

PATHKINEX UPDATE

Join Us in Exploring Emerging PathKinex Trends & Insights

Together, United Animal Health and Microbial Discovery Group are pioneering the investigation of factors that impact animal health, including connections between microorganisms and host or environmental influences. Our PathKinex platform and growing database of rectal and intestinal swab samples provide a unique resource to extract valuable insights, and we are eager to share our key findings with you!

Our hope is that our discoveries lead to discussion; we encourage you to question, ponder and discuss these microbial findings within the larger context of animal health, performance, and customer profitability.

Our goal is to provide you with industry insights and up-to-date pathogen trends that can help your customers understand the current clinical picture and identify proactive microbial approaches.

Enjoy this series of bite-sized updates, each highlighting a current pathogen surveillance, provided through PathKinex™ analysis.

Are *E. coli* pressures higher this year? PathKinex™ surveillance says yes.

PathKinex™ Updates are intended to provide you with the latest research insights on emerging pathogen trends and are for your internal use.

Across the industry, many have noted an increase in swine enteric disease challenges present in 2021. In this first update, we explore the fluctuation in abundance of *E. coli* and associated virulence genes in rectal swab surveillance of sows and nursing piglets over a several year-period.

Negative Effects of *E. coli*

Weaned pig quality and nursery performance can be negatively influenced by many factors, including enteric disease. Post-wean diarrhea associated with pathogenic *E. coli* is responsible for estimated losses between \$50-\$370 per sow, adding up to hundreds of millions of dollars annually due to increased mortality, morbidity and cost of medication, along with suppressed performance. Although many strains of *E. coli* are commensal, pathogenic *E. coli* can cause a range of chronic or sporadic health problems in swine and are one of the most common causes of neonatal scours. The severity of neonatal *E. coli* infection can be increased when additional bacterial pathogens such *Clostridium perfringens* and *Salmonella*, viral pathogens including rotavirus or PRRS, or environmental stressors such as heat and weaning stress are present, making *E. coli* infection one of the most costly concerns in neonatal pig health.

PathKinex Method: Detect >Quantify>Correlate

Rectal swabs were obtained from 506 sows and 754 nursing piglets between the years 2018 and 2021 and classified as healthy or sick.

Detect:

- Genomic DNA and total RNA were extracted from swab samples.
- DNA and RNA were tested with a panel of qPCR assays for genus- or species-specific markers and virulence genes unique to bacterial, viral, and fungal pathogens of interest.

Quantify:

- Gene data was log-transformed and analyzed via one-way ANOVA with Tukey's pairwise comparisons to assess differences in gene quantity between groups of pigs.

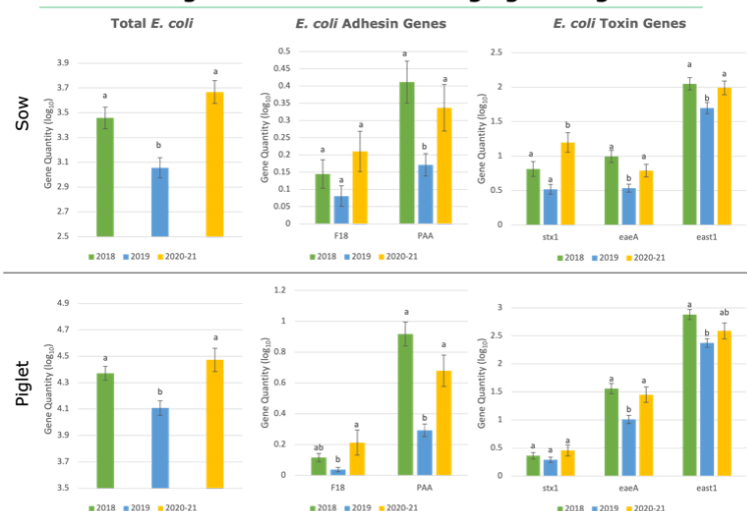
Correlate:

- Data are analyzed to find relationships between factors influencing animal health status, including abundance of specific virulence genes, as well as other factors such as seasonality and phase of production.

Findings

- Sow *E. coli* profiles mirror their offspring, year over year (sow is the source).
- Total *E. coli* and specific adhesin or toxin genes were detected in higher quantities in 2020/21 compared to previous years (2018, 2019)
 - *Stx1*, associated with shiga toxinogenic *E. coli*, has increased in sows
 - *F18* quantities higher in piglets; sows reflect a similar trend
 - *eaeA*, *Paa*, and *EAST1* levels suggest lower pressure from enteropathogenic and enteroaggregative *E. coli* in 2019 compared to 2018 or 2020/21

Swine Pathogen Surveillance – Emerging Pathogens



Action:

These PathKinex™ findings suggest higher quantities of virulent *E. coli* may be circling at the sow farm this year, leading to additional enteric disease pressures downstream. This underscores the need to consider strategies for preventive measures aimed at reducing the *E. coli* burden, starting with the sow.

Are you seeing the same trends in the field?

Respond to MDG

Is there a topic you'd like to learn more about in a future newsletter? We enjoy hearing from you! We welcome your questions, comments and suggestions on PathKinex updates. Please contact us at AnimalAg@mdgbio.com



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