Christian-Albrechts-University, Kiel
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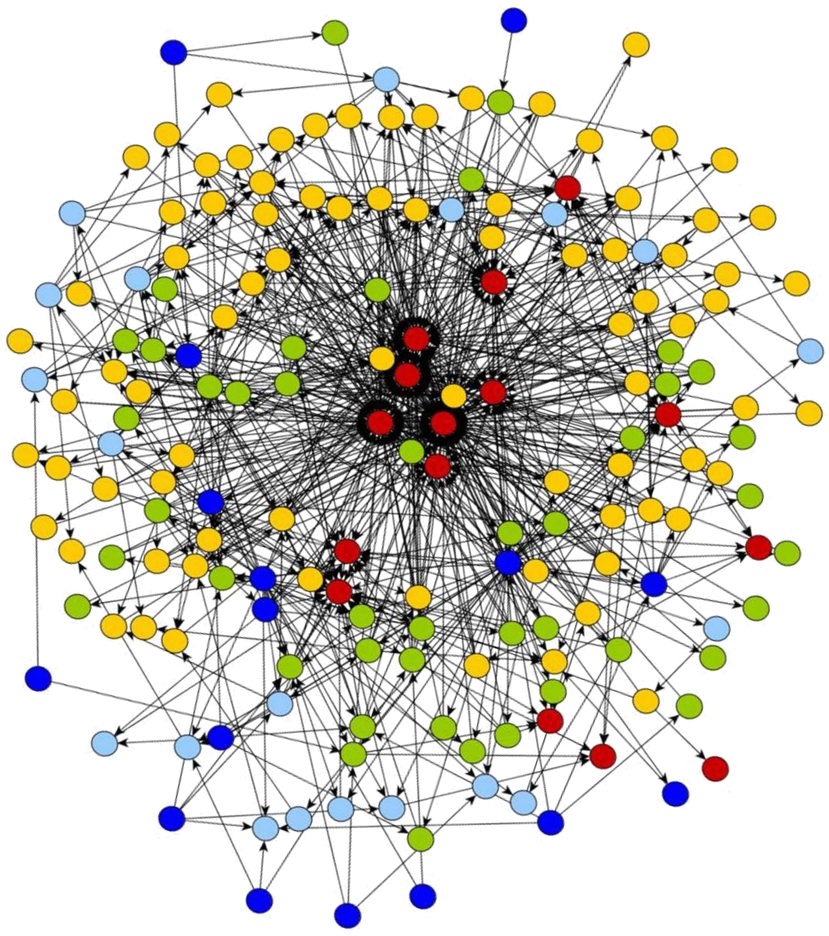
Trade contact network in the pork supply chain

Characterisation of the network topology

Data basis

- 176 premises from a producer community in Northern Germany
- 6,892 animal movements in an observation period from 2006 – 2009
  → 770 different trade connections



