Prevalence of *mcr* genes in retail meats collected from local markets of Japan and Thailand after banning of colistin

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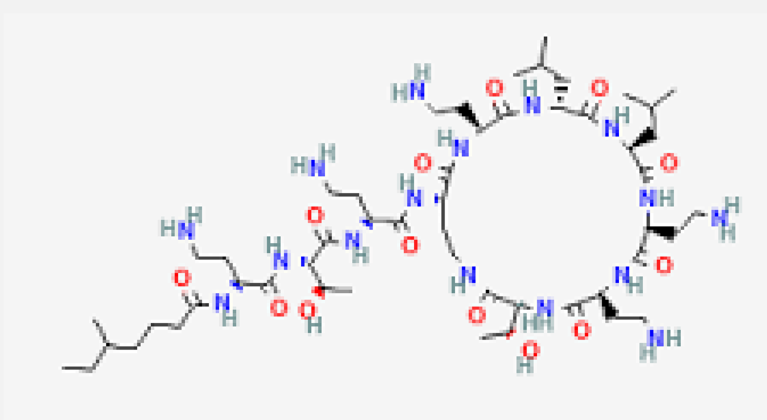
Background

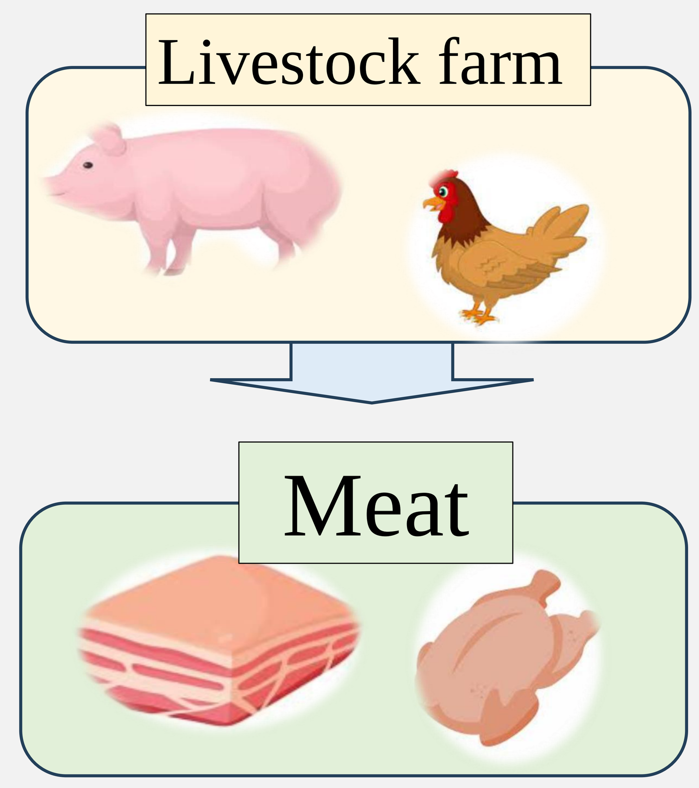


Colistin, a polymyxin antimicrobial

a last-resort antimicrobial due to the rise of β-lactams and carbapenem resistance

Colistin resistance

- The mobile colistin resistance (*mcr*-1) gene was detected in 2015 for the first time (Liu *et al.*, 2016)
- Other variants (*mcr*-1 to 10) were also reported



major source of *mcr*-genes

What is the incidence of *mcr*-genes after colistin banning?

Colistin Banning

❖Total banning in 2018, Japan (Usui et al., 2021)
❖Partial banning 1n 2017, Thailand (Poolperm et al., 2020)

Objectives of this study

I. Investigate the effect of colistin banning on the prevalence of *mcr*-genes carrying bacteria in retail meat after complete or partial banning of colistin in Japan and Thailand, respectively

