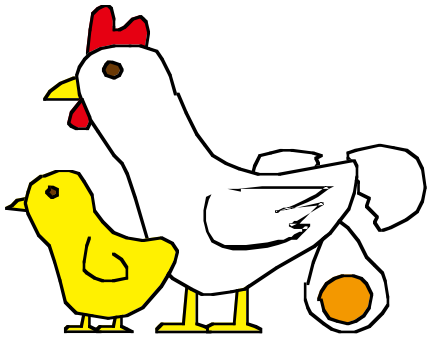
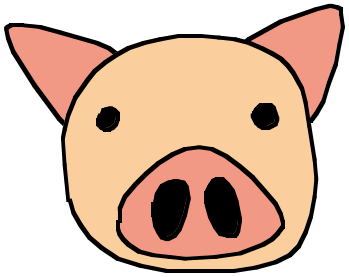
The Project for Determining the Outbreak Mechanisms and Development of a Surveillance Model for Multi-Drug Resistance Bacteria

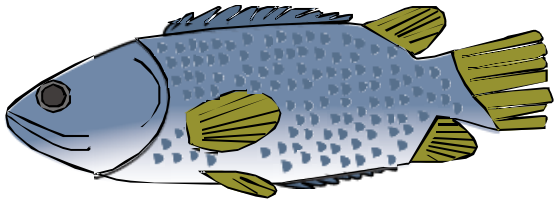
Prevalence of extended-spectrum-β-lactamase-producing *Escherichia coli* in foods in Vietnam

Nguyen Do Phuc

Institute of Public Health in Ho Chi Minh (IPH)







25 August, 2016

Introduction

- Extended-spectrum β-lactamase (ESBL) -producing *E. coli* poses a threat to public health care because of its ability to hydrolyze 3rd-generation cephalosporins.
- ESBL-producing *E. coli* have been rapidly expanding worldwide to date.
- Recently, several studies showed the significantly high prevalence of ESBL-producing *E. coli* in healthy individuales in Southeast Asia: China (65.0%), Thailand (58.2-69.3%) and Vietnam (51.0%), and that in healthy travelers from Netherlands to East and South Asia (67%, 72%, respectively). possibility of the potential transmission of ESBL producing *E. coli* from food-producing animal to human via Food chain (FC).
- However, the extent to which animal-based food contribute to a dissemination route for these bacteria to human in the FC has not yet been investgated in Southeast Asia.

Research purposes

- Determine the prevalence of ESBL-producing *E. coli* in chicken meat, pork, and fish/shrimp samples obtained in the food distribution system in Vietnam.

