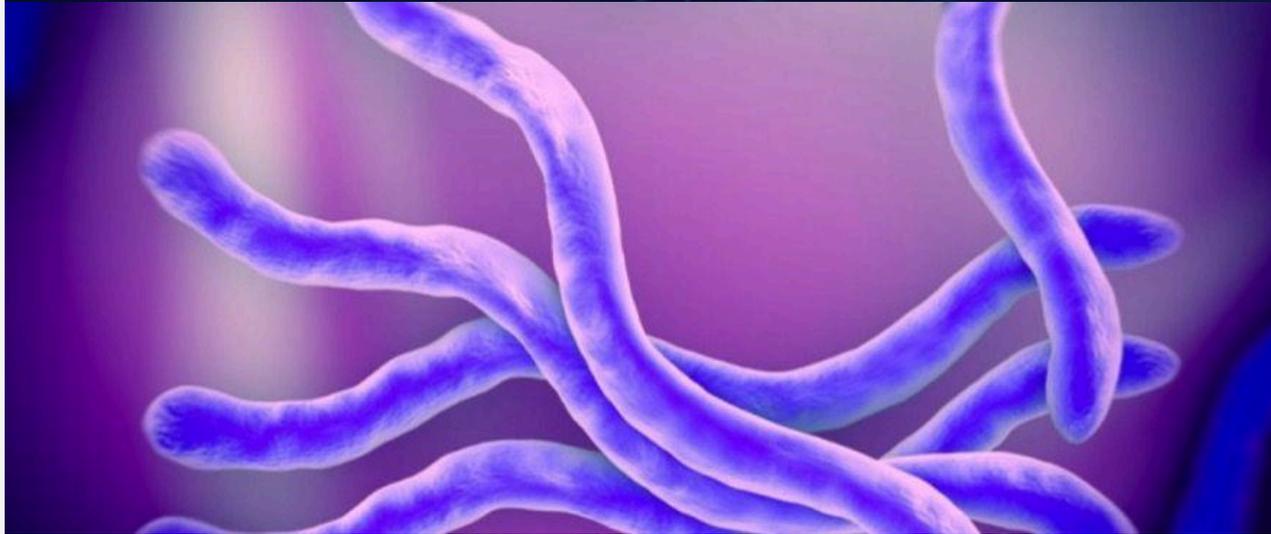


PATHKINEX UPDATE



Keeping Up with Current Events: Adding *Brachyspira* to PathKinex™

Though *E. coli*, *Clostridia*, and *Salmonella* get a lot of attention for their ability to be highly disruptive to livestock production, many other bacterial pathogens can

also cause problems, including reduced yields, increased morbidity and mortality, higher treatment and diagnostic costs, and even potential food safety concerns. Recently, MDG has been investigating spirochetes, a group of corkscrew-shaped bacteria which are involved in livestock disease.

Brachyspira is one such spirochete that can colonize the intestinal tract of various animals like poultry and pigs, causing avian intestinal spirochetosis (AIS) and swine dysentery. There are several species of *Brachyspira*, but *B. pilosicoli*, *B. hyodysenteriae*, and *B. intermedia* are most often linked to disease. The following are common characteristics associated with these species:

	Poultry ¹	Swine ²
Disease	Avian intestinal spirochetosis (AIS)	Swine dysentery (SD)
Age	Breeder Egg-laying chickens	Growing-finishing pigs
Gastrointestinal section affected	Ceca Colorectum	Large intestine
Outcome	Increased fecal water Reduced growth rate Reduced egg production by 5-10%	Reduces growth performance Causes variable mortality
Species involved	<i>B. pilosicoli</i> <i>B. intermedia</i> <i>B. hyodysenteriae</i>	<i>B. hyodysenteriae</i> (primary) <i>B. pilosicoli</i>

Brachyspira spp. can also interact with other pathogens in the gastrointestinal tract, exacerbating disease severity and complicating clinical outcomes. For example, in poultry, coinfection with multiple *Brachyspira* species can lead to more severe clinical signs and lower egg production.³ In swine, animals coinfecting with *B. hyodysenteriae* and *L. intracellularis* exhibited more severe symptoms and tissue damage compared to single infections, suggesting potential interaction between the pathogens.⁴ These connections highlight the importance of understanding the complex dynamics between different pathogens in the animal's gastrointestinal tract.

