Faculty of Agricultural and Nutritional Science

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Institute of Animal Breeding and Husbandry

Control of classical swine fever epidemics for varying outbreak conditions focusing on emergency vaccination and rapid PCR testing

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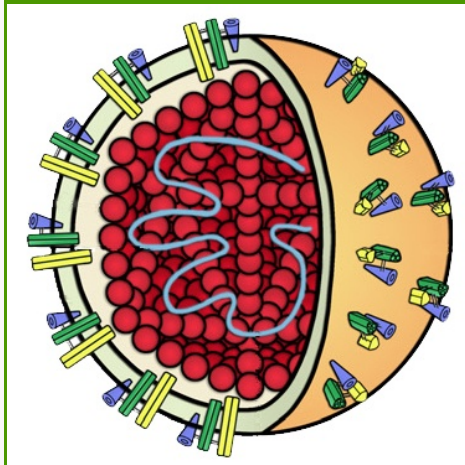


Session 56b, Abstract no. 17016, itraulsen@tierzucht.uni-kiel.de

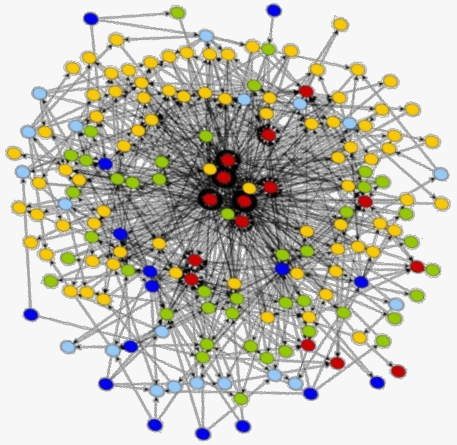
Introduction

- Eradication of classical swine fever (CSF) follows EU Directive 2001/89/EG and is based on
  - Culling of infected herds, Stand-Still, contact tracing and preventive culling
- Currently political and ethical discussions to avoid culling of uninfected animals
  - rRT-PCR allows early detection of CSF virus and overcomes welfare cullings
  - Emergency vaccination

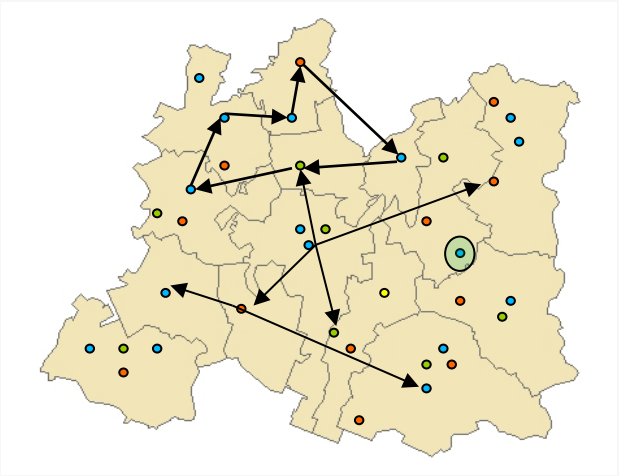
Evaluation of emergency vaccination and rapid PCR testing as alternative measures to improve CSF disease eradication

