**AIM**
To build a within- and between-herd transmission model of *S. Dublin* infection in dairy herds to further evaluate potential surveillance strategies

**MODEL**

**WITHIN-HERD INFECTION DYNAMICS**
- Stochastic compartmental model based on the Gillespie algorithm (R package *siminf*)
- Susceptible – Infected – Carrier – Recovered
- Age-specific parameters
- Infection probability depending on the environmental infectious pressure

**BETWEEN-HERD INFECTION DYNAMICS**
- Animals moved between herds according to the Swedish cattle movement registry data
- Same data to determine ageing events, introductions and exits in each herd

**DATA**
- All cattle movements recorded in Sweden in Jul 2005 – Dec 2013
- 37,000 cattle herds (8400 dairy)
- 1.6 million cattle (900,000 dairy)
- 10.8 million events
  - birth, purchase, death, sale, slaughter, ageing

**INITIALIZATION**
- 3 age groups
  - calves: < 6 months
  - young stock: 6 – 30 months
  - adults: > 30 months
- Starting point: 420 (5%) randomly selected infected dairy herds, preferentially located in the high-prevalence region.

**RESULTS**
- Median within-herd prevalence was 9% for calves, 3.5% for young stock and 2.5% for adults (Fig. 1)
- Within-herd prevalence fluctuated around the year (seasonality) but had the same pattern between years
- Seasonality was modelled as different rate of bacterial decay per season → direct (negative) correlation with environmental infectious pressure
- Between-herd prevalence stabilized to around 1% after few years (Fig. 2)
- Results are censored because the model depends on real movement data → sensitive to starting values

**DISCUSSION**
- Within-herd infection dynamics are driven by the parameters in the model, while between-herd infection dynamics mainly depend on the data
- The model mimics the spread of *S. Dublin* between Swedish dairy cattle herds → influenced by specific herd sizes and pattern of animal movements
- Animal movements include also the control measures applied during the 6 years for any cattle disease → restricted herds = ban of movements
- The model can be useful for evaluating surveillance strategies specific for the disease situation in Sweden

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**Motivation**
- Around 1% of Swedish dairy herds are infected with *S. Dublin*
- Surveillance and control measures have been in place since 1960s
- Fewer cases were detected over the years → eradication of *S. Dublin* may be possible, but it requires a more sensitive surveillance strategy

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