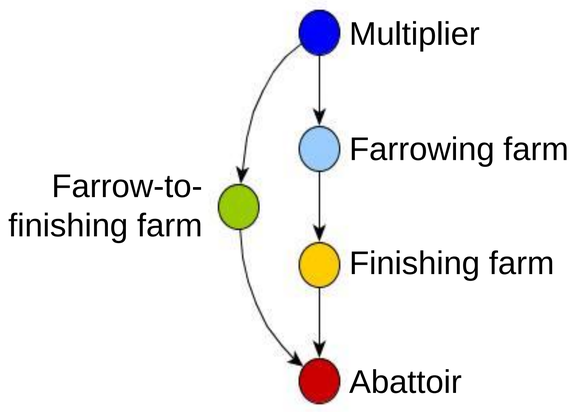
Static network analysis

In-degree

- Number of trade partners which **deliver** animals to a specific premise

Out-degree

- Number of trade partners which **receive** animals from a specific premise



Scale-free networks

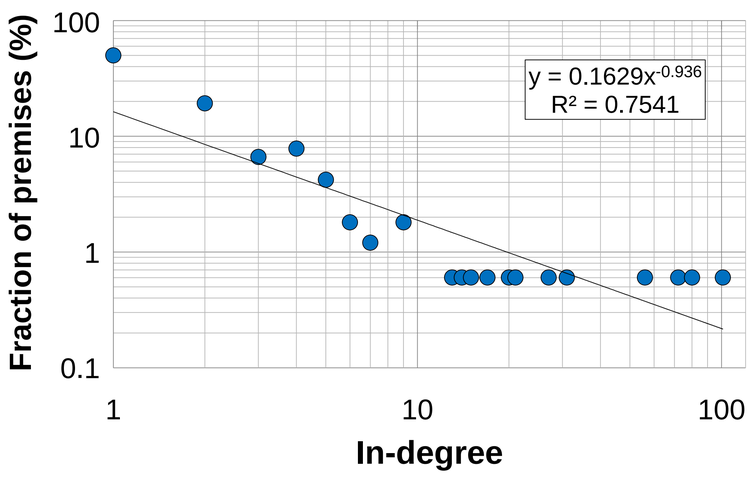
- Power-law degree distribution → $p_k \sim Ck^{-\alpha}$
- High amount of low-degree premises, small number of high-degree premises

Results

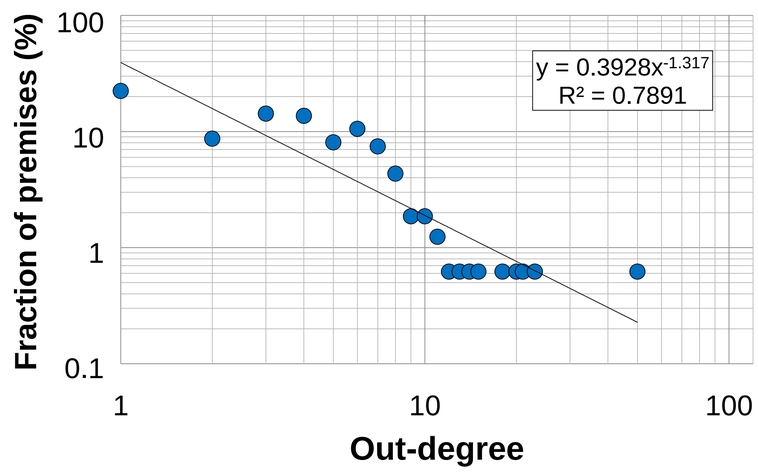
In- and out-degree per premise type

Premise type	n	In-degree			Out-degree		
		25th Pctl	50th Pctl	75th Pctl	25th Pctl	50th Pctl	75th Pctl
Multiplier	16	0	0	1	3	5	10
Farrowing farm	20	1	2	3	1	3	8
Finishing farm	81	1	2	3	2	3	5
Farrow-to-finishing farm	44	1	1	2	2	5	7
Abattoir	15	6	20	56	0	0	0
Total	**176**	**1**	**1**	**3**	**1**	**4**	**6**

In-degree distribution

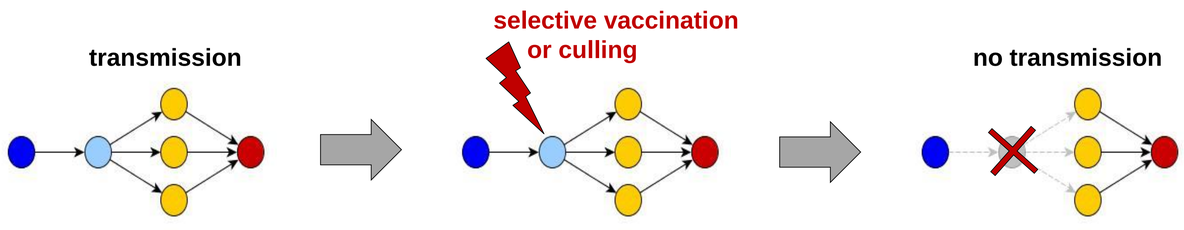


Out-degree distribution



Conclusion

- Network analysis provides a substantial tool for characterising contact patterns
- Different types of premises reveal various degrees reflecting their position in the pork supply chain
- The described network shows scale-free characteristics
- Scale-free networks are highly resistant concerning the random removal of premises



→ By strategic removal of highest-degree premises the network structure changes and can decompose into fragments.

→ The chain of infections can be interrupted and further disease spread can be prevented.

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