

# Structural change has impact on potential of FMD outbreak in Finland

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Animal production has changed during several decades: the average farm size has increased, while the number of farms has declined. Structural changes has consequences on the contact structure of farms because the number of neighboring farms and transports between farms have also changed. This change may have consequences on the ability of animal diseases to spread within the country and on the risk management costs required for eradication of the disease.

## Structural changes in pig and cattle production 2006-2009

### Farms

Average farm size has increased noticeably; the largest change in size has been among fattening pig farms and dairy cattle. Simultaneously the number of farms has declined in every production type (Table 1).

Table 1. The number of farms and animals/farm in years 2006 and 2009 in Finland.

Variable	Farm type	Year 2006	Year 2009	Change
Number of farms	Sow farm	1003	757	-25%
	Farrow-to-finish farm	1028	874	-15%
	Fattening farm	1072	696	-35%
	Dairy farm	14715	12380	-16%
	Beef cow farm	3327	2569	-22%
	Suckler cow farm	1885	1617	-14%
Number of animals/farm*	Sow farm	167	211	+26%
	Farrow-to-finish farm	390	439	+12%
	Fattening farm	448	668	+49%
	Dairy farm	32	49	+53%
	Beef cow farm	51	58	+14%
	Suckler cow farm	51	63	+24%

\*excluding piglets under 3 months, cattle under 6 months

### Contacts

The number of neighboring farms has declined on average 19% within a 3 km range from the farm.

Number of animal transports between pig farms has declined clearly (25%). On the contrary, in the cattle sector the increase of animal transports has been even more apparent (38%) (Table 2).

Table 2. The number of animal transports to other farms on years 2006 and 2009 in Finland.

Variable	Farm type	Year 2006	Year 2009	Change
Number of animal transports from farm	Sow farm	25282	16945	-33%
	Farrow-to-finish farm	8669	6941	-20%
	Fattening farm	794	613	-23%
	Dairy farm	64803	85391	+32%
	Beef cow farm	1815	3127	+72%
	Suckler cow farm	2936	3219	+10%

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## Simulated outcomes

- Simulated outbreaks n=100000, by Finnish FMD model (Lyytikäinen et. al 2011)
- Spread of FMD was simulated from every Finnish cattle and pig farm
- The model included spread by animal transports, neighborhood and airborne spread up to 3 km, and human contacts
- Data of year 2006 and 2009 was used
- Size of outbreaks (N of infected farms) of year 2006 and 2009 were then compared

## Results

- The average outbreak size **declined** in most parts of the production (-24%, average size changed from 5.1 to 3.9, Figure 1)
- The relative variation (CV) of outbreak size **increased** (from 1.3-1.6 to 1.4-2.1)
- The proportion of large outbreaks (>30 infected farms) **increased** when outbreak was started on beef or suckler cow farms (from 0.4-0.6% to 1.0-1.6%)

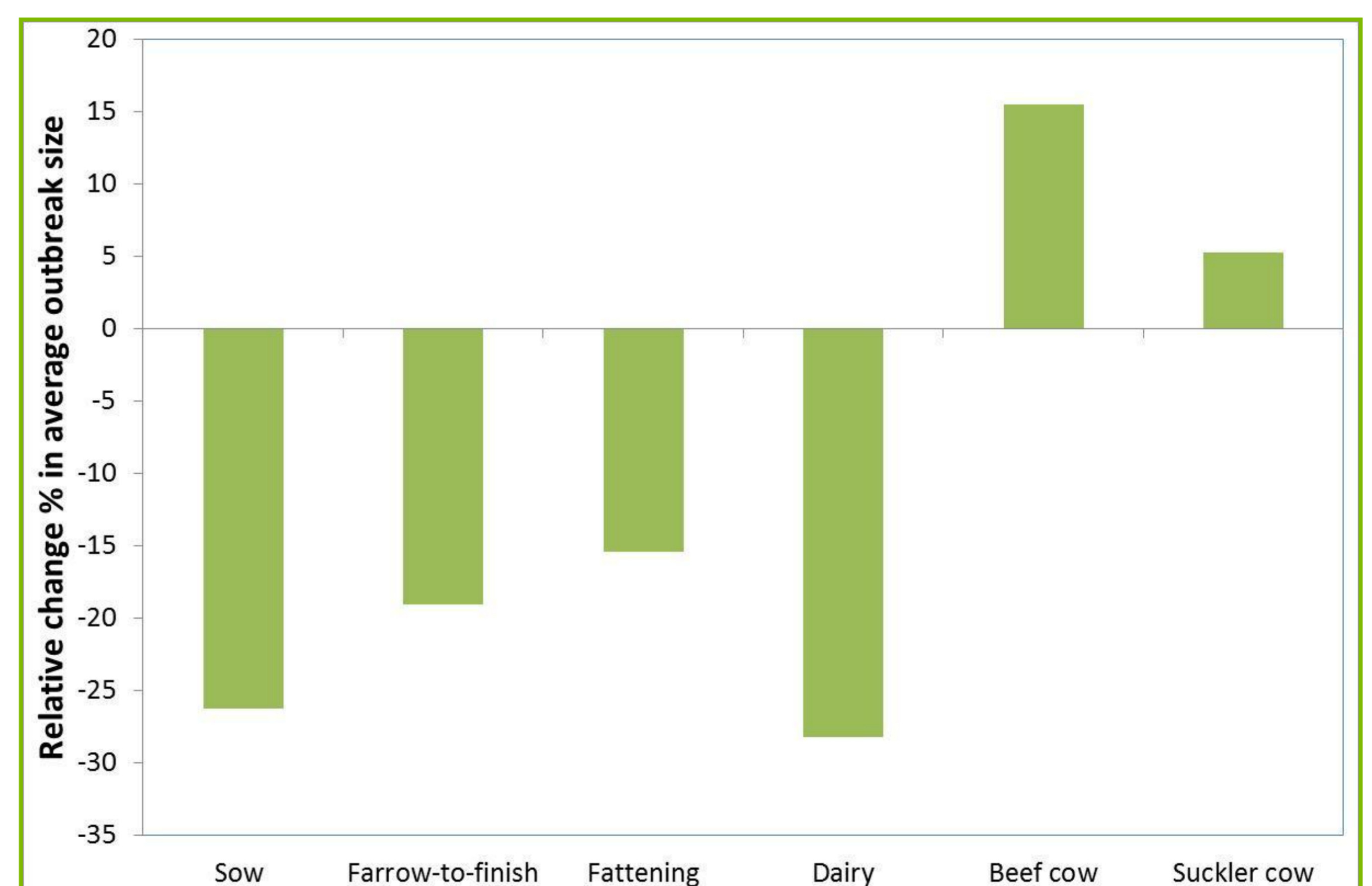


Figure 1. The relative change of the average outbreak size on different farm types between years 2006 and 2009. Farm type refers to the farm type of the primary infected farm.

## Conclusions

- Results indicate that even if there is a general tendency for fewer infected farms, beef and suckler cow farms have an increased risk of spread
- Because the farm size has increased (25%) and average size of an outbreak has declined (24%), the consequences of an outbreak would remain almost the same
- It is noteworthy that the relative variation of the size and the probability of large outbreaks have increased

### References

Lyytikäinen T, Niemi J, Sahlström L, Virtanen T and Lehtonen H (2011). The spread of Foot-and-mouth disease (FMD) within Finland and emergency vaccination in case of an epidemic outbreak, Evira Research Reports 1/2011.