



THE UNIVERSITY OF GEORGIA
College of Veterinary Medicine

Stability of live *Mycoplasma* vaccines in the field

Naola Ferguson-Noel, DVM, MAM, PhD

SIAM July 2016



Acknowledgements

Camir Ricketts

John Maurer

Margie Lee

Natalie Armour

Victoria Laibinis

Michelle Farrar

Ruth Wooten

Larissa Pickler

Saravanaraj

Ayyampalayam

Maricarmen García

Mohammed El Gazzar

Saad Gharaibeh

Lisa Stabler

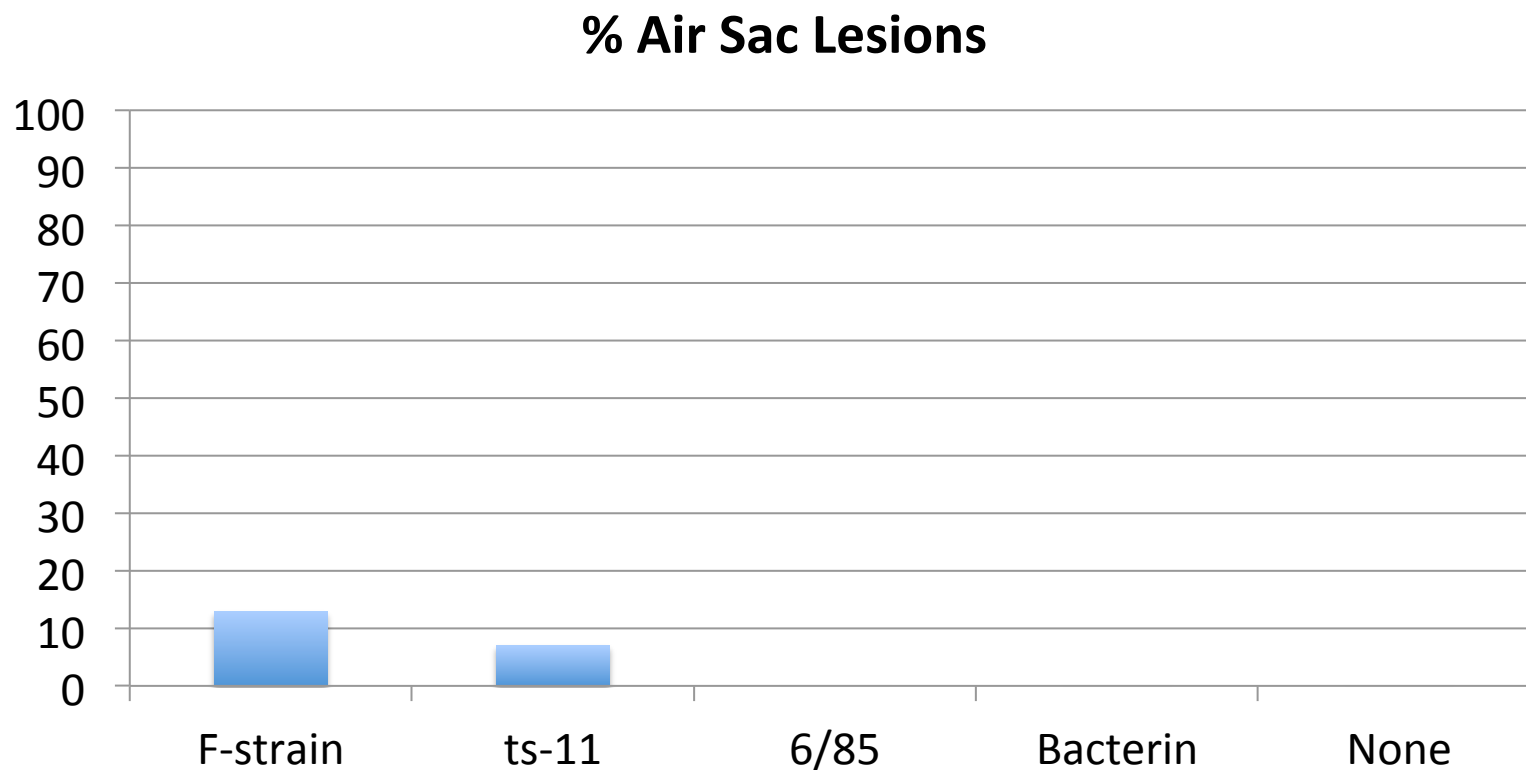


The Perfect Vaccine

- Safe
 - Reactivity
 - Transmission – horizontal and vertical
 - Reversion to virulence
- Efficacious
 - Duration of immunity
- Low Cost
- Easy to Administer and Transport
- Stable
 - On the shelf and in the birds



Safety of Live Vaccines and Bacterin



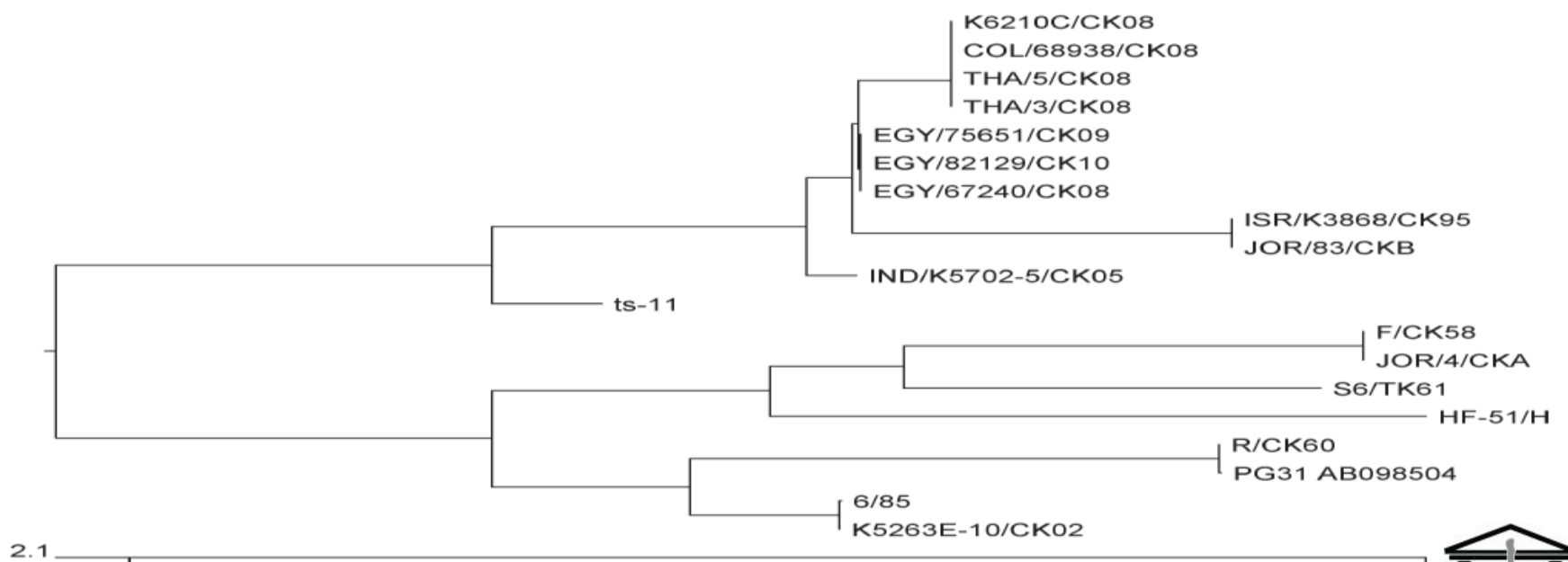
MG epidemiology in Jordan

- Relatively large and developing chicken industry
- No national plan to control MG infection
- Farmers depend on vaccination and/or chemotherapy
- 70 % of broiler flocks that suffered from respiratory disease were positive for MG by ELISA



