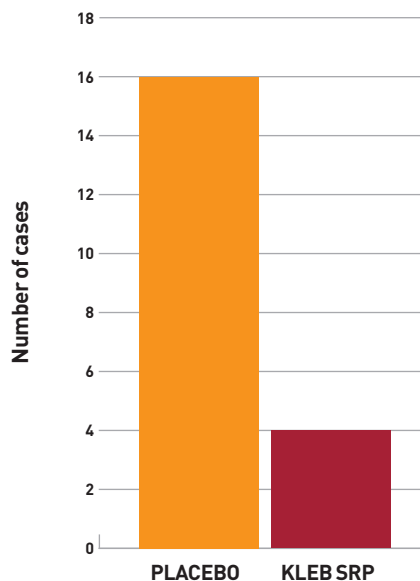
Prevented Fraction 0.7143; 95% CI: 0.1453 to 0.9045. P=0.0171

Source: Iowa State University study

### REDUCED INCIDENCE OF *KLEBSIELLA* MASTITIS



### Incidence of *Klebsiella* mastitis in cows vaccinated with *Klebsiella* SRP vaccine versus placebo



Prevented Fraction 0.7594; 95% CI: 0.2804 to 0.9195. P=0.0056

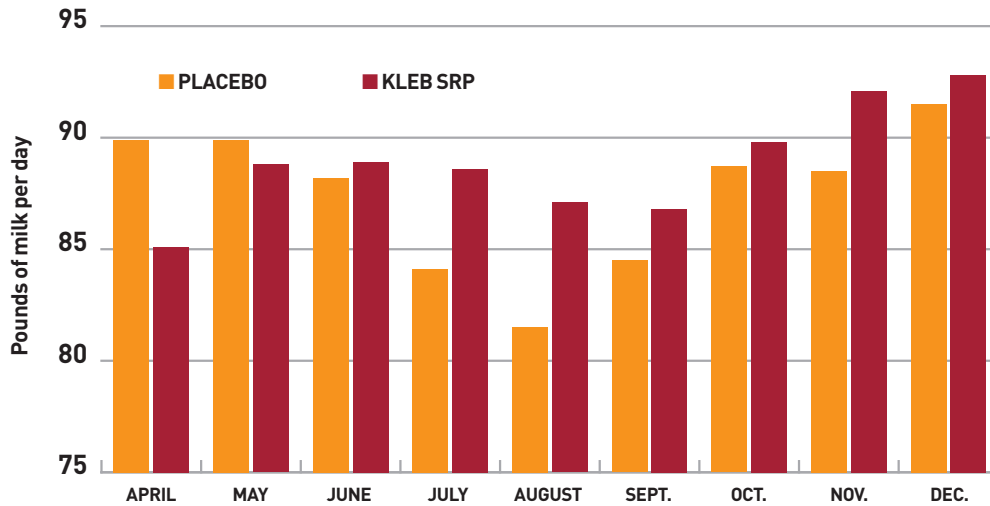
Source: Iowa State University study

# Klebsiella Vetovax™ SRP®

KLEBSIELLA PNEUMONIAE BACTERIAL EXTRACT VACCINE

## Average daily milk production per cow

from cows vaccinated with *Klebsiella* SRP vaccine versus placebo

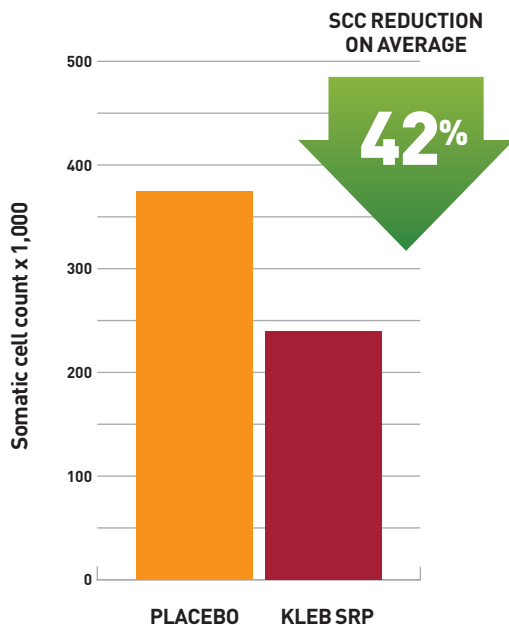


INCREASED MILK PRODUCTION PER COW, PER DAY

Overall 2.002 pound of milk advantage in *Klebsiella* SRP Vaccinates per cow per day. P=0.0000