Simulation model

Spatial and temporal Monte-Carlo simulation

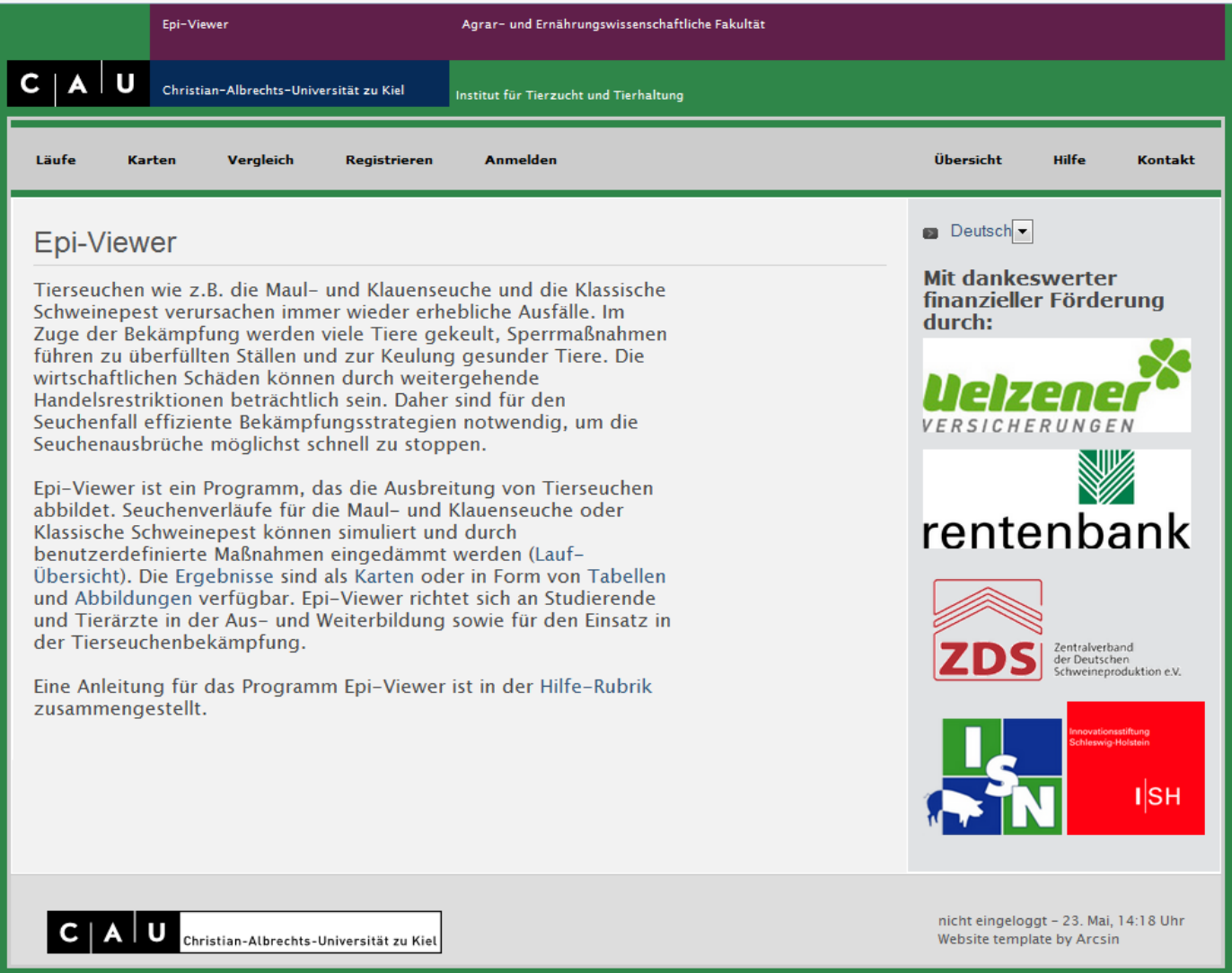


- Data base
  - Farm data (location, animals)
  - Epidemiology of the virus



- Transmission paths
  - Direct and indirect contacts
    (Animals, feed, vet)
  - Local (up to 1 km by rodents, …)

