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Quantifying transmission of high- and low-pathogenicity H7N1 avian influenza in turkeys

Outbreaks of avian influenza in poultry can be devastating, and yet many of the basic parameters have not been accurately characterised. In 1999-2000 in Northern Italy, outbreaks of H7N1 low-pathogenicity avian influenza virus (LPAI) preceded the emergence of H7N1 high-pathogenicity avian influenza virus (HPAI). This study investigates the transmission dynamics in turkeys of representative HPAI and LPAI H7N1 virus strains from this outbreak in an experimental setting, allowing direct comparison of the two strains. The fi

tted transmission rates for the two strains are similar: 2.04 (1.5-2.7) for HPAI, 2.01 (1.6-2.5) for LPAI. However, the mean infections period is far shorter for HPAI, due to the rapid death of infected turkeys: 1.48 (1.3-1.7) days for HPAI, 7.65 (7.0-8.4) days for LPAI. Hence the basic reproductive ratio, R0 is significantly lower for HPAI than for LPAI: 3.01 (2.2-4.0) for HPAI, 15.37 (11.8-19.8) for LPAI. To be able to extrapolate experimental results from relatively small numbers of birds to the commercial poultry flock size, two competing hypotheses for how transmission rates vary with population size were investigated. Frequency-dependent transmission was determined to give a better

fit to data from experiments with varying number of birds.