Brachyspira do not grow on conventional culture media, making their detection via traditional methods difficult. However, through PathKinex™, UAH and MDG can help producers develop an understanding of diverse pathogens like *Brachyspira* that cannot be cultured. This knowledge enables both producers and veterinary health teams to implement targeted control measures to maintain farm health and productivity, profitability, and public health. We are excited to share that our PathKinex™ panels have now been expanded to include assays for two *Brachyspira* species, *B. pilosicoli* and *B. hyodysenteriae*.



***Brachyspira* Detection in Breeder Ceca Samples**

Our new assays were put to the test in a PathKinex™ evaluation aimed at identifying and quantifying pathogen genes in the ceca across multiple ages of pullets and breeders on commercial poultry farms. Cecal swabs were collected across six different ages, sampling four birds from each age group.

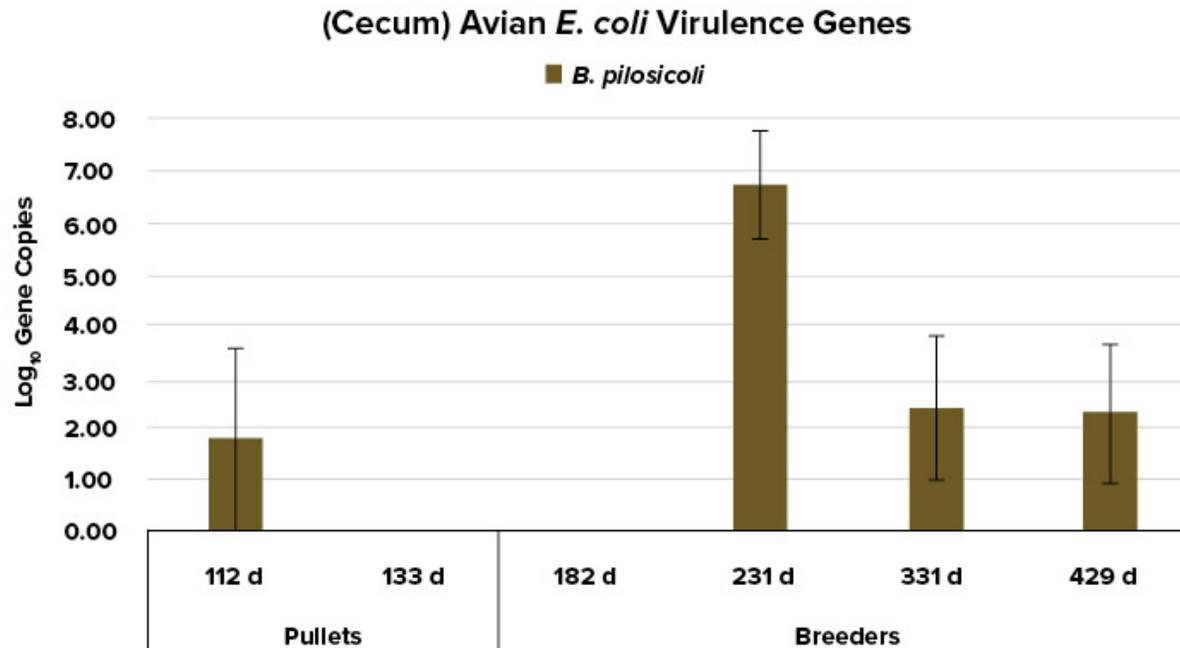


Figure 1. Gene quantities associated with *B. pilosicoli* detected in ceca of pullets and breeders from a commercial poultry farm.

Though *B. hyodysenteriae* was not detected in any of the samples, *B. pilosicoli* was detected in three of the four breeder age groups and one of the two pullet groups, with quantities trending higher in breeders $p \leq 0.2$ (Fig. 1). Though this was a small pilot evaluation, these results align with scientific literature, suggesting the presence of *Brachyspira* in adult breeders and egg-laying chickens over the age of 15 weeks.⁵

