

# PATHKINEX UPDATE



## PathKinex™ Update: Spotlight on Pathogen Control with ProVent® ECL, Strateris®, and Novela® ECL

*Written by Amy Lange, Microbiologist III at Microbial Discovery Group*

*Bacillus* species are some of the most active “microbial factories” in nature. They produce and secrete a wide range of substances into the digestive tract of a host animal, including enzymes for digestion, signaling molecules that modulate host immune cells and intestinal barrier function, and a diverse range of antimicrobial compounds that inhibit the growth of other bacteria. Many of these compounds can effectively control the growth of enteric pathogen species such as *E. coli*, *Salmonella*, and *Clostridium perfringens* in vitro. When used as direct-fed microbials (DFMs), they may help decrease reliance on antibiotic use or boost the effectiveness of medically necessary antibiotics. These compounds may also lower mortality and/or infectious disease symptoms in livestock animals by controlling pathogens in the gastrointestinal tract.

It's clear that *Bacillus* are versatile and important organisms when it comes to pathogen control, which is why we at Microbial Discovery Group (MDG) study them so closely with our PathKinex™ platform. Let's take a look at our antimicrobial screening process and see some up-to-date results for three of our products: ProVent® ECL, Novela® ECL, and Strateris®.

### Our Method:

We have been building libraries of livestock pathogens since 2016 by culturing multiple species of pathogens during almost every PathKinex™ project, and our library has grown to a collection of over **21,000 pathogenic isolates of animal origin**. Our pathogen libraries are stored in high-density arrays of microtubes and preserved in ultralow freezers at -80°C/-112°F, enabling us to return to those cultures years later and retest them. Most of these pathogen isolates are from commercial farms, animals with symptoms of enteric disease, or other situations with specific pathogen challenges.

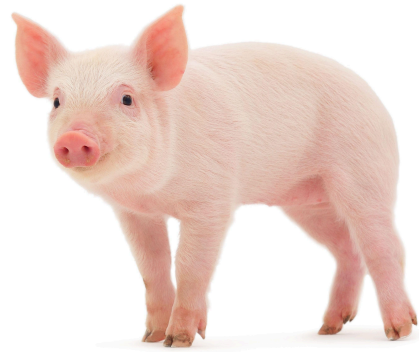
We use multiple antimicrobial susceptibility (AST) methods to evaluate the effectiveness of our *Bacillus* strains against our library of pathogens. For most of our AST, we use a broth culture method that allows us to test multiple combinations of pathogen cultures and *Bacillus* strains in the same multiwell plate. We calculate the percent inhibition based on the difference in growth between untreated and treated pathogens for every strain in our animal health products, enabling us to include antimicrobial data in our PathKinex™ projects.



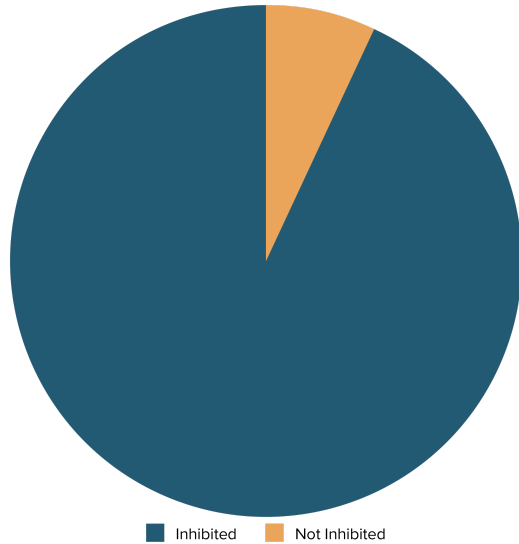
## Our Results

Our *Bacillus* strains demonstrate effective antimicrobial activity against key pathogens in poultry, swine, and dairy cows. When our products are doing well, any given pathogen is inhibited by one or more of the *Bacillus* strains in our multi-strain, health-focused DFM products. Not every pathogen will be inhibited by the same strain, but including multiple antimicrobial strains in our products gives us multiple layers of coverage. This means that **most of our health-related products can inhibit between 91% and 99% of pathogen isolates** from swine, poultry, or dairy libraries with one or more of their *Bacillus* strains!