Source: Iowa State University study

## Effect of *Klebsiella* SRP vaccination on somatic cell count (SCC)

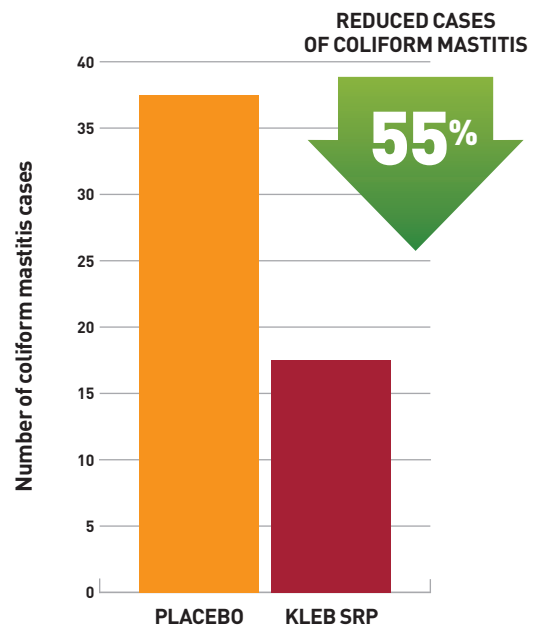


Error bars show 95% CI. Controlling for other variables, vaccination with *Klebsiella* SRP reduces SCC on average 42%. P<0.001

Source: Iowa State University study

## Cumulative cases of coliform mastitis

from cows vaccinated with *Klebsiella* SRP vaccine versus placebo



Over a ten-month period Prevented Fraction 0.5478; 95% CI: 0.1953 to 0.7459. P=0.0057

Source: Iowa State University study

# Klebsiella Vetovax™ SRP®

KLEBSIELLA PNEUMONIAE BACTERIAL EXTRACT VACCINE



## What is *Klebsiella*?

- ▶ Gram-negative fecal coliform bacteria
- ▶ Found on almost all dairy farms
- ▶ Significant environmental mastitis pathogen, especially in large herds
- ▶ Hard to diagnose on culture as bacteria dies quickly
- ▶ Upon death, bacteria releases a difficult to treat endotoxin causing devastating disease in dairy cattle
- ▶ Significant pathogen in human medicine as well
- ▶ Extended survival in environment
- ▶ Two major pathogens:  
*Klebsiella pneumoniae* and *Klebsiella oxytoca*

## Sources of *Klebsiella*

- ▶ Feces, bedding, feed
- ▶ Milking equipment
- ▶ Drinking water
- ▶ Cow hide and mucosa

## 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

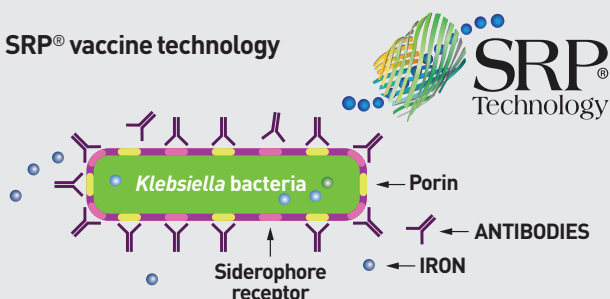
## How does it work

- ▶ 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 *Klebsiella Vetovax*™ SRP® vaccine stimulates the immune system to produce antibodies to siderophore receptors and porins in the bacterial cell wall.

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

### SRP® vaccine technology



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 *Klebsiella pneumoniae* bacterial extract vaccine.



new

# Klebsiella Vetovax™ SRP®

## KLEBSIELLA PNEUMONIAE BACTERIAL EXTRACT

Siderophore receptors and porins

**Veterinary use only**

VLN365/PCN 2879.00

### Indication

This product has been shown to be effective for vaccination of healthy cattle 22 months or older against mastitis caused by *Klebsiella pneumoniae*. The duration of immunity is unknown. For more information regarding efficacy and safety data, consult the product data. aphis.usda.gov website under *Klebsiella pneumoniae* Bacterial Extract.

### Dosage and administration

**Shake well before use.** Administer 2 mL (1 dose) subcutaneously. Revaccinate in 2 to 4 weeks. Heifers should receive their first dose 30 days after calving. Dry cows 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 at the injection site (>5 cm) may occur. Heifers less than 22 months of age should not receive this product until 30 days after calving. In case of allergic response, administer flunixin meglumine and/or epinephrine. Contains formaldehyde and polymyxin-B as preservatives. Do not mix with other products.

### Warning

In case of human exposure, contact a physician.

### Patent information

[www.epitopix.com/patents](http://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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### Product

### VTQ

### CDMV

### VP

### WDDC

### AVP

<b>Klebsiella Vetovax™ SRP® 100 mL</b> ( <i>Klebsiella pneumoniae</i> bacterial extract)	458807	125614	1150350	138934	1152070
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