Example of CSF simulation



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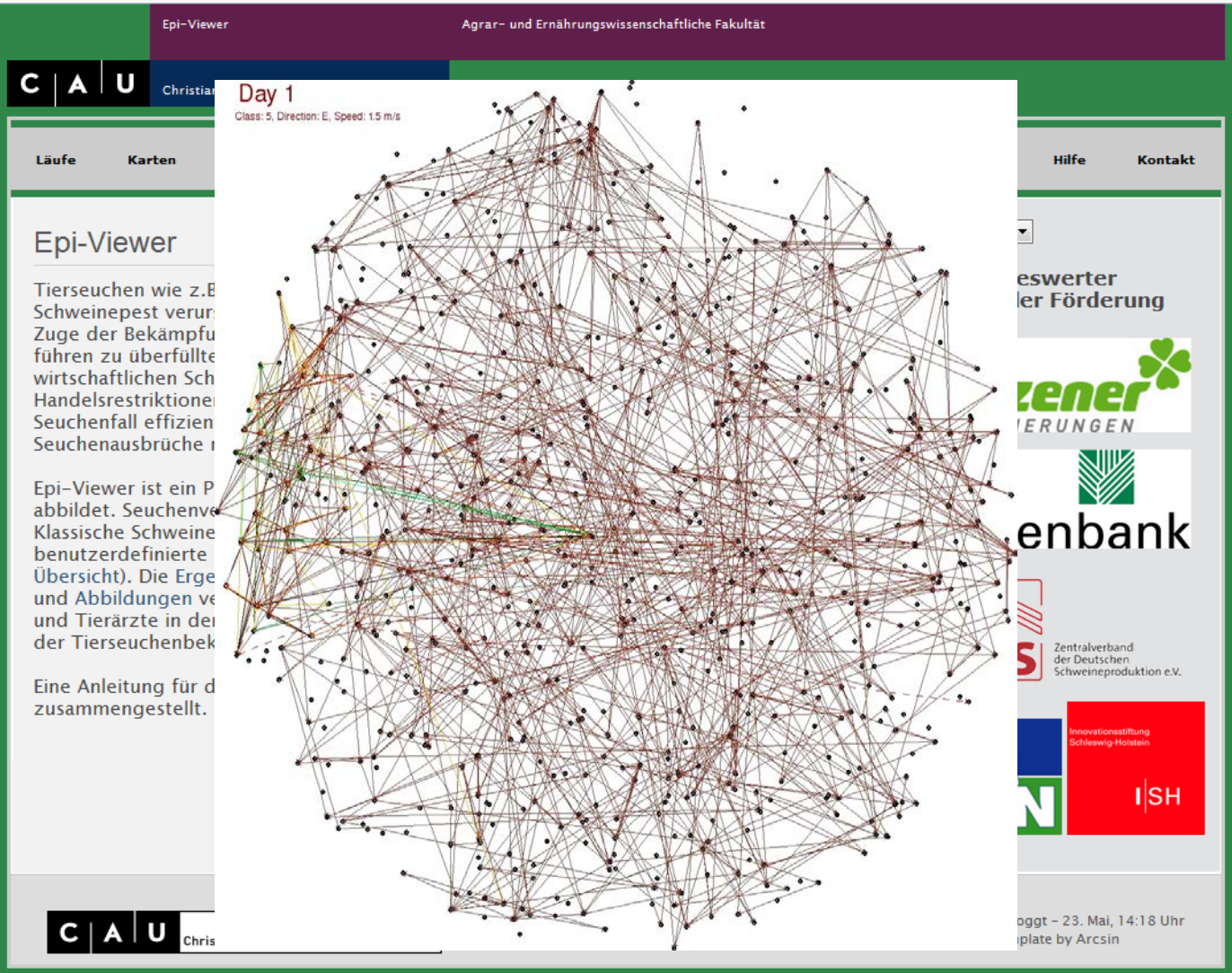
Example of CSF simulation



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Control strategies

- **Trad**: Traditional control (culling of infected herds, protection (3 km) and surveillance (10 km) zone, preventive culling (1km) zone)
- **Trad + Vacc**: emergency vaccination of finishing and farrow-to-finishing farms (3/10 km, live vaccine with Ø 4 days until immunity, 98 % vaccination success)
- **Trad + TTC**: rRT-PCR as test-to-control with efficacy of 99% of finishing pigs at establishment and after 7 days in testing zone (3/10 km)
- **Trad + TTS**: rRT-PCR as test-to-slaughter with efficacy of 99% of finishing pigs before slaughter in testing zone (3/10 km)
- **Trad + Vacc + TTS**: combination emergency vaccination and test-to-slaughter

