

## *Mycoplasma gallisepticum* Update

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North Carolina has been affected by *Mycoplasma gallisepticum* (MG ) since October 1999. This epidemic occurred soon after a series of hurricanes (Dennis [Aug 31], Floyd [Sept 16], and Irene [Oct 18]) hit the North Carolina coast. The first flocks known to be infected were broiler and turkey breeders. Cases were first observed in the Eastern part of the state (Figure 1). Before the end of the year, chicken and turkey grow-outs had been infected by vertical (broilers) and horizontal (turkeys) transmission. This included 25 broiler farms in Western NC that had to be quarantined because progeny of infected broiler breeder flocks had been placed in the field. The infected breeders at the origin of this vertical transmission tested negative for MG at 18 weeks of age but were positive at 35 weeks.

To date, the majority of cases have occurred in the Eastern part of the state. The highest number of cases was recorded in December, followed by the lowest number in January. This was likely due to limited testing during this first month of the year because of the holiday season and because a major snowstorm in January prevented access to farms for several days. This situation also forced the placement of broiler flocks on litter from previously infected birds. In all cases, the litter was heated to 100 F for 4 days with a total downtime of 10 to 14 days. A close monitoring of these flocks indicated that all remained MG negative (Dr. E. Krushinskie, personal communication).

Of 69 cases in the Eastern part of the state, 7 resulted from vertical transmission in broilers. At least four different strains of MG have been identified by DNA fingerprinting. The most prevalent (Strain B) was first discovered in broiler breeders in mid production (Figure 2).

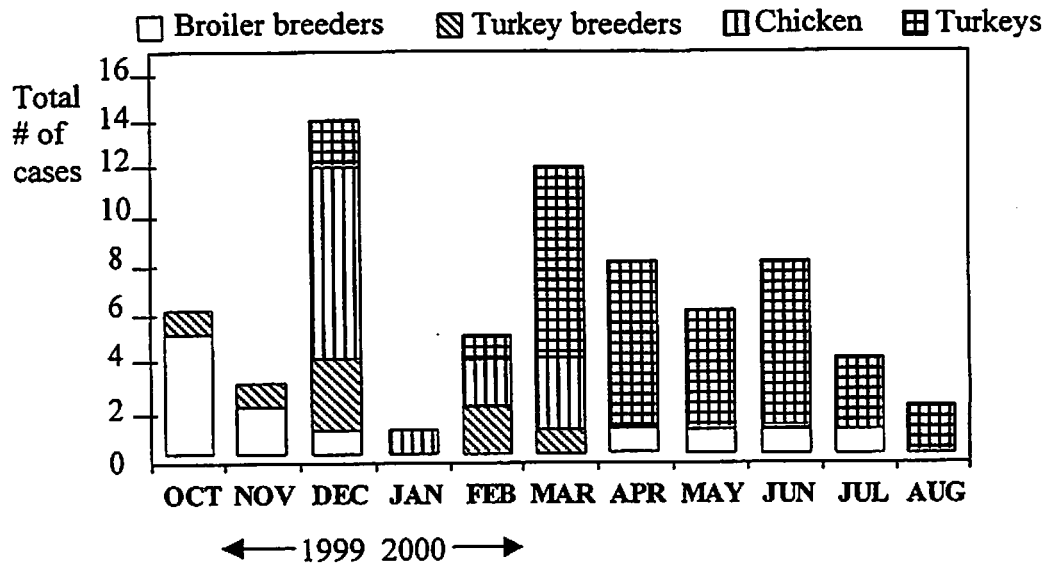


Figure 1: Total number of cases reported over time depending on type of production (breeder chickens; breeder turkeys; commercial chickens; commercial turkeys) in Eastern North Carolina.

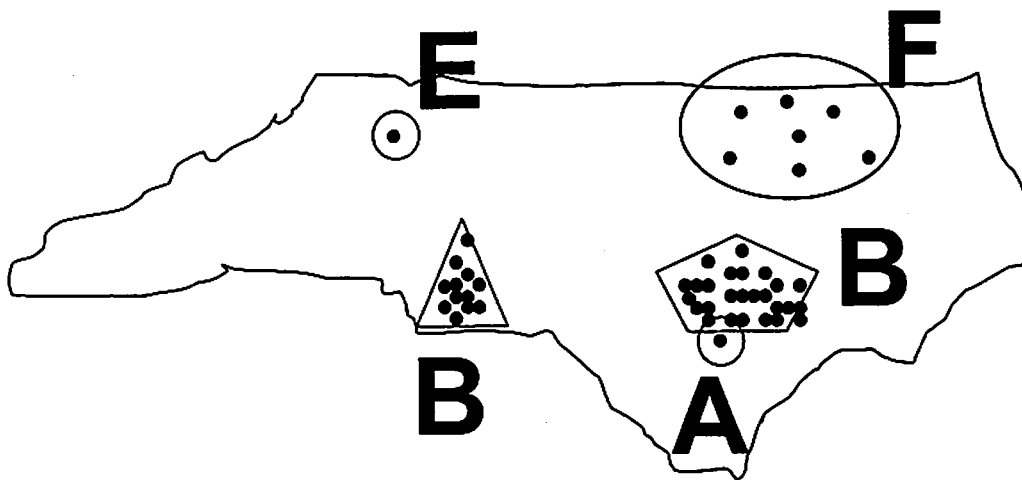


Figure 2: Schematic distribution of the four MG strains identified so far.  
 Strain A: One turkey breeder farm and a nearby backyard flock.  
 Strain B: First isolated in broiler breeders; spread via progeny to the west; spread to turkey farms via horizontal transmission.  
 Strain E: Limited to a broiler breeder flock.  
 Strain F: Limited to a broiler breeder flock and a few broiler farms that received progeny of the breeder flock.