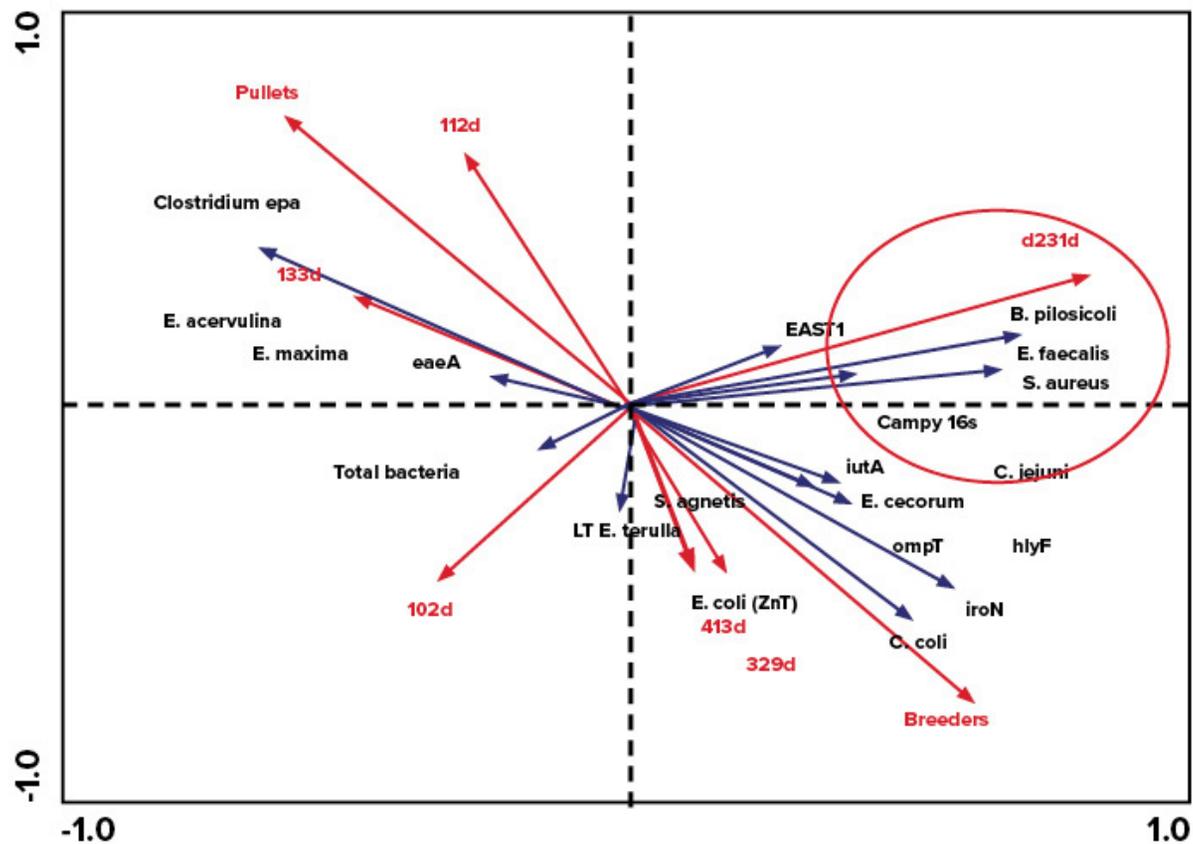


Figure 2. Statistical ordination plot showing correlations between microbial virulence gene quantities in the ceca across different ages.

Interestingly, breeder ceca samples harboring the greatest quantities of *B. pilosicoli* also contained high quantities of *Enterococcus faecalis*, *Campylobacter jejuni*, *Staphylococcus aureus*, and several genes associated with avian pathogenic *E. coli* (APEC). Clustering of these co-occurring pathogens with breeder birds is shown in the ordination plot in Fig. 2.

Brachyspira AIS primarily affects layers and broiler breeder hens, posing a significant concern for egg-producing birds.⁵ *Escherichia coli* infections in poultry, particularly associated with colibacillosis and salpingitis, can also detrimentally impact both production and egg quality. While *Enterococcus spp.* are typically part of the normal microbiota of most birds, they have the potential to cause secondary infections.⁶ *Campylobacter*, one of the leading bacterial foodborne pathogens globally, can further impact flock health and contaminate product downstream, thereby increasing the risk of foodborne transmission to humans.⁷ When a flock is coinfecting, the present pathogens may interact, which could exacerbate intestinal inflammation, tissue damage, and clinical signs. All of this can lead to more severe disease outcomes.⁸

These complex interactions highlight the importance of understanding and managing coinfections to preserve both poultry welfare and public health and developing effective strategies for disease control and prevention in poultry and swine production systems.



Questions to consider for your customers:

What can customers do to manage avian intestinal spirochetosis (AIS) or swine dysentery (SD) in their production facilities? Are coinfections considered?

RESPOND TO MDG

For customer-facing Seismic users, consider reviewing the Coinfection Session from the last global sales meeting.

Seismic>Collections>Technical Subjects>GSM 23 – Microbial Cross Species Insights

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