MG epidemiology in Jordan

- 2004-2005 vs 2007-2008 (n=24)
- None of the flocks were vaccinated
- 21 isolates indistinguishable from F-strain



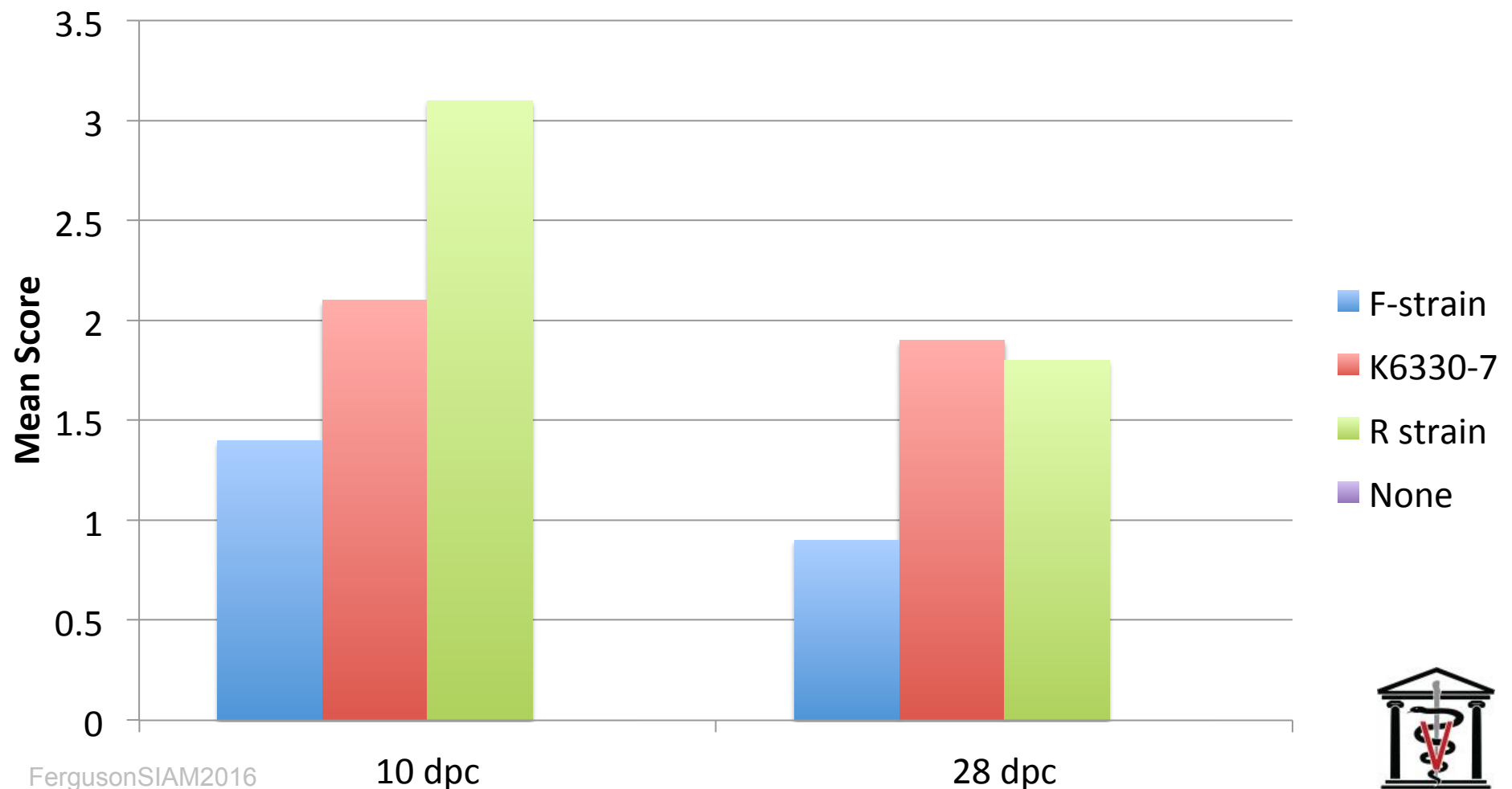
MG epidemiology in Jordan

- 2004-2005 vs 2007-2008 (n=24)
- None of the flocks were vaccinated
- 21 isolates indistinguishable from F-strain
- The most common vaccine used in Jordan in the early 2000's was F-strain
- In later years, F-strain availability was very limited



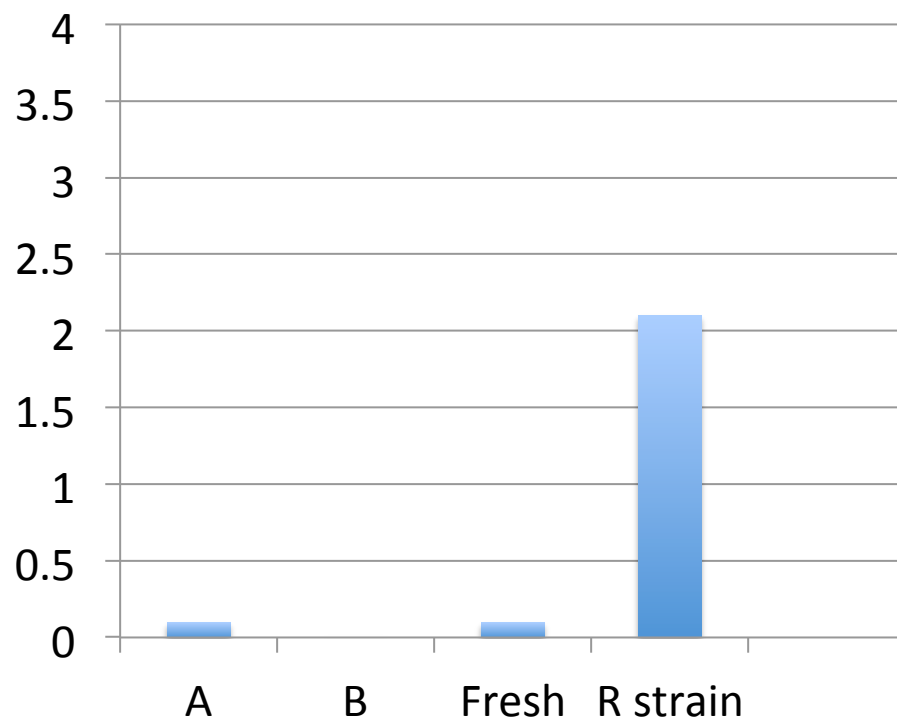
Jordan F-Strain – Increased Virulence in Broilers