Figure 1: AST results tables for ProVent®ECL, Novela® ECL, and Strateris®

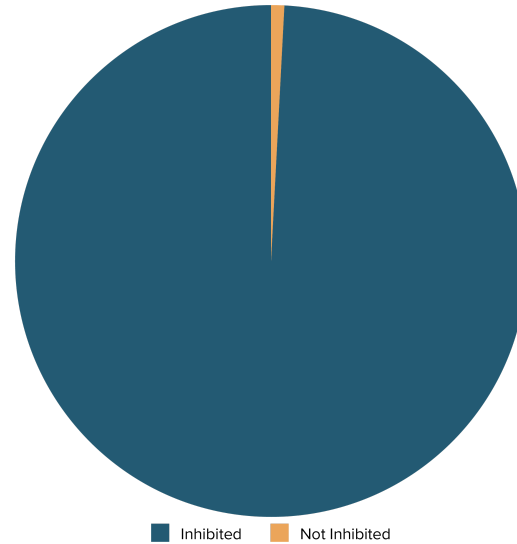


Swine *E. coli*



5965 *E. coli* isolates from 144 farms tested via liquid and agar AST. Provent ECL inhibited growth of over 93% of *E. coli* tested between 2016 and 2024.

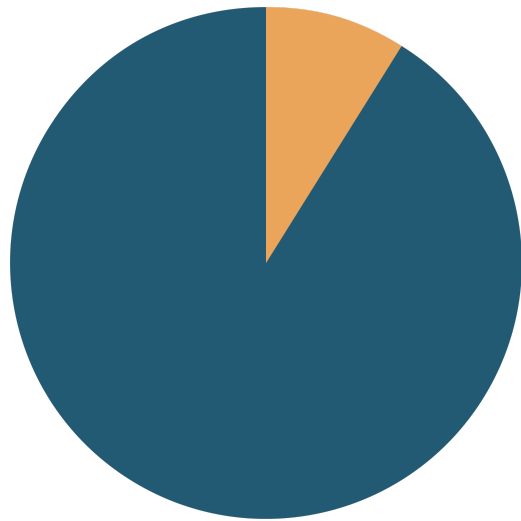
Swine *C. perfringens*



3461 *C. perfringens* isolates from 107 farms tested via liquid and agar AST. ProVent<sup>®</sup> ECL inhibited growth of 99% of *C. perfringens* tested between 2016 and 2024.

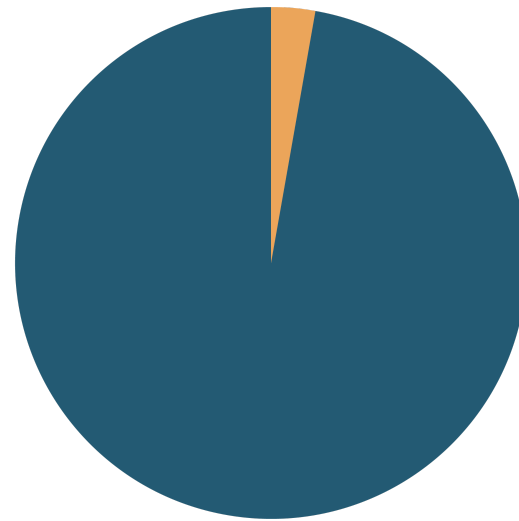
Swine *Salmonella*

Swine *C. difficile*



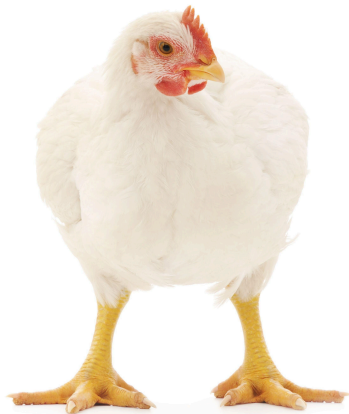
■ Inhibited ■ Not Inhibited

812 *Salmonella* isolates from 33 farms tested via liquid and agar AST. ProVent® ECL inhibited growth of over 91% of *Salmonella* tested between 2016 and 2024.



■ Inhibited ■ Not Inhibited

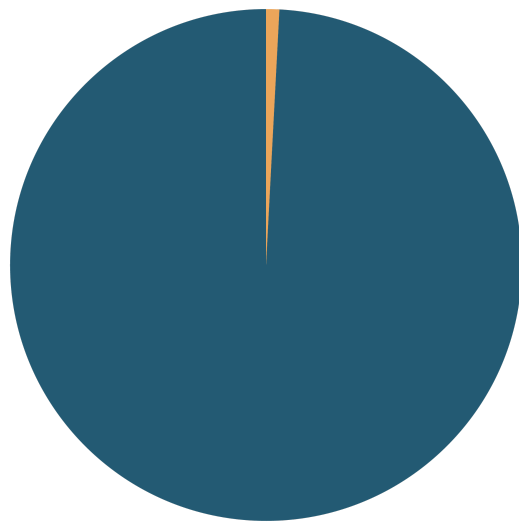
2667 *C. difficile* isolates from 73 farms tested via liquid and agar AST. ProVent® ECL inhibited growth of 97% of *C. difficile* tested between 2016 and 2024.