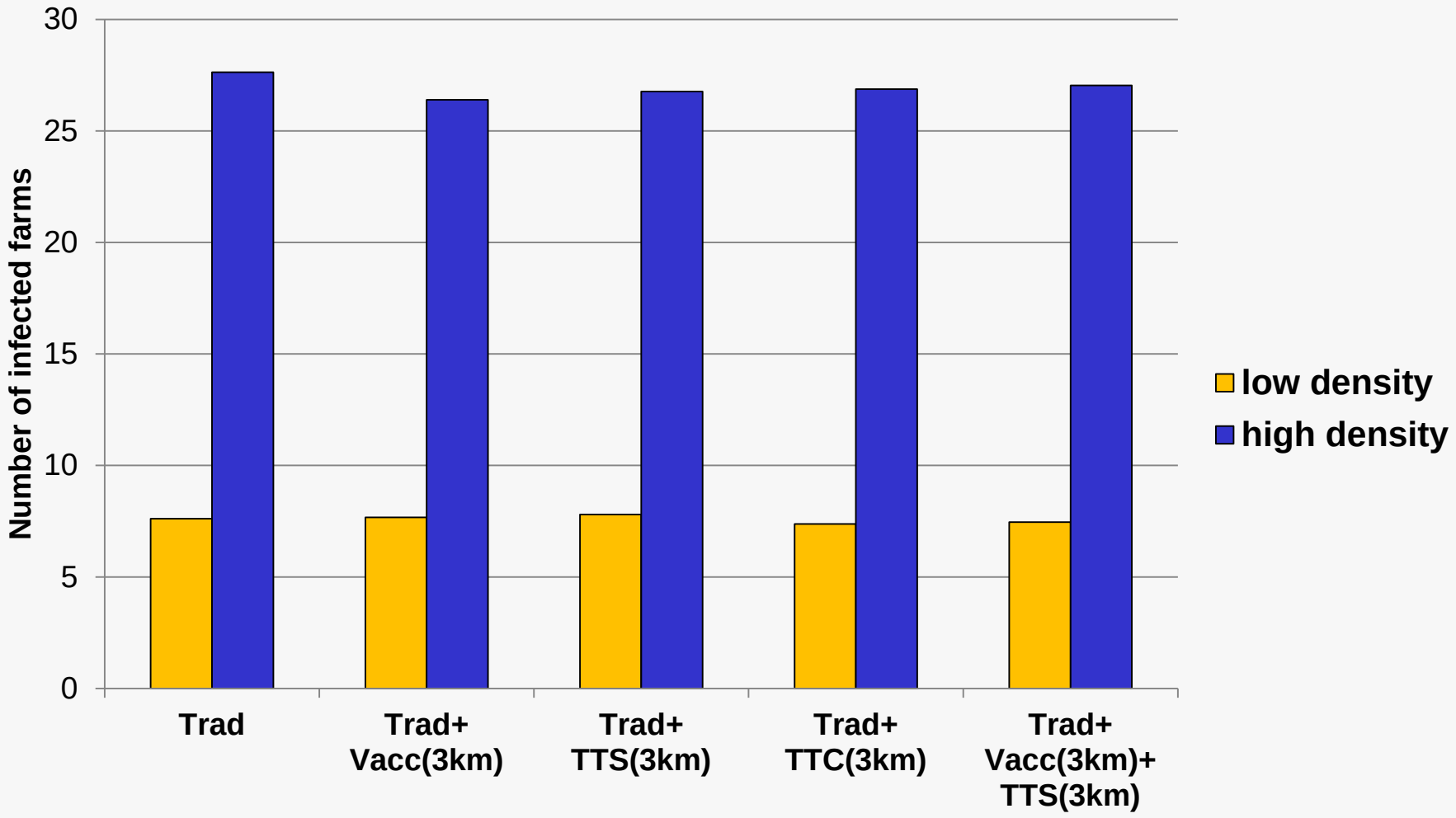
Additional effects

- Farm density in an area of 908 km²
  - Area 1: 0.8 farms /km² (729 farms)
  - Area 2: 3.2 farms /km² (2950 farms)
- Compliance with movement restrictions in protection and surveillance zone
  - 80/ 90 / 100 %
- Delay until vaccination starts
  - 3 days (first outbreak)/ 2 days (secondary outbreaks)
  - 15 days (first outbreak)/ 6 days (secondary outbreaks)