Air Sac Lesion Scores

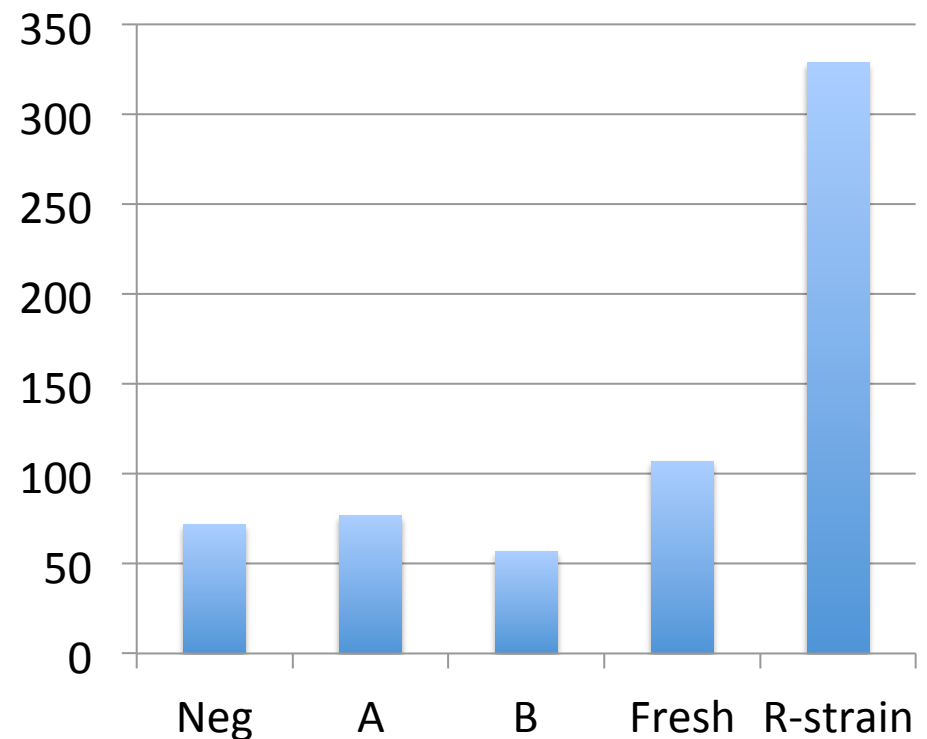


Safety of F Strain Vaccines – SPF Layers

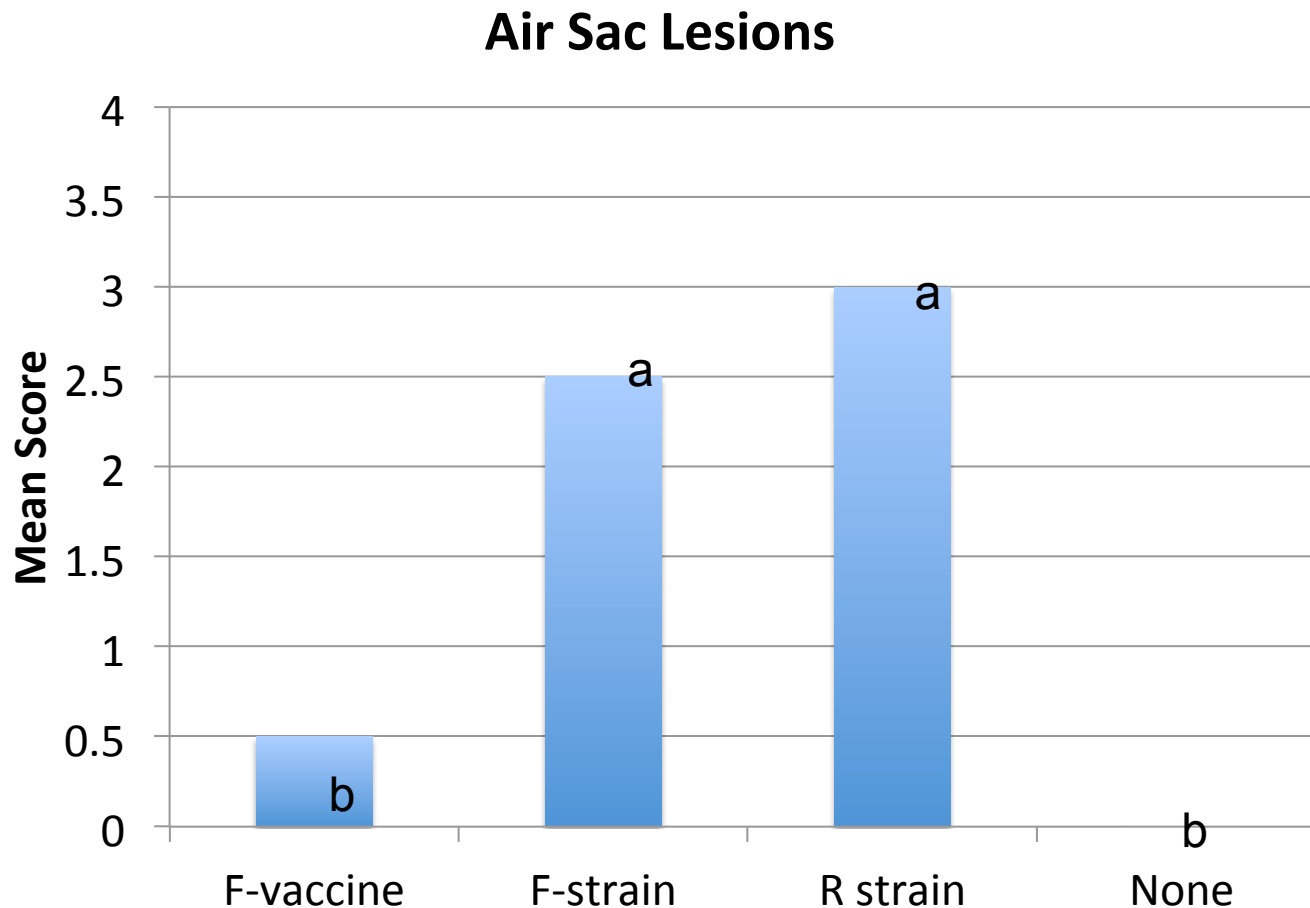
Mean Air Sac Lesion Score



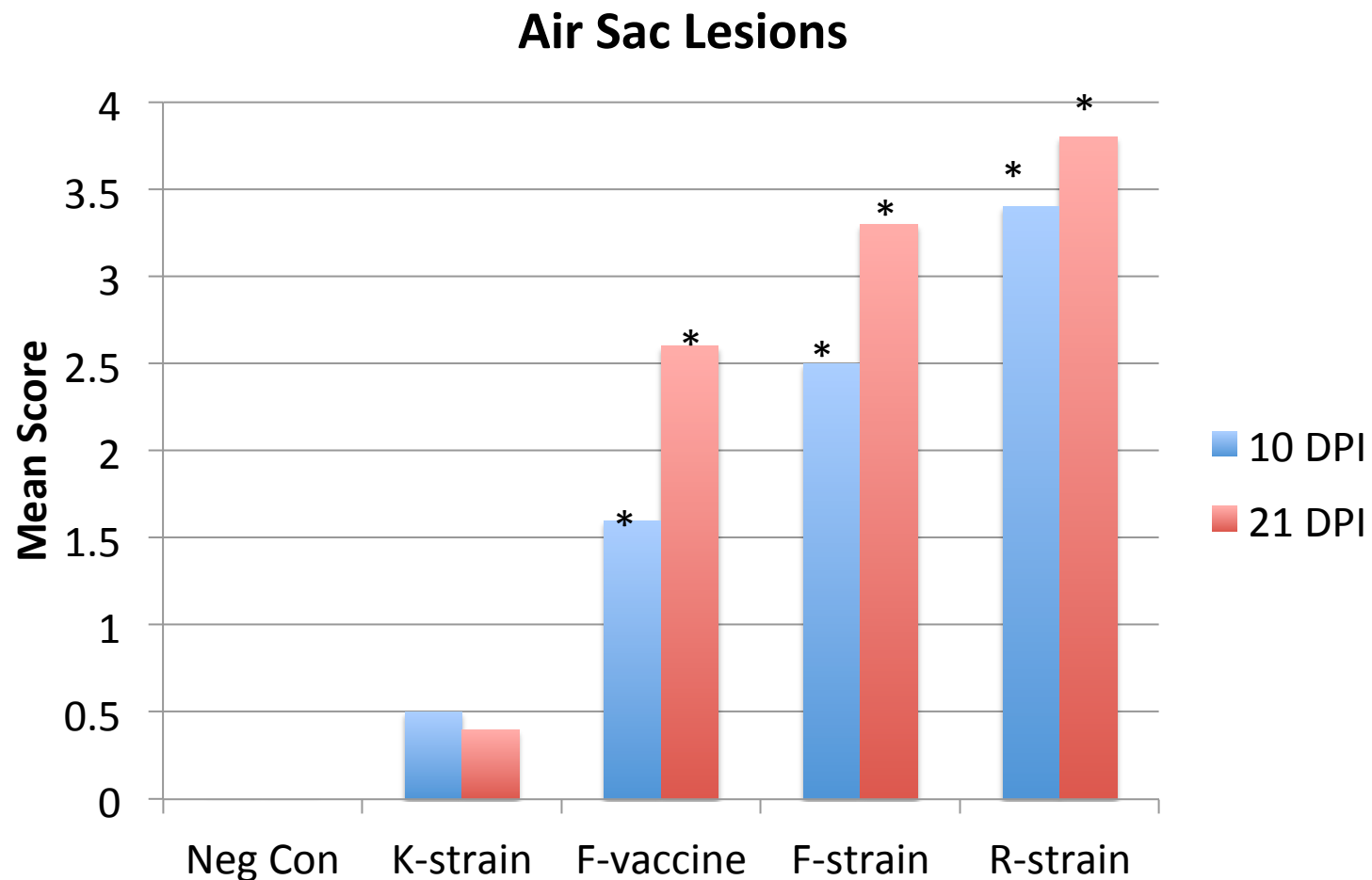
Tracheal Mucosal Thickness



Safety of F-Strain Laying Chickens



Safety of F-Strain Turkeys



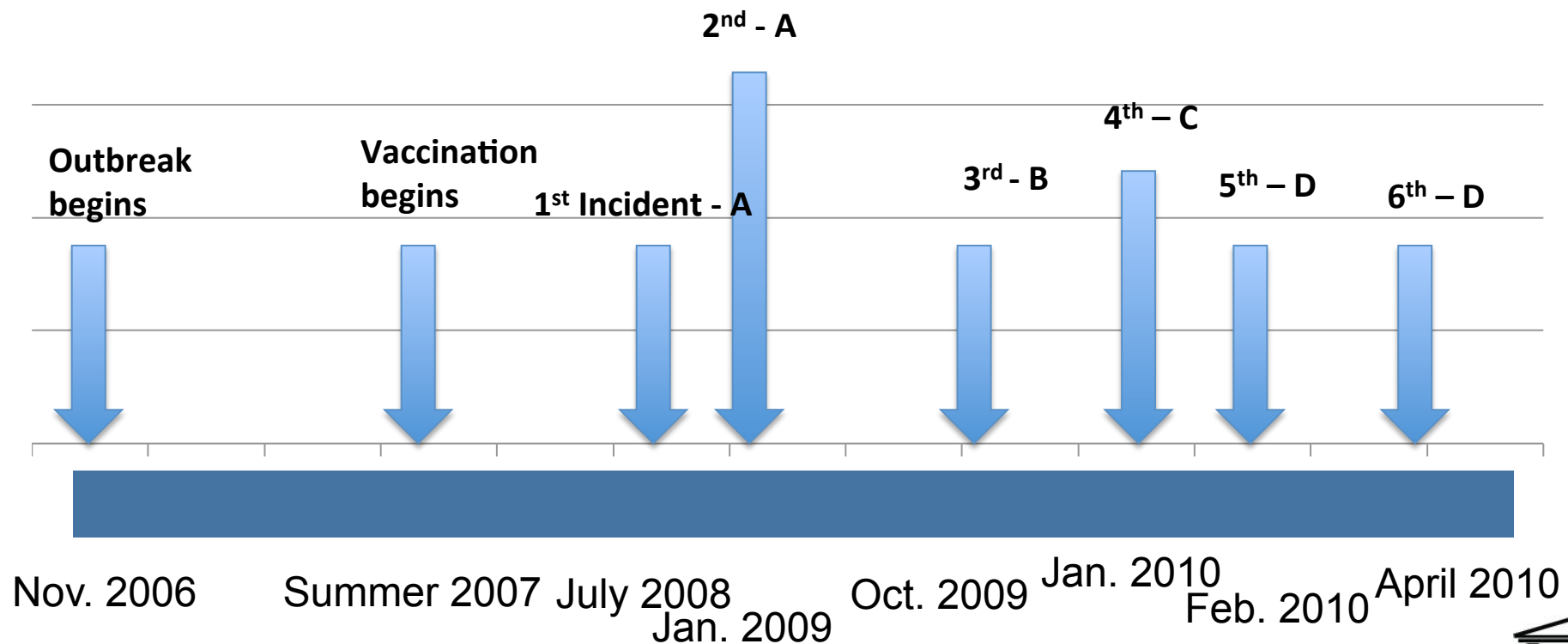
Conclusions

- F-strain vaccines attenuated (for chickens)
- Lateral spread = increased virulence

Biosecurity!!!!



MG Outbreak in NE GA and ts-11 Vaccination



ts-11 - Increased Virulence and Vertical Transmission

- Pathogenicity Trial
 - El Gazzar, M., Laibinis, V. & Ferguson-Noel, N. (2011). **Characterization of a ts-11-like *Mycoplasma gallisepticum* Isolate From Commercial Broiler Chickens.** *Avian Dis*, 55, 569-574.

