Salmonella Smugglers: The Role of Migratory Birds in the Spread of Salmonellosis

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Objective

Conduct an extensive literature review to investigate how interactions between migratory birds and agricultural farms may influence the dispersal of *Salmonella enterica*

Background

- ***Salmonella enterica*** is a highly diverse species with over 2600 serovars, many of which are zoonotic (Fig.1)
- Host-specialist serovars, pullorum and gallinarum, can cause severe disease in poultry, leading to **economic impacts**
- Host-generalist serovars, typhimurium and enteriditis, cause severe disease in humans, resulting in **health impacts**
- Documenting dispersal of host-generalist serovars among flocks is complicated because infections are generally asymptomatic in birds
- The asymptomatic nature of *Salmonella* infection in birds coupled with their ability to disperse across long distances may allow migratory birds to serve as long distance vectors of zoonotic pathogens
- Spread of *Salmonella* between wild and domestic birds can occur through contaminated feed, water, and pastures (Fig.2)
- The locations of many broiler chicken factory farms in the US overlap with the North Atlantic Flyway (Fig.3)
- Growing centralization and industrialization of agriculture has increased prevalence of *S. enterica*[1]

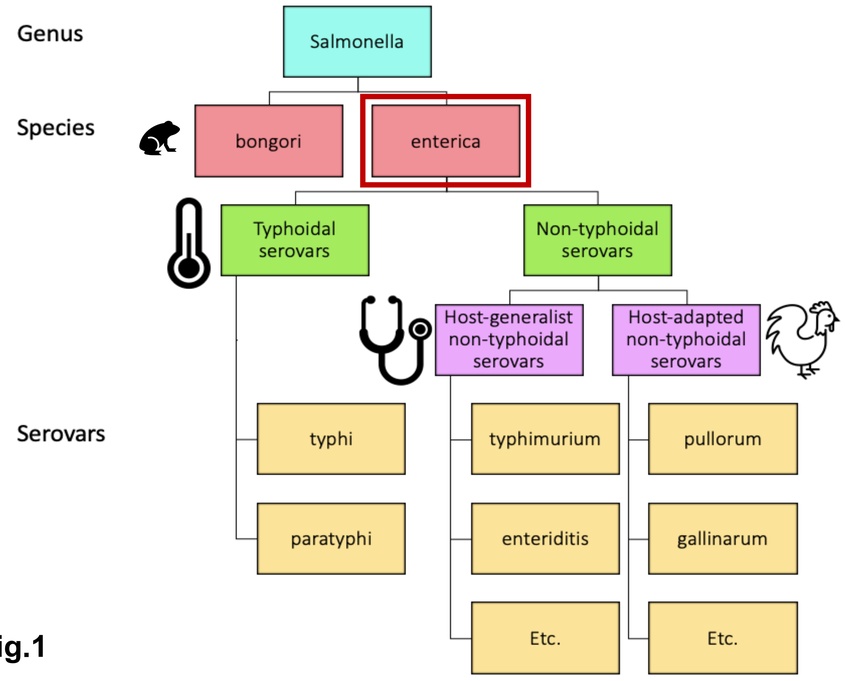

Fig.1

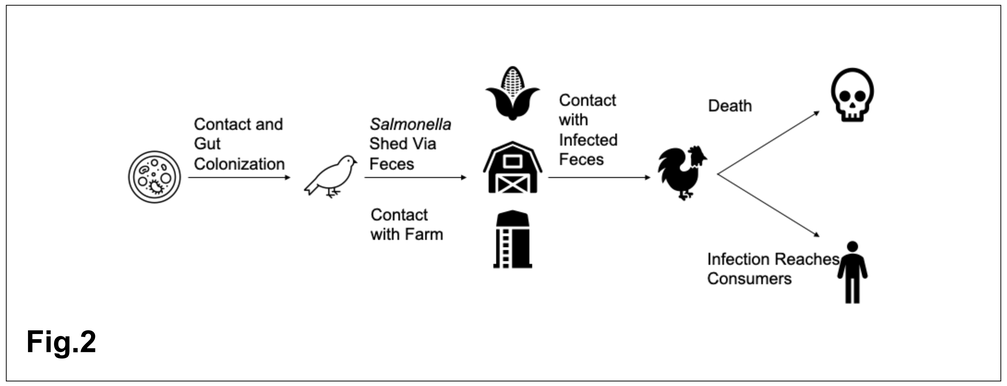

Fig.2

North Atlantic Flyway[2]

Broiler Chicken Factory Farms (2017)[3]

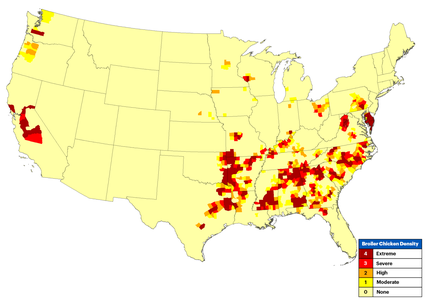

Fig.3

Examples

- Typhimurium (Phage type DT40) is a major cause of bovine salmonellosis in Japan. Two major die offs (in 2005 and 2008) of Eurasian tree sparrows near farms (*Passer montanus*) showed a 100% similarity to the strain found in sick cattle (Tamamura *et al*. 2016)[4]
- 14.9% of sampled migratory passerines in the Central Flyway (which encompasses many cattle producing regions) were infected with host-generalist *Salmonella* serovars (Callaway *et al* 2012)[5]
- Typhimurium (phage type DT160) caused septicemia and death in *P. montanus* and enteric disease in humans (NZ). This serovar also infected poultry, but asymptomatically (Alley *et al*. 2002)[6]

Discussion

- Meta-analyses are critical for properly assessing serovars maintained in wild populations and their implications for wild and domesticated birds
- The complexity of *S. enterica* taxonomy necessitates proper serotyping, including sequence-based approaches
- The intermittent shedding of *Salmonella* in birds may result in underestimation of prevalence depending on when samples are collected (e.g., seasonal variation)
- Testing should include under-sampled bird taxa and utilize a screening approach to detect asymptomatic infections that may nevertheless be important for disease dispersal

Relevant Literature: https://sciences.ucf.edu/biology/annaforsman/Julia-gneckow