# Buying and selling cattle can link individual farms to thousands of others per purchase

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Understanding the complex networks of "contact chains" between British farms, could help identify potential routes for spread of infections and improve disease control strategies for the cattle industry.

A pioneering new study, led by veterinary researcher Helen Fielding from the University of Exeter, has examined the remarkable extent to which British beef and dairy farms are connected through cattle movements.

The research could help identify potential pathways for the spread of important cattle infections that can cause major health, welfare and economic problems for the British farming industry.

The researchers analysed patterns of buying and selling cattle on British farms using official records of 75 million movements of cattle between farms from 2001-2015.

Starting with direct trades, when one farm buys from or sells cattle to another, the researchers traced 'contact chains' that describe networks of farms linked by sequential movements of their cattle.

By looking at 12 month periods of trading, the study found that around half of all British cattle farms were connected to more than 1,000 other farms every year when they bought in cattle. 16% of farms were connected to more than 10,000 other farms in a single year.

When selling cattle, the contact chains were similarly extensive: Two thirds of farms were connected to more than 1,000 other farms. 15% of farms again linked to more than 10,000 farms in a single year.

The study found that on average from 2001-2015, over 13,000 British cattle farms had contact chains extending to more than 10,000 other farms by selling and more than 10,000 farms by buying, in any single year. These super-connected farms could potentially be particularly exposed to infections and particularly able to spread them.

The study is published by The Royal Society.

Helen Fielding, veterinary researcher at the University of Exeter's Environment and Sustainability Institute said: "We found that farms, even if they only bought cattle from one or two other farms, could be at the end of a chain connecting their farm and their animals to several thousand other farms.

"For example, one farm in Devon bought only six cattle in one year, those six cattle came from four farms, and those four farms were connected in two steps back to ten others. Tracking back 12 months, the sequence of links to the one Devon farm extended to 11,132 farms, as far afield as Kent, North Wales and Orkney."

Professor Robbie McDonald, the senior author of the study, said: "Currently, it is very difficult for farmers to see the whole history of the animals they buy and the status of the farms they are directly bought from. This research shows that even farms that buy their cattle very carefully might be exposed to infections from many other unknown farms across the whole country.

"Better understanding of the extensive connections formed by trading between British farms can help quantify the risks of disease spread and assist in the formulation of control strategies that work alongside efficient trading practices."

Contact chains of cattle farms in Great Britain by Helen Fielding, Trevelyan McKinley, Matthew Silk, Richard Delahay and Robbie McDonald, is published in the journal *Royal Society Open Science*.

**More information:** Helen R. Fielding et al, Contact chains of cattle farms in Great Britain, *Royal Society Open Science* (2019). DOI: 10.1098/rsos.180719

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