Changes in pig farming in the 20th century spread antibiotic-resistant Salmonella around the world, finds study

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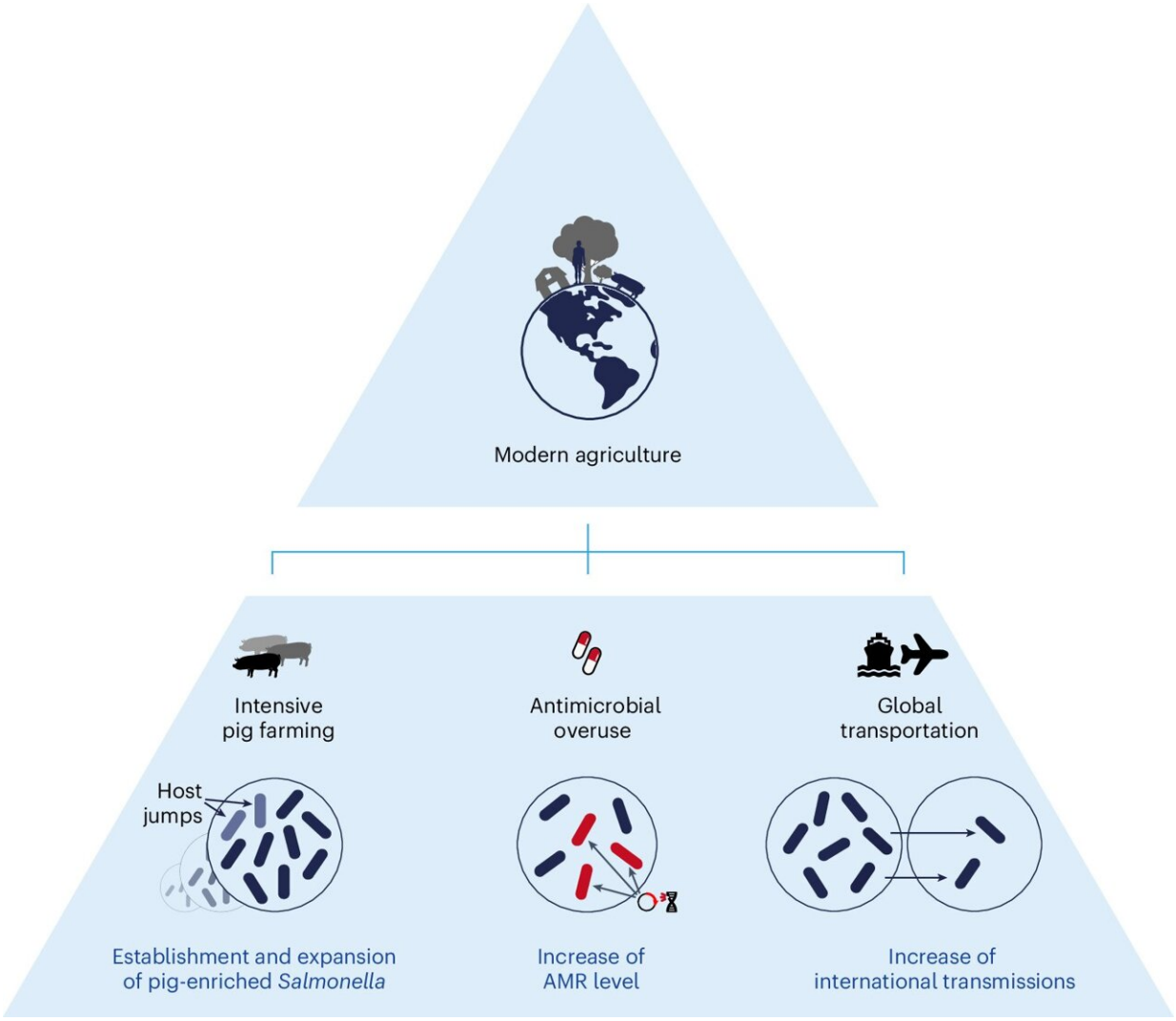

The influences of modern agriculture on the population dynamics of S. enterica

serovars. Credit: *Nature Food* (2024). DOI: 10.1038/s43016-024-00968-1

Historical changes in pig farming led to the global spread of Salmonella, resistant to antibiotics—a new international study led by researchers at the University of Warwick suggests.

Salmonella enterica is a type of bacteria responsible for millions of illnesses annually, that can contaminate food, water, and food processing facilities. It can enter the food supply chain, with pork being a major source of infections. The pathogen can "jump" from pigs to humans, causing severe, potentially fatal, illnesses.

Until now, the impact of intensive farming practices and global trade on Salmonella prevalence around the world and the spread of antibiotic resistance remained unclear.

Now, new research published in *Nature Food* provides evidence that intensive farming practices over the last century has enabled the Salmonella bacteria to spread internationally. The overreliance on antibiotics also led to the bacteria evolving to be resistant to antibiotics—posing a huge problem for global health.

In the study, DNA was analyzed from 362,931 strains of bacteria. This was made possible by the EnteroBase system developed and hosted at Warwick. This led to the detection of nine Salmonella populations that are abundant in pigs.

The scientists linked the expansion of the bacteria with two historical events in the 20th century. The first was the development of intensive pig farming in the early 20th century. The second was due to the overuse of antibiotics after the 1960s. Europe and the U.S. contributed the most

to international transmissions of the bacteria.

Professor Sascha Ott, Warwick Medical School, University of Warwick, said, "Our study has shown how the global trade of pork has played a key role in the evolution of Salmonella—posing direct threats to food safety worldwide.

Dr. Zhemin Zhou, honorary research fellow at the University of Warwick, said, "As the majority of Salmonella genomes included were from developed countries, with limited data from developing countries, especially those in South America and Africa, further research should look at these understudied regions. This should improve knowledge of Salmonella evolution and aid efforts to prevent illnesses caused by this pathogen."

Dr. Laura Baxter, Bioinformatics Research Technology Platform, University of Warwick, said, "Our study showcases the influences of human activities on the evolution and spread of pathogens. Salmonella is not likely to be the only pathogen that has been reshaped by human agricultural practices, so we should also investigate the evolution of other pathogens."

More information: Heng Li et al, Centralized industrialization of pork in Europe and America contributes to the global spread of Salmonella enterica, *Nature Food* (2024). DOI: 10.1038/s43016-024-00968-1

Provided by University of Warwick