Poultry *E. coli*

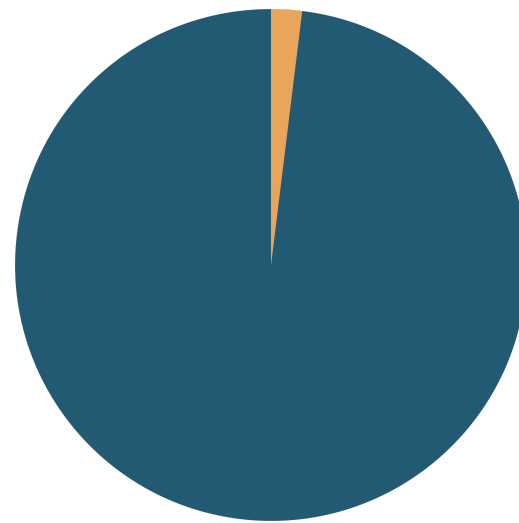
**Novela**<sup>®</sup>  
ECL

Poultry *C. perfringens*



■ Inhibited ■ Not Inhibited

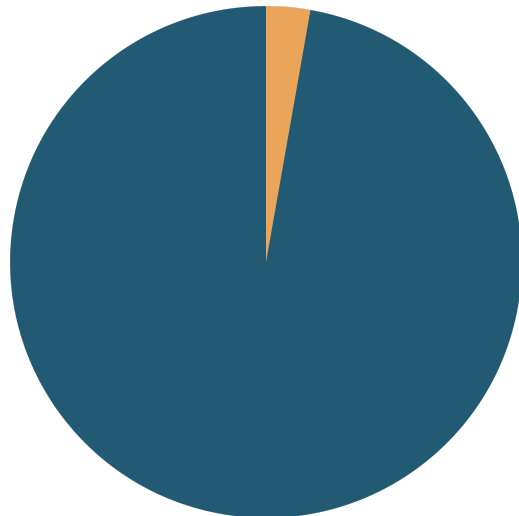
842 *E. coli* isolates from 110 farms tested via liquid AST. Novela® ECL inhibited growth of over 99% of *E. coli* tested between 2018 and 2024.



■ Inhibited ■ Not Inhibited

435 *C. perfringens* isolates from 60 farms tested via liquid AST. Novela® ECL inhibited growth of 98% of *C. perfringens* tested between 2018 and 2024.

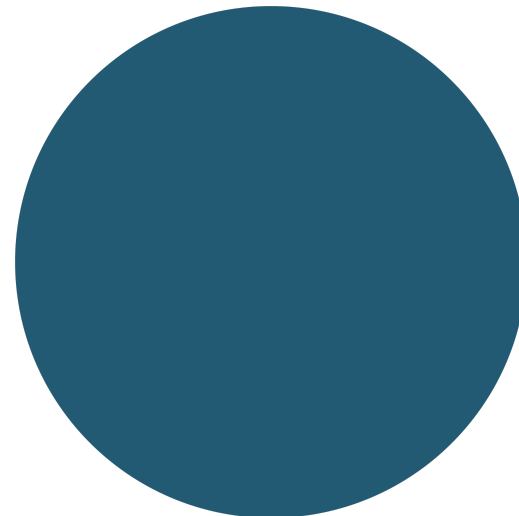
### Poultry *Salmonella*



■ Inhibited ■ Not Inhibited

287 *Salmonella* isolates from 29 farms tested via liquid AST. Novela® ECL inhibited growth of 97% of *Salmonella* tested between 2018 and 2024.

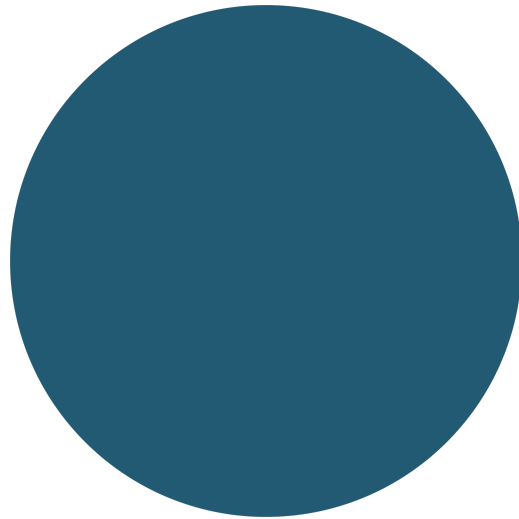
### Poultry *E. faecalis*



■ Inhibited ■ Not Inhibited

103 *Enterococcus faecalis* isolates from 20 farms tested via agar AST and liquid AST. Novela® ECL inhibited growth of 100% of *E. faecalis* tested between 2022 and 2024.