II. Characterize the *mcr*-gene variants and carrying bacteria.

Area of the study

I. **Japan,** supermarkets in Izuminano city, Osaka

II. **Thailand,** supermarkets and open markets in Klong Nueng City

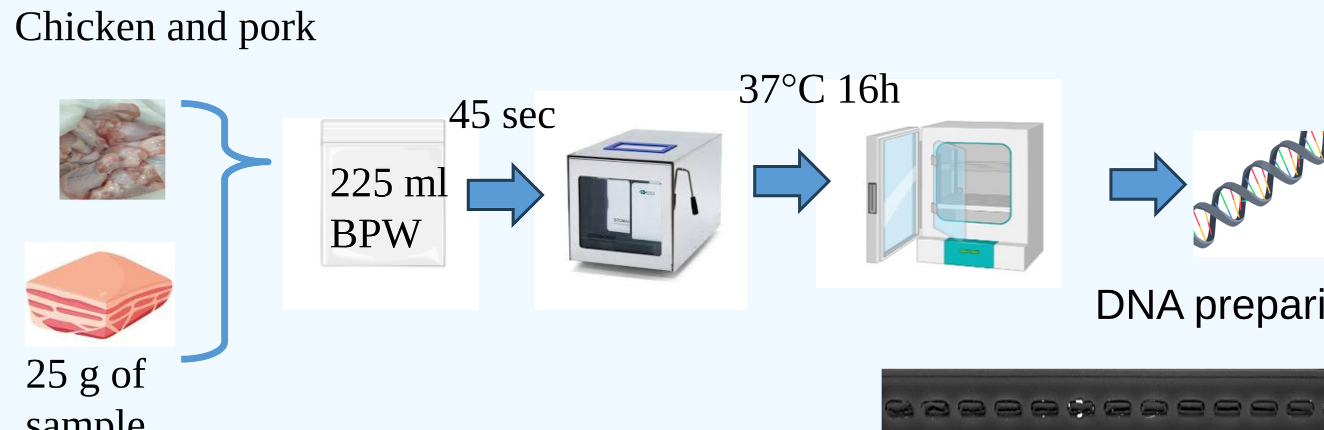
Materials and methods

1- Samples collection

Sample	Japan	Thailand	Total
Chicken	169	103	272
Pork	25	49	74
Total	194	152	346

2- Sample processing

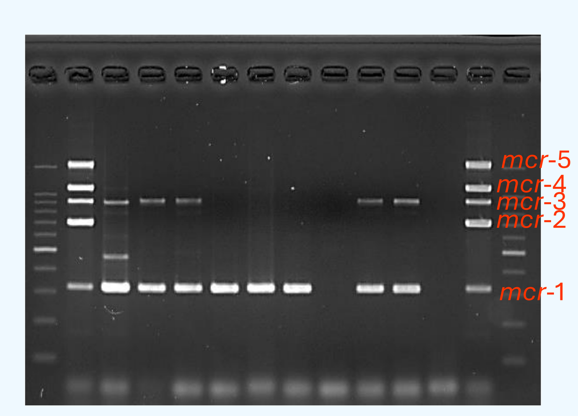
Chicken and pork



3- Detection of *mcr*-genes

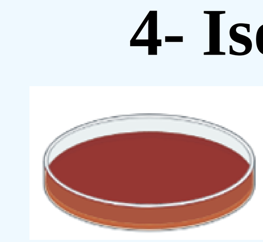
a) Multiplex PCR for *mcr* 1-5 genes (Rebelo et al., 2018)

b) Confirmation of *mcr*-gene by uniplex-PCR



LE 2% agarose, 1.5 µl PCR product / lane
ethidium bromide staining, visualized by UV

4- Isolation of *mcr*-carrying bacteria



MAC + CST (1µg/ml)

37 °C 16 h

Random selection of 3-5 colonies

5- Characterization of *mcr* positive isolates

- Biochemical identification
- Phylogenetic grouping
- MIC of colistin
- Antimicrobial resistance
- Plasmid profiling

Conclusions

•**In Japan,** *mcr* gene prevalence in retail meat declined after colistin banning and ***E. coli*** was the common carrier for *mcr* -1 gene

•**In Thailand,** a decline in *mcr* gene prevalence but due to a fluctuation in colistin banning *mcr*-1, *mcr*-3, and *mcr*1,3 genes were detected in *E. coli* and *K. pneumoniae*

•Bacteria carrying *mcr* genes were **Multidrug Resistance (MDR)**

•**Transferability of *mcr* genes was detected, indicating the possibility to** spread to other susceptible bacteria leading to acceleration the spread of colistin resistance