

Does hepatitis E virus spread among pigs?

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Introduction

Hepatitis E virus (HEV) is a cause of human hepatitis and pigs are a potential source of infection. Pigs are a true animal reservoir for human infection if:

- infected pigs are able to transmit HEV to other pigs
- the contact structure between pigs allows persistence of HEV

Objective

To test whether the basic reproduction ratio (R_0) for HEV is larger than 1.

Materials and methods

Experimental design

- One-to-one transmission experiment (40 pigs in total)

Transmission chain (see Fig.)

Pen 1: an intravenously inoculated (I.V.) pig (~ 10^4 HEV units) is housed with a susceptible pig (C1)

If a C1-pig excretes HEV for 3 consecutive samplings, it is joined with a susceptible pig (C2) in pen 2

If a C2-pig excretes HEV for 3 consecutive samplings, it is joined with a susceptible pig (C3) in pen 3

- Per chain: 4 male piglets (3-4 weeks old)
- 10 chains, two blocks of five each
- Faecal samples collected 3 x per week

Diagnostics

- HEV-RNA detection by RT-PCR on ORF2

Analysis

- R_0 = transmission rate (β) \times length of infectious period
- Stochastic *SI*-model used to estimate β
- Within- (β_w) and between-compartment (β_b) transmission estimated by GLM using complementary log-log link function

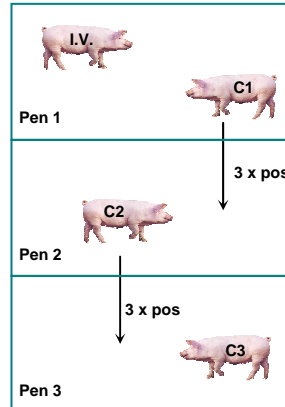


Fig. 1 Transmission chain and picture of the stable

Results

- All 10 IV and all 10 C1 pigs infected (Table below)
- 12 contact infections out of 14 exposures in C2- and C3-pigs

Transmission from:	Number of contact infections		
	Block 1	Block 2	Total
I.V.-pigs to C1 pigs	5/5	5/5	10/10
C1-pigs to C2-pigs	4/4	3/4	7/8
C2-pigs to C3-pigs	5/5	0/1	5/6

Transmission rate: $\beta_w = 0.66 \text{ day}^{-1}$ (95%CI: 0.32-1.35)

$\beta_b = 0.02 \text{ day}^{-1}$ (95%CI: 0.01-0.04)

Infectious period: block 1: 49 days (95%CI: 17-141)

block 2: 13 days (95%CI: 11-17)

Conservative $R_0 = 8.8$ (95%CI: 4.2-18.8)

Conclusion

YES, HEV spreads among pigs ($R_0 = 8.8$).

So, HEV can persist in pig populations.

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