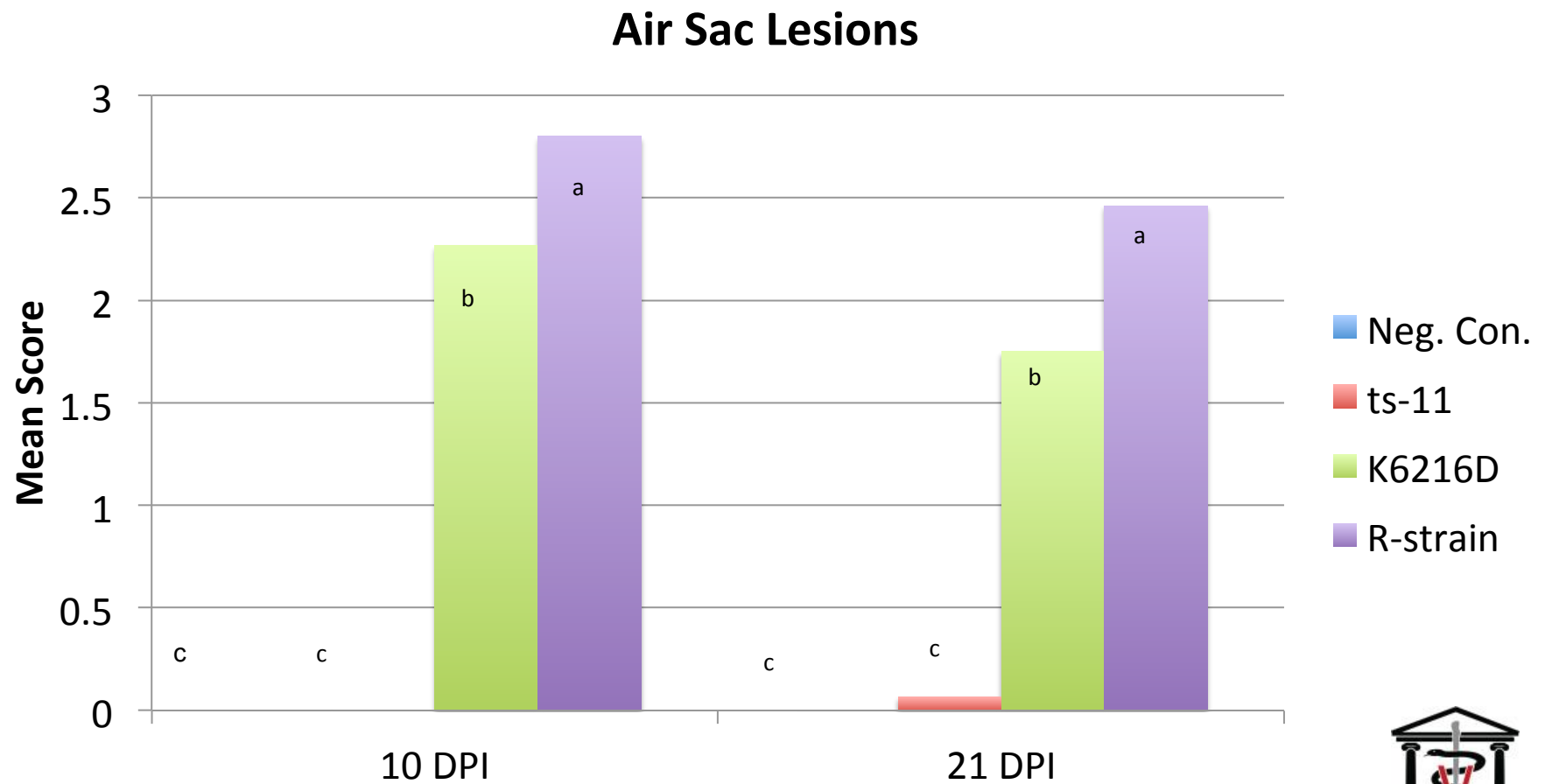


Pathogenicity Trial

- Cloned ts-11-like field isolate from broilers vs ts-11 and R-strain
- Broilers
- Inoculate at ~5 woa via aerosol
- Necropsy at 10 and 21 dpi – serology, real-time PCR, air sac lesions, tracheal lesions, culture of air sacs



NE GA ts-11 – Increased Virulence in Broilers



ts-11 - Increased Virulence and Vertical Transmission

- Pathogenicity Trial
 - El Gazzar, M., Laibinis, V. & Ferguson-Noel, N. (2011). **Characterization of a ts-11-like *Mycoplasma gallisepticum* Isolate From Commercial Broiler Chickens.** *Avian Dis*, 55, 569-574.
- Vertical Transmission Trial
 - Armour, N.K. & Ferguson-Noel, N. (2015). **Evaluation of the egg transmission and pathogenicity of *Mycoplasma gallisepticum* isolates genotyped as ts-11.** *Avian Pathol*, 1-24. doi: 10.1080/03079457.2015.1044890