Poultry *E. cecorum*



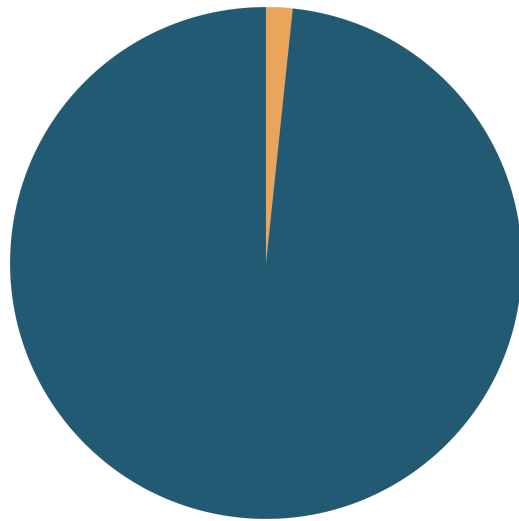
■ Inhibited ■ Not Inhibited

42 *Enterococcus cecorum* isolates from 16 farms tested vis agar AST. Novela® ECL inhibited growth of 100% of *E. cecorum* tested between 2022 and 2024.



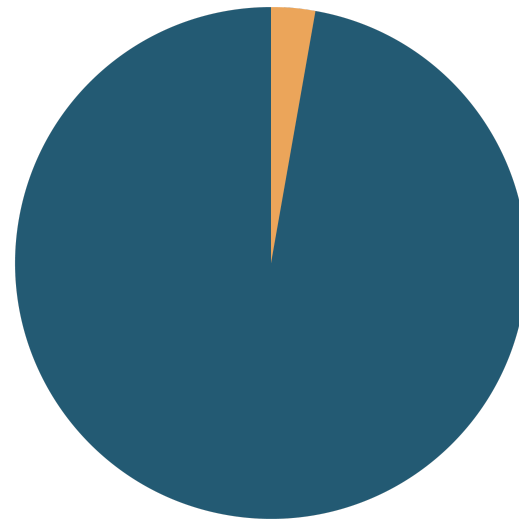
Dairy *E. coli*

Dairy *C. perfringens*



■ Inhibited ■ Not Inhibited

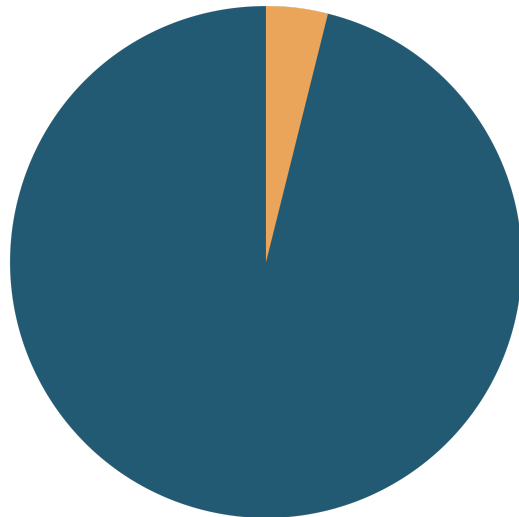
3384 *E. coli* isolates from 114 farms tested via liquid AST. Strateris<sup>®</sup> inhibited growth of over 98% of *E. coli* tested between 2018 and 2024.



■ Inhibited ■ Not Inhibited

2055 *C. perfringens* isolates from 91 farms tested via liquid AST. Strateris<sup>®</sup> inhibited growth of over 97% of *C. perfringens* tested between 2018 and 2024.

### Dairy *Salmonella*



■ Inhibited ■ Not Inhibited

1030 *Salmonella* isolates from 49 farms tested via liquid AST. Strateris<sup>®</sup> inhibited growth of over 96% of *Salmonella* tested between 2018 and 2024.



## PathKinex™: Aiding the Next Generation of Product Development

Our extensive AST testing provides compelling evidence of the effectiveness of our strains against key pathogens isolated from poultry, swine, and dairy cows. Our large pathogen library also provides a second, less obvious benefit: the opportunity for continuous innovation. We mine our data and perform additional testing to find out how new *Bacillus* strains or strain combinations perform. By testing new *Bacillus* strains and established high performers against a growing library of pathogens, we ensure a pipeline of efficacious products that keep ahead of changing pathogen populations.



### Further Reading:

[See how we're bringing AST screening to international customers and partner labs with PathKinex™ Live.](#)

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