Farm density

Influence of farm density and control strategy on the number of infected farms

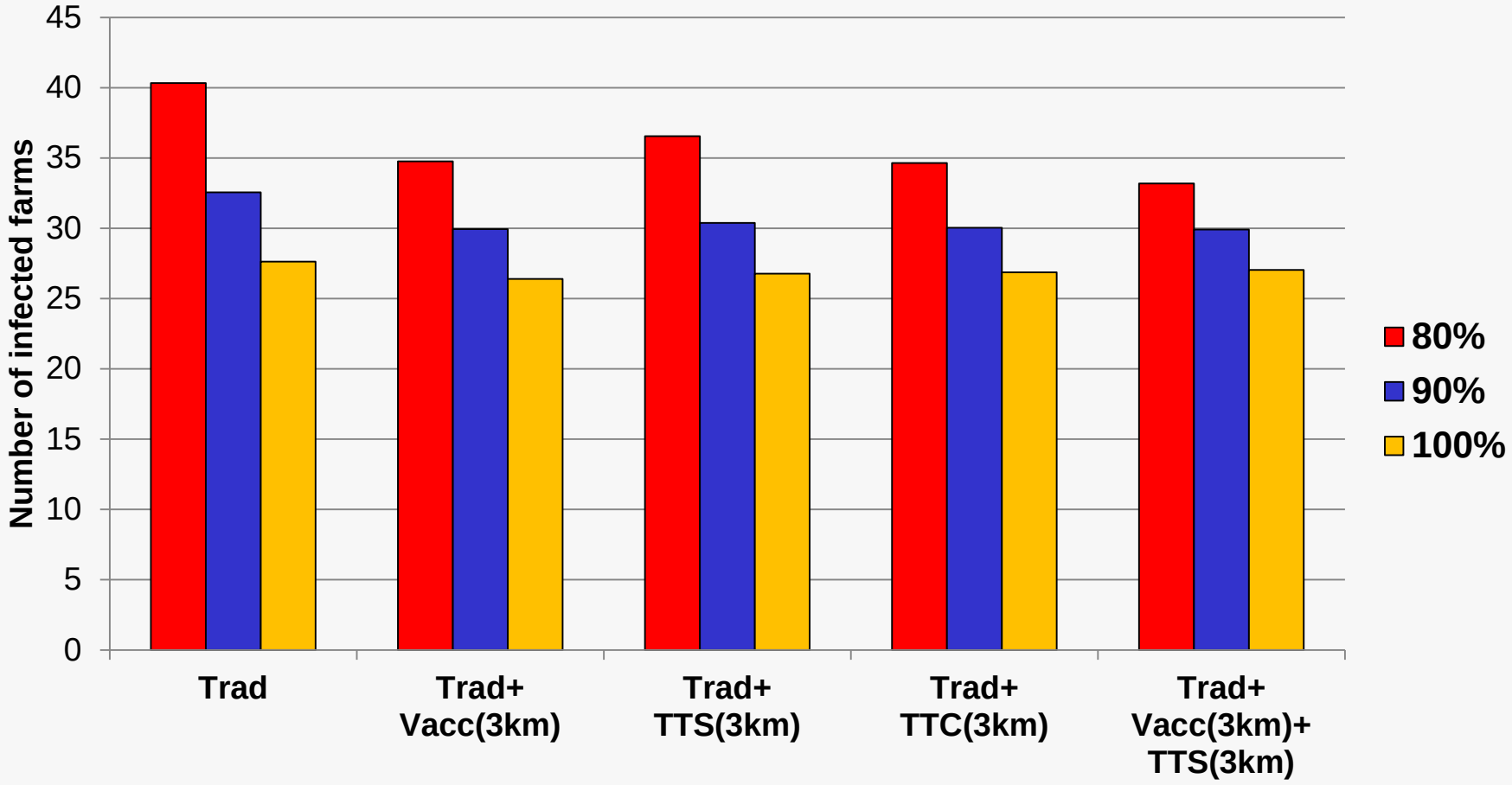
(Trad: culling infected farms, protection zone (<3 km), surveillance zone (3-10 km), contact tracing)



Compliance with Stand-Still

Influence of compliance with Stand-Still in protection and surveillance zone on the number of infected farms

(Trad: culling infected farms, protection zone (<3 km), surveillance zone (3-10 km), contact tracing)



Evaluation of strategies

- Epidemiological evaluation only one aspect

- Holistic/complex view needs to account for
  - Epidemiology
  - Economy
  - Ethical and social aspects

→ Multi criteria decision analysis (MCDA)

Results of MCDA

	Epidemiology> Economy> Ethical/ Social Aspects		**Epidemiology~ Economy> Ethical/ Social Aspects**	
	Low density	High density	Low density	High density
Trad	74.3	62.2	75.1	57.1
Trad+Vacc	74.1	80.4	74.9	**78.7**
Trad+TTS	**86.2**	80.9	**79.1**	72.1
Trad+TTC	83.5	84.0	74.7	70.7
Trad+Vacc+ TTS	85.1	**85.5**	78.8	76.9

Conclusion

- Success of eradication strongly depends on compliance with Stand-Still, particularly in areas with a high farm density.