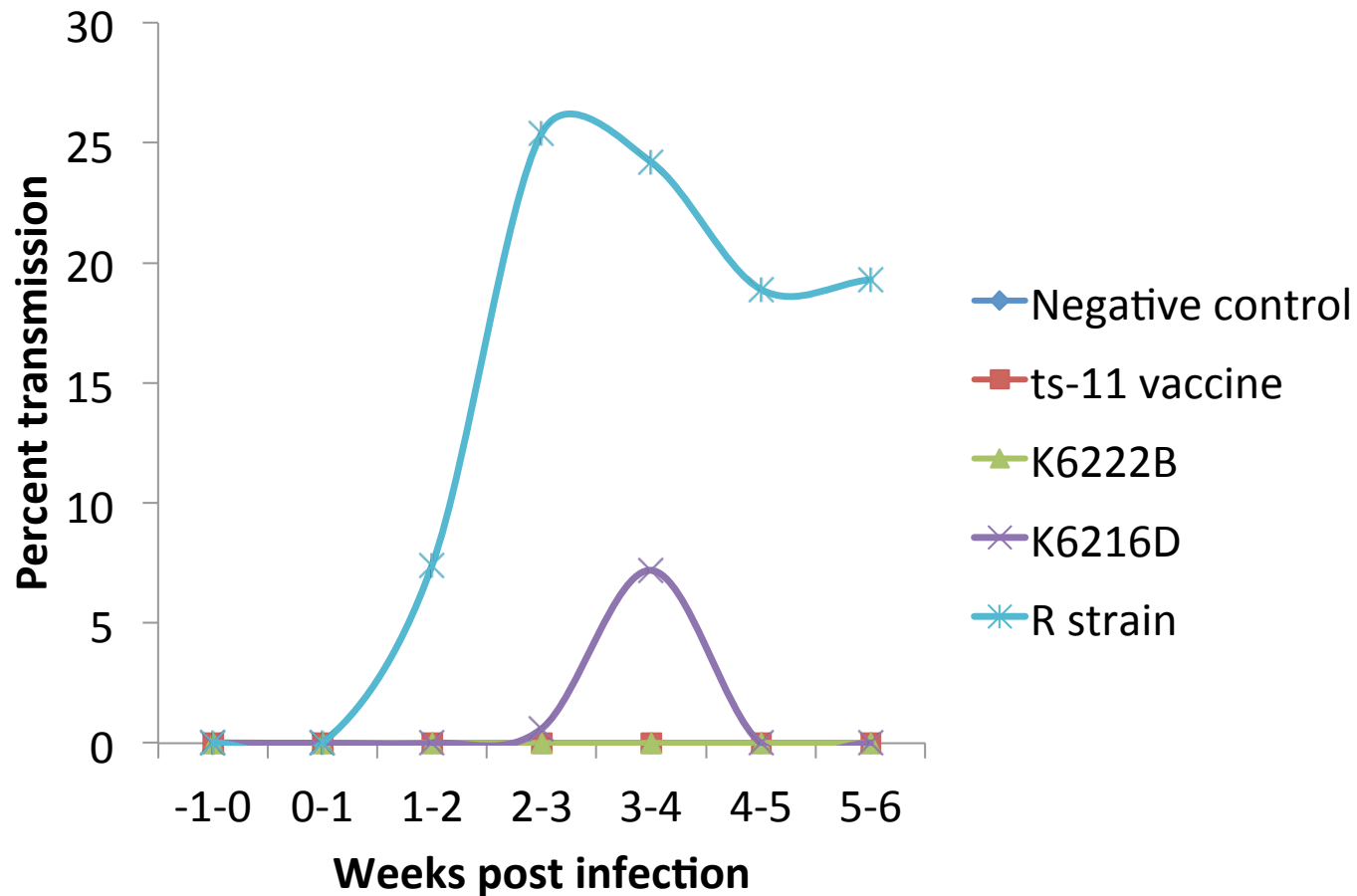


Vertical Transmission Trial

- Cloned ts-11-like field isolates from broilers and broiler breeder vs ts-11 and R-strain
- Layers
- Inoculate at 28 woa via eye drop and aerosol
- Culture fertile eggs (18 days) for 6 wk pi
- Necropsy at 6 wk pi – serology, real-time PCR, air sac lesions, tracheal lesions, culture of air sacs, ovaries and oviducts



Vertical Transmission of ts-11 genotype



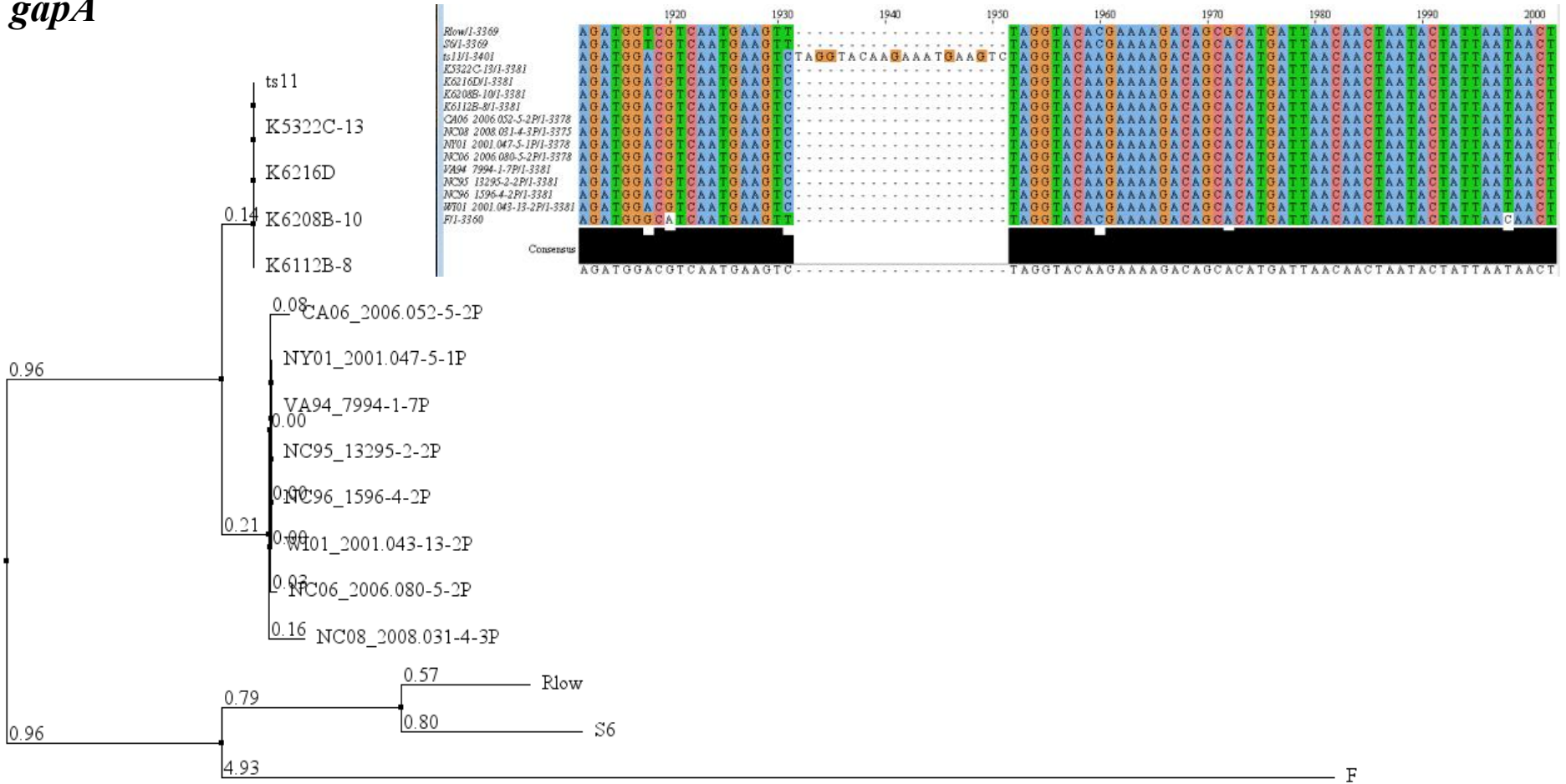
ts-11 - Increased Virulence and Vertical Transmission

- Pathogenicity Trial
 - El Gazzar, M., Laibinis, V. & Ferguson-Noel, N. (2011). **Characterization of a ts-11-like *Mycoplasma gallisepticum* Isolate From Commercial Broiler Chickens.** *Avian Dis*, 55, 569-574.
- Vertical Transmission Trial
 - Armour, N.K. & Ferguson-Noel, N. (2015). **Evaluation of the egg transmission and pathogenicity of *Mycoplasma gallisepticum* isolates genotyped as ts-11.** *Avian Pathol*, 1-24. doi: 10.1080/03079457.2015.1044890
- Whole Genome Analysis
 - Manuscript submitted

