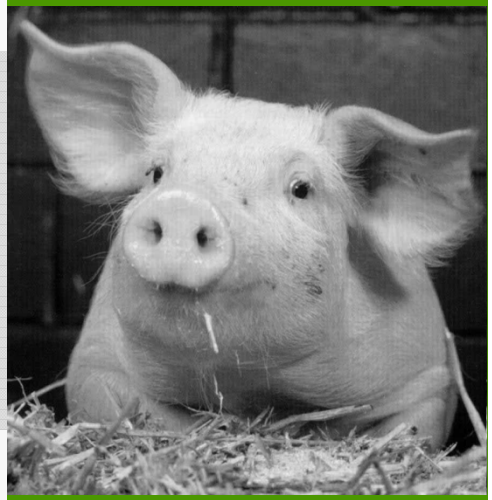
Faculty of Agricultural and Nutritional Sciences

Christian-Albrechts-University, Kiel
Institute of Animal Breeding and Husbrandy

Vaccination strategies to control classical swine fever epidemics



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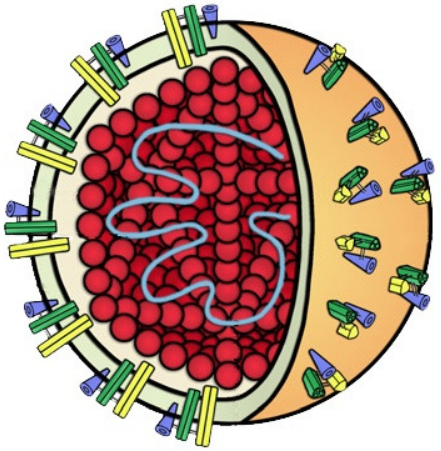


Introduction

- classical swine fever (CSF)
  → highly contagious virus disease

- economic losses
  - movement restrictions on farms in protection and surveillance zones
  - export losses
  - preventive culling

- ethical objections

Control measures

- EU Directive 2001/89/EG

- current control strategy:
  - depopulation of infected herds
  - protection and surveillance zones
  - preventive culling

- since 1988: non-vaccination policy in the EU

Alternative control measures

Emergency vaccination

- permitted since 1990
- emergency vaccination plan
- live attenuated vaccines
  - no discrimination between vaccinated and infected pigs
  - trade restrictions

Alternative control measures

Rapid PCR testing

- Real time RT-PCR
  - direct detection of CSF virus

- avoid culling of healthy animals
- change in CSF policy
  - virus free pig populations are free from risk

Aim of the study

Comparison of emergency vaccination and rapid PCR testing with the current control strategy (preventive culling)

Simulation model

- spatial and temporal Monte-Carlo Simulation
- daily basis
- virus transmission:
  - animal, person and vehicle contact
  - local spread
- control strategies according to
  EU Directive 2001/89/EG + rapid PCR testing

Simulation model

- Farm data:
  - region in Northern Germany
  - 908 km²
  - 1108 farms (777 finishing farms, 57 farrowing farms, 274 farrow-to-finish farms)
  - 1.2 farms/km²

Control strategy combinations

Basis: control zones (protection and surveillance zone)

- strict transport standstill

+ preventive culling

- 500 m, 1km around all diagnosed farms

+ emergency vaccination

- 5 km, 10 km around the first diagnosed farm
- delay of 10 days until start
- time until immunity: Ø 4 days