Since March, the vast majority of confirmed MG cases have been commercial turkey flocks. Typically, infected turkey flocks first showed upper respiratory signs before testing could confirm the presence of MG. On average, flocks were 13 weeks of age at onset of disease (the median being 12 weeks). The youngest flocks showing clinical signs were 6 weeks old and the oldest were 19 weeks of age. Some flocks showed signs consistent with MG a few days before processing (normally at 20 weeks), but these cases could not be confirmed by serology or isolation. When brooder-age birds were present on farms with MG positive grow-out birds, MG was also detected in these younger birds soon after transfer to grow-out at 6 weeks of age. However, in some instances, MG was not confirmed before the younger flock had reached 13 to 16 weeks of age. In these cases the birds had been medicated with tetracycline every other week from the time MG was found in the older flocks.

The causes of the epidemic are not clear. One hypothesis is that the hurricanes that disturbed Eastern NC in the Fall of 99 have provided favorable conditions to trigger the initial outbreaks (i.e., strong winds, flooding, severe damage to buildings leading to increased on-farm traffic, etc.). However, two of the four strains of MG identified to date surfaced in commercial operations several months after these climatic disturbances. We do know that the interval between testing periods in broiler breeders was too long (10-12 weeks). The lag time between testing and the availability of results was also too long because of limited resources.

Investigation of cases where vertical transmission is not suspected is ongoing. We are also visiting neighboring farms that were not quarantined. These farms are matched with MG-positive farms based on location, type of production, and age of the flock at the time the MG flocks were found positive. Preliminary univariate analyses (Fisher Exact test) on data collected on 26 MG-positive and 14 MG-negative farms suggest that relationships among farm workers and biosecurity issues are at the core of this epidemic.

Farm location: The risk of becoming MG positive appears to be higher in areas of high farm density. About 7% of farms with at least 10 other farms within a 2-mile radius have been identified as MG positive compared to about 4% for farms with less than 10 neighbors. However, on average, MG-positive farms had 2.1 MG-positive neighbors while MG-negative farms had 2.6. Of course, this was by design since MG-negative farms were selected on purpose in MG-positive areas. Nonetheless, it does suggest that proximity to MG positive farms is not the only determining factor. For example, although MG-positive backyard flocks have been directly associated with a few outbreaks, the presence of backyard flocks known to commercial growers in the vicinity of their farm was the same for MG-positive and MG-negative farms ( $p=0.75$ ). Interestingly, when asked if they knew the owner of these backyard operations, 12 of 16 MG-positive growers answered yes compared to 2 of 6 MG-negative growers ( $p=0.14$ ). We could also determine that in 10 of the 26 MG cases, a direct connection existed between a positive farm and a previous case (e.g., grower helped another grower who had MG and then returned to his farm without changing clothing or boots). Such connections could not be established for the MG-negative farms that have been investigated so far ( $p=0.03$ ).

**Biosecurity:** Previous investigations on turkey farms infected with turkey coronavirus have shown that basic biosecurity measures such as the consistent use of coveralls and boots for visitors are not always implemented. The current MG investigation confirms this finding. About 63% of growers from MG-positive farms did not require coveralls for visitors compared to 7% of the MG-negative growers ( $p=0.0009$ ). A quarter of MG-positive growers also did not require rubber or plastic boots while all of the MG-negative growers required at least one of the two types of boots for farm visits ( $p=0.04$ ). Factors such as the presence of a washing station at the entrance of the farm or the use of a gate to control on-farm traffic did not differ between MG-positive and MG-negative farms. Owners of MG-negative farms were also not less likely to hire a company to remove used litter than MG-positive growers ( $p=1.00$ ). In both cases, about 90% of them were using a specialized company to do this work.

On few occasions, MG-positive broiler or turkey breeder flocks located in only one or two infected houses out of multi-house facilities have been culled or moved to another site to prevent transmission to the other birds on the farm. There is no evidence that this has led to disease transmission in the area where the birds were moved. However, results on the farm of origin have been mixed. While disease transmission to the other houses appears to have been prevented in some multi-house facilities, others have had to be completely depopulated over time. Given the value of breeding stock, partial depopulation remains the first step on breeder farms where the infection appears to have been limited to only some of the houses.

Since MG is a reportable disease in North Carolina, all infected farms are quarantined. However, because financial compensation is not available from state government, farm depopulation is not always immediate. In many cases, commercial birds have been kept several weeks after being confirmed MG positive. The impact of keeping these flocks in the field on the incidence and duration of the epidemic is being studied but is not known at this point. It is certainly a source of concern.

At the time of submitting this paper (September 2000), it appears that the epidemic is slowing down considerably. Cases identified since June have been limited to two small areas (Salemburg, Sampson county; and Richlands, Onslow county). Although the investigation is still ongoing, current evidence suggests that inadequate MG monitoring (interval between testing and delays in obtaining results) in 1999 and people movement coupled with the lack of biosecurity on several farms have greatly contributed to this epidemic.