Assessment of the probability of introducing Mycobacterium tuberculosis into Danish cattle herds

Tuberculosis is a zoonosis caused by Mycobacterium spp. International trade in cattle is regulated with respect to Mycobacterium bovis (M. bovis) but not Mycobacterium tuberculosis (M. tuberculosis), despite that cattle can become infected with both species. In this study we estimated the annual probability (PIntro) of introducing M. tuberculosis into the Danish cattle population, by the import of cattle and/or by immigrants working in Danish cattle herds. Data from 2013 with date, number, and origin of imported live cattle were obtained from the Danish cattle database. Information on immigrants working in Danish cattle herds was obtained through a questionnaire sent to Danish cattle farmers. The gained inputs were fed into three stochastic scenario trees to assess the PIntro for the current and alternative test-and-manage strategies, such as testing of imported animals and/or testing immigrant workers with the tuberculin skin test. We considered the population of Danish farmers and practitioners free of tuberculosis, because in Denmark, the incidence of the disease in humans is low and primarily related to immigrants and socially disadvantaged people.

The median annual probability of introducing M. tuberculosis into the Danish cattle population due to imported live cattle was 0.008% (90% P.I.: 0.0007%; 0.03%), while the probability due to immigrant workers was 4.1% (90% P.I.: 0.8%; 12.6%). Hence, on average at least one introduction each 24 (90% P.I.: 8; 125) years could be expected. Imported live cattle appeared to play a marginal role on the overall annual PIntro, because they represented only approximately 0.2% of the median annual probability. By testing immigrant workers the overall annual PIntro could be reduced to 0.2% (90% P.I.: 0.04%; 0.7%).

Thus, testing of immigrant workers could be considered as a risk mitigation strategy to markedly reduce the likelihood of introducing M. tuberculosis into the Danish cattle population, if the risk is considered unacceptable by the veterinary public health authorities.
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