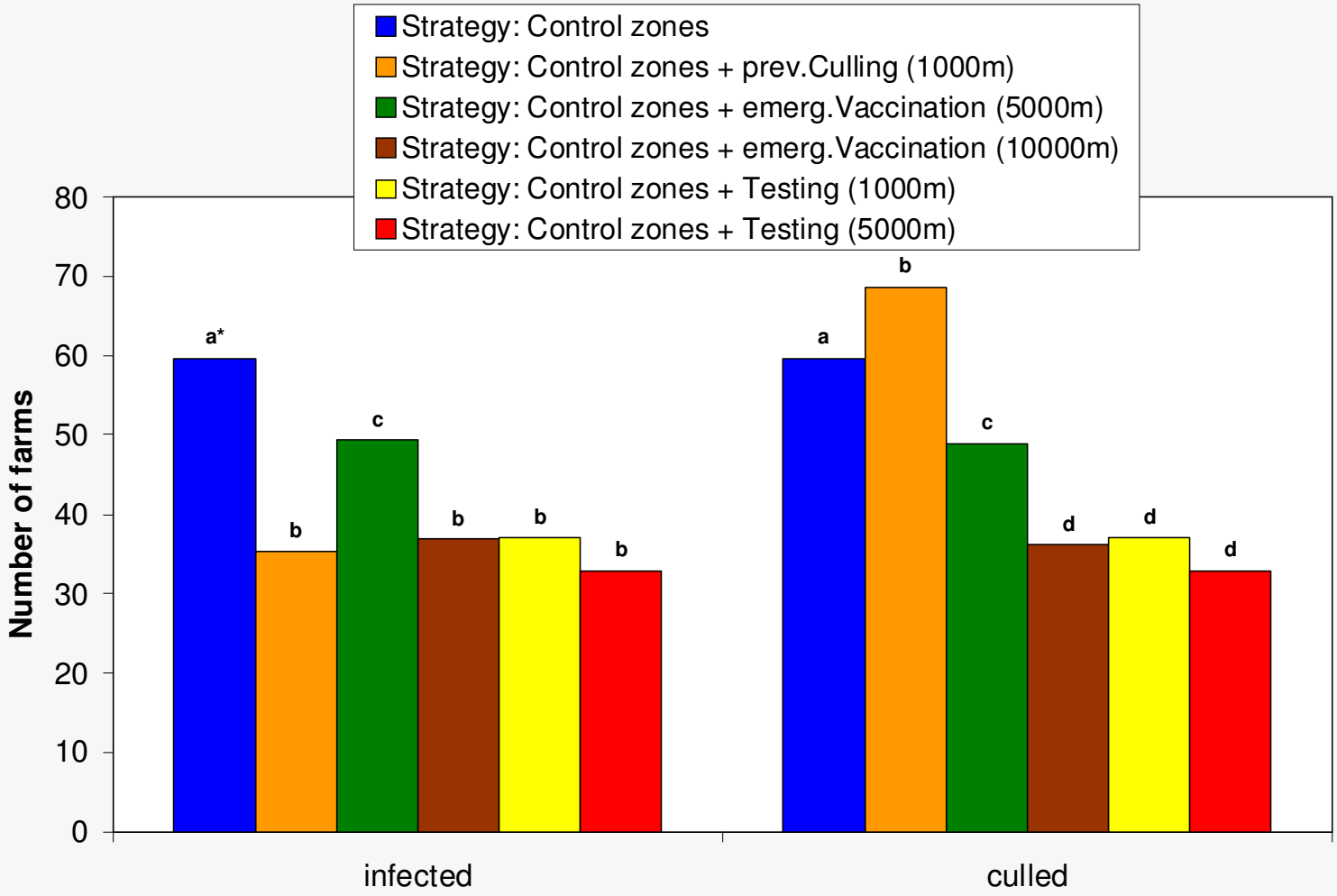
Control strategy combinations

Basis: control zones (protection and surveillance zone)

+ rapid PCR testing
  - 1-5 km around all diagnosed farms
  - 80 farms per day
  - PCR results after 24 h
  - PCR examination interval: 30 days
  - clinical examination interval: 10 days

Results

Mean number of infected and culled farms



* Different letters indicate significant differences between parameters (<0.05)

Results

Comparison of farms culled preventively and after testing depending on application radius

	farms culled preventively	farms culled after positive PCR result
500m-radius	23.3	16.7
1000m-radius	53.2	21.2
2000m-radius	173.9	22.9
3000m-radius	331.4	22.7

Results

Number of infected farms

	Preventive culling	PCR testing
500m-radius	48.6	50.5
1000m-radius	35.3	36.9
2000m-radius	35.2	36.2
⋮	⋮	⋮
5000m-radius	31.1	32.9

Conclusion and summary

- vaccination radius of 10 km around first diagnosed farm → 422 vaccinated farms
- testing radius of 1 km → 55 tested farms
  - repetition of PCR and clinical examination
- personnel and material effort
- PCR testing is an alternative from the ethical point of view

Thank you for your attention!