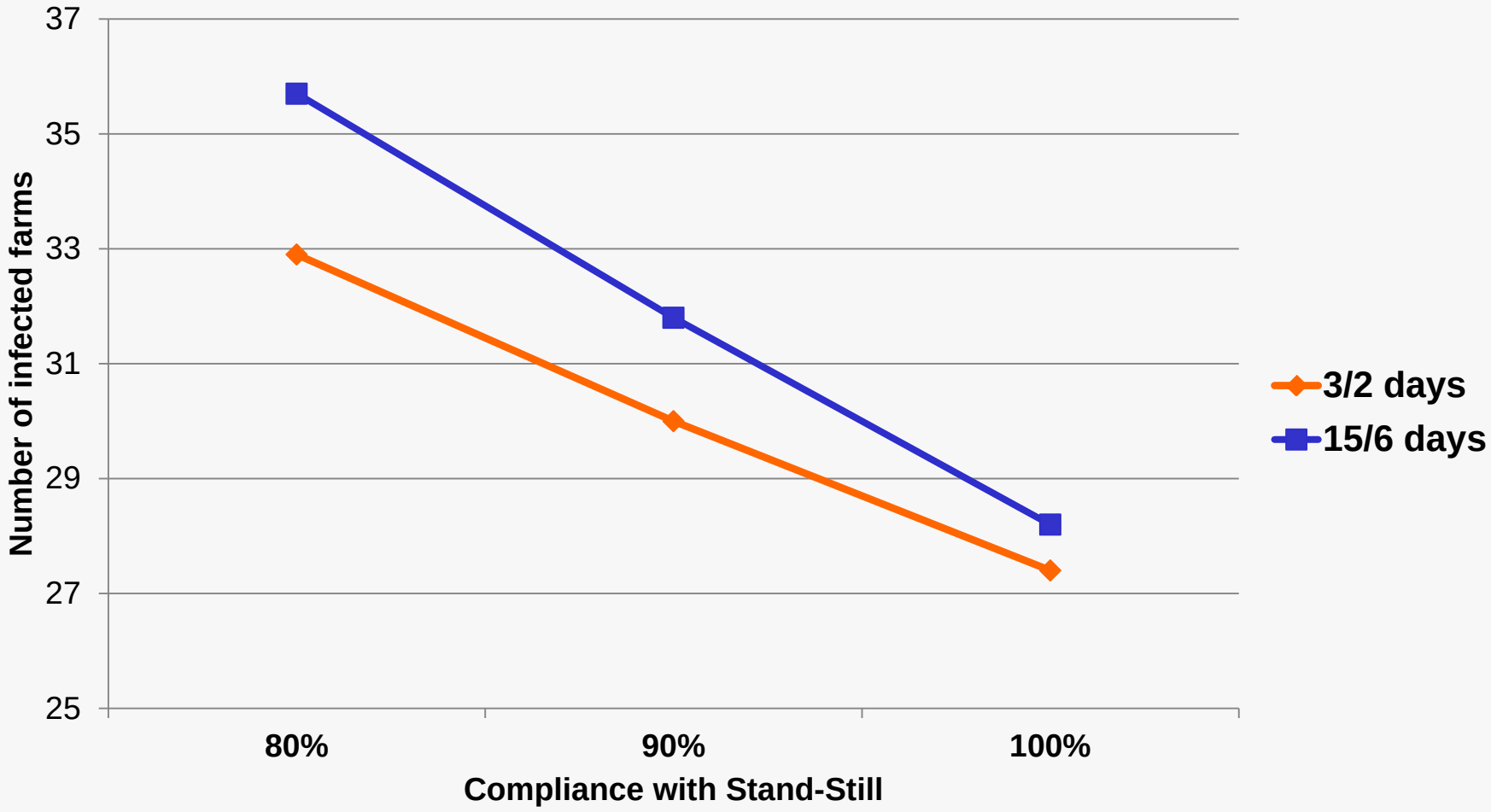
- Traditional and alternative control measures resulted in same number of infected farms with strict compliance with Stand-Still or in sparsely populated areas.

- Including economical and ethical/ social aspects in evaluation shows higher rankings of alternative measures than traditional control.

Thank you for your attention!

Delay in emergeny vaccination

Interaction between compliance of movement restrictions and delay in establishment of emergency vaccination on the number of infected farms



MCDA of control strategies