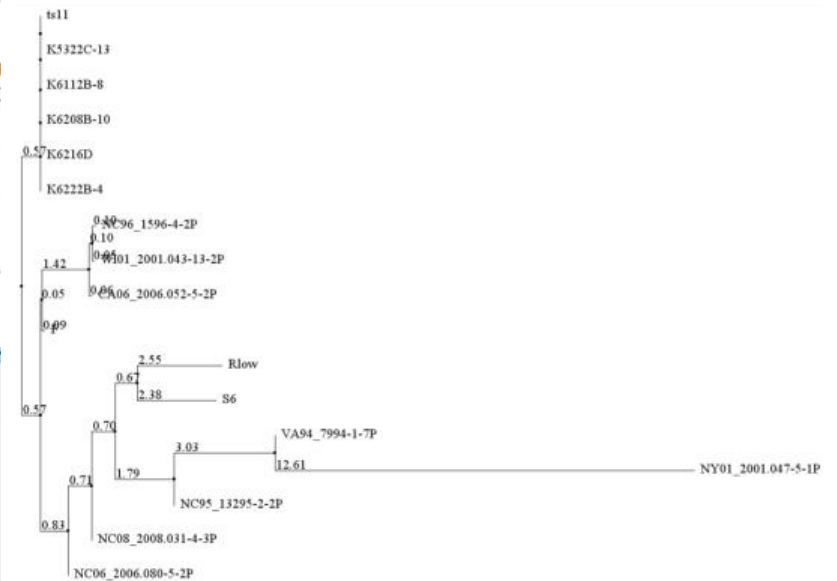
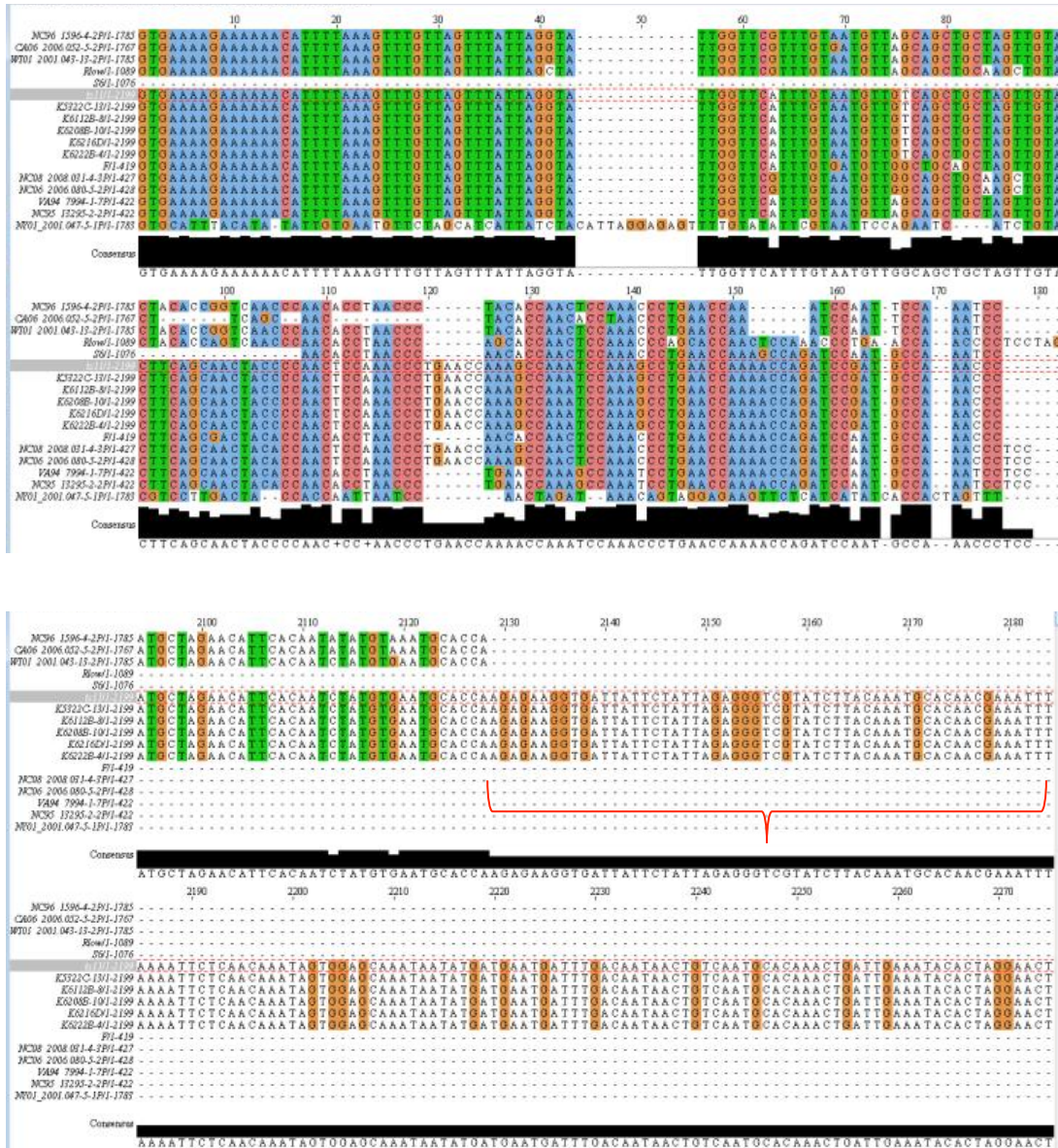
ts-11 Isolates for Whole Genome Analysis

Isolate	Description	Virulence
ts-11	Vaccine	attenuated strain
K5322C-13	Study - re-isolate	Avirulent/reisolate
K6112B-8	BB; No CS	Avirulent/reisolate
K6208B-10	BB; No CS	Avirulent/reisolate
K6216D	B; sick	Virulent
K6222B-4	BB; sick	Virulent
K6356-12	B; sick	Virulent
K6372-23	B; sick	Virulent

gapA



vlhA3.04b

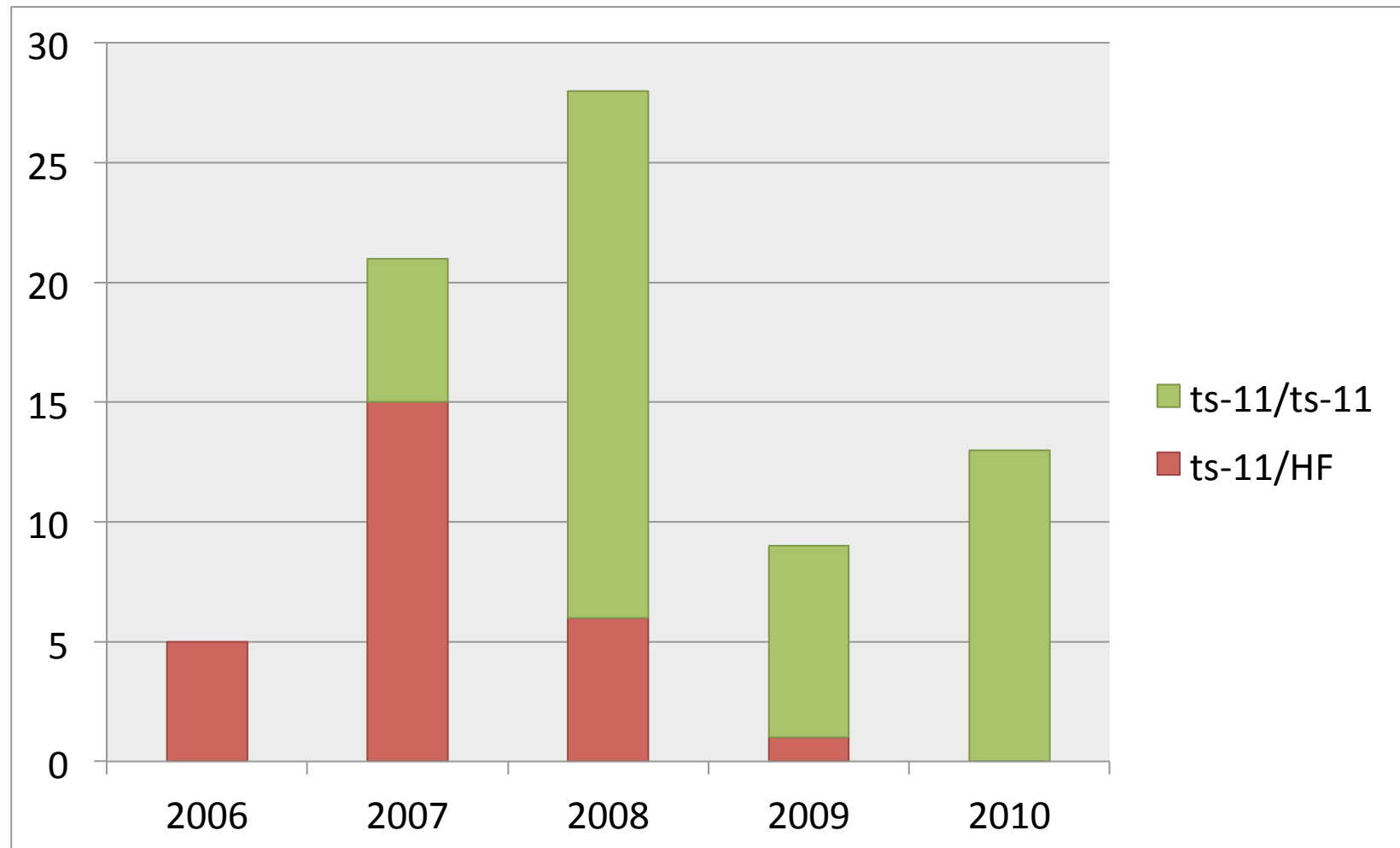


Increased Virulence and Vertical Transmission

- <http://www.gapoultrylab.org/wp-content/uploads/2012/05/Experience-in-Use-of-MG.pdf>



MG – GA Broiler-type

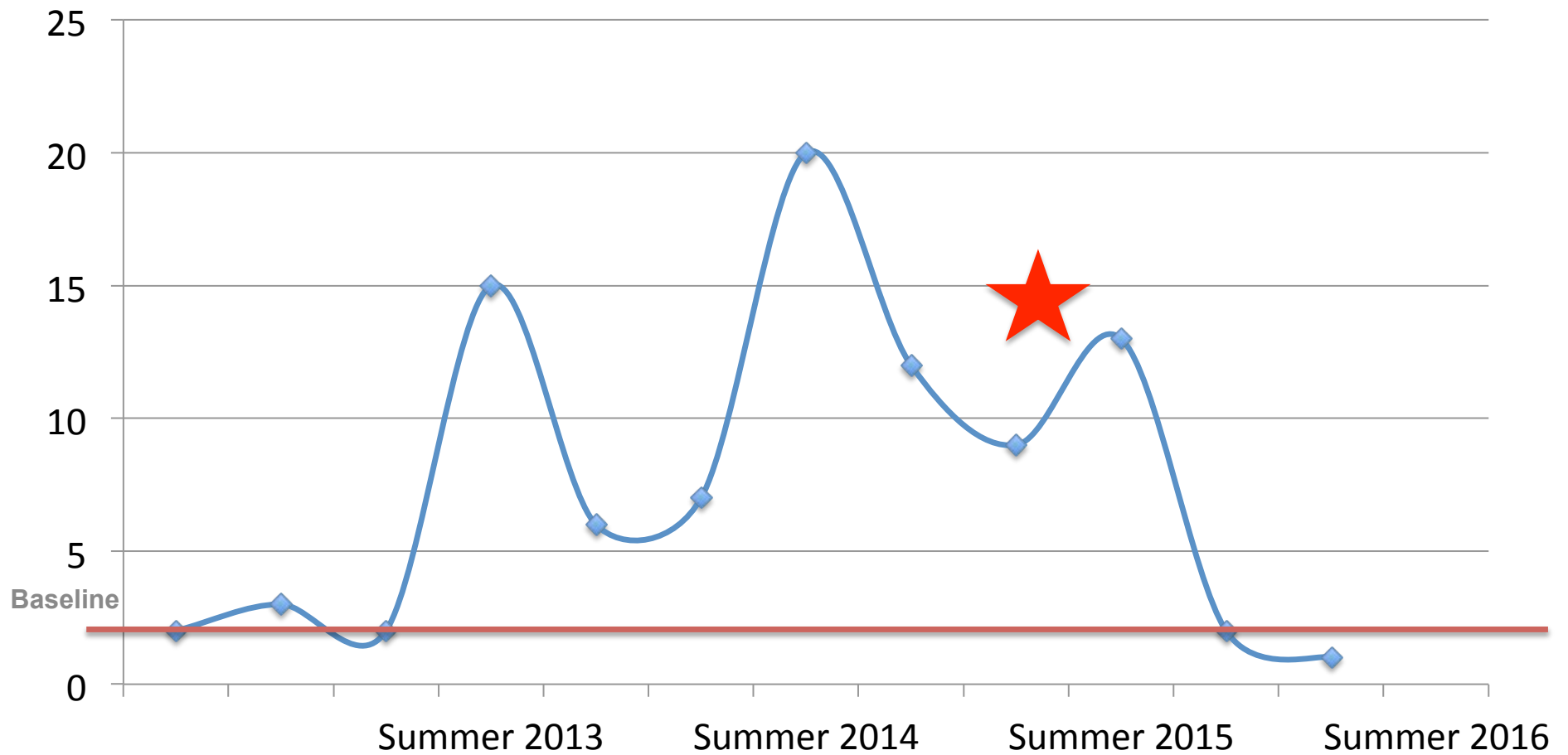


Questions

- Were the GA ts-11 isolates temperature sensitive?
- Maybe this is a GA “ts-11-like” field strain?
- Were the breeders/broilers also infected with a wild-type?
- Why did it take so long for the vertical transmission to begin?



MS Outbreak in NE GA



Thank you

Naola Ferguson-Noel, DVM, MAM, PhD
University of Georgia, Poultry Diagnostic & Research
Center

953 College Station Rd., Athens, GA 30602-4875

Phone: (706) 542-3068 Lab: (706) 542-5646

naolaf@uga.edu

<http://vet.uga.edu/avian>

New Molecular Tests at PDRC:

M. gallisepticum ts-11 PCR

Campylobacter jejuni/coli

Avibacterium paragallinarum

Salmonella serotyping

Clostridium perfringens netB