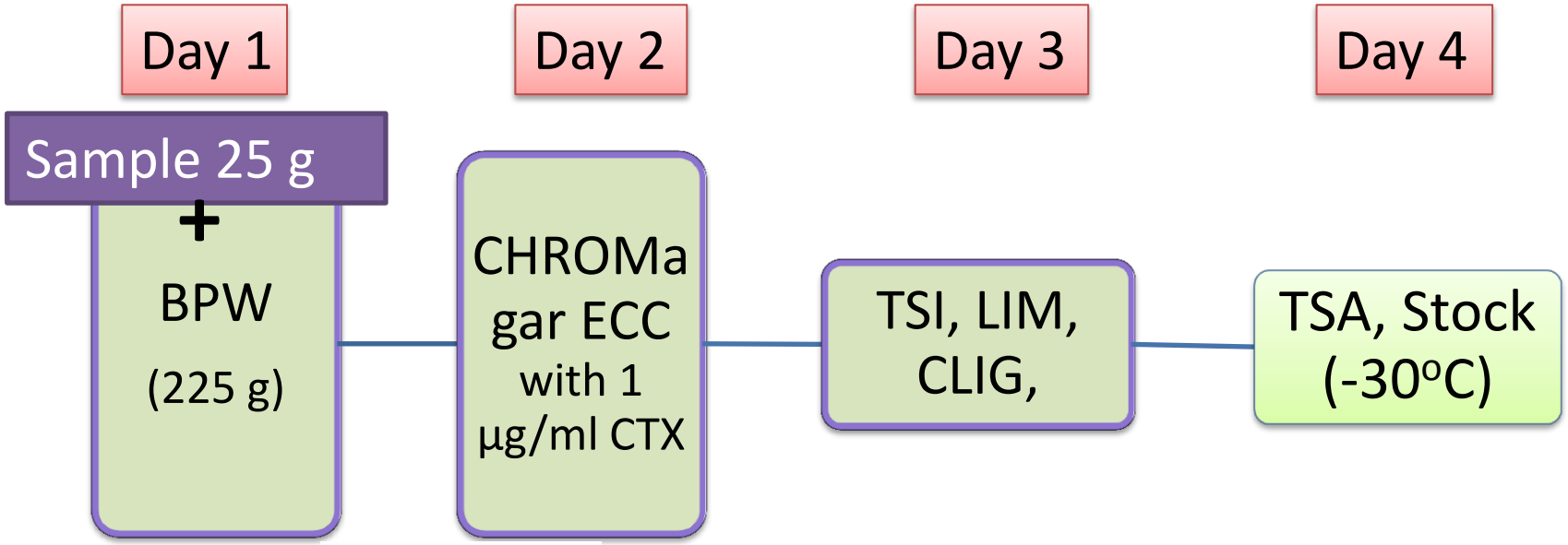
Specific Goals

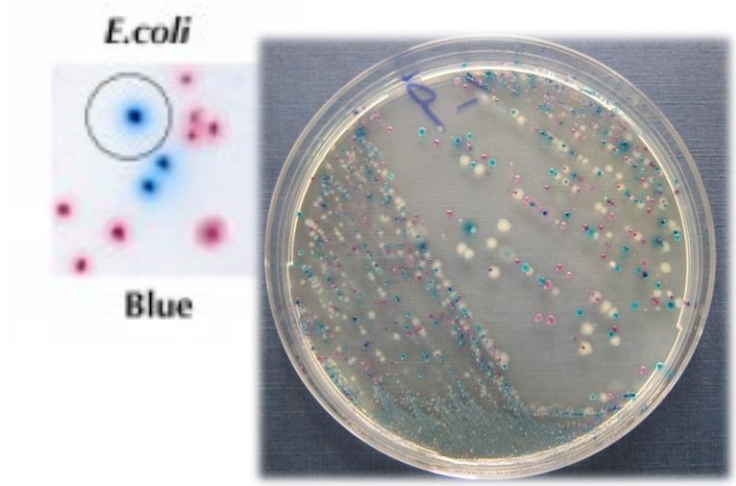
1. Prevalence of ESBL-producing *E. coli*

2. Genetic characterization of ESBL-producing *E. coli*

3. ESBL phenotyping and Antibiotic resistance of ESBL-producing E. coli isolates

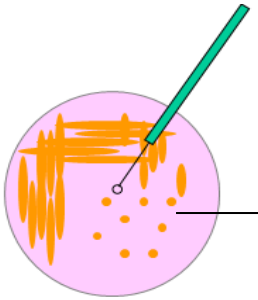
Method for Isolation of ESBL-*E.coli* in food



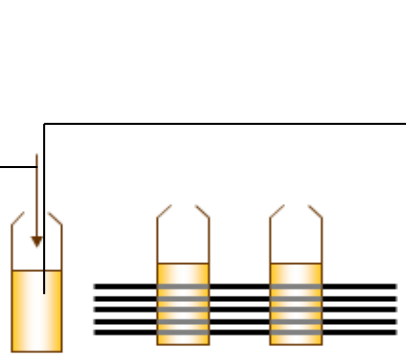


TSI: Triple Sugar Iron agar slants
LIM: Lysine Indole Motility medium
CLIG: Cellobiose Lactose Indole β-Glucuronidase agar slnts

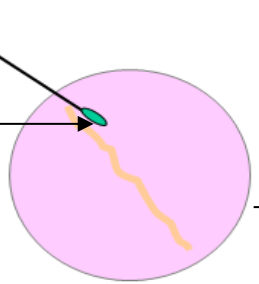
Disk diffusion method (CLSI method)



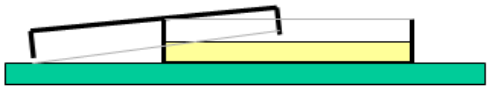
Bacteria incubated at 35°C/20h on TSA



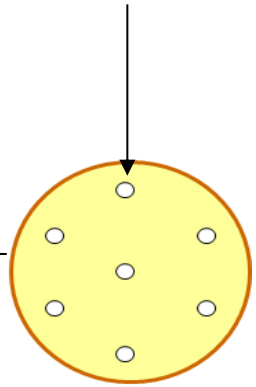
Dilution bacteria the same 0,5Mc Farland

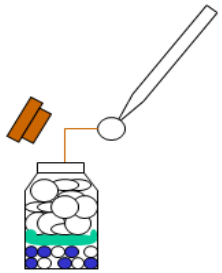


Treak bacteria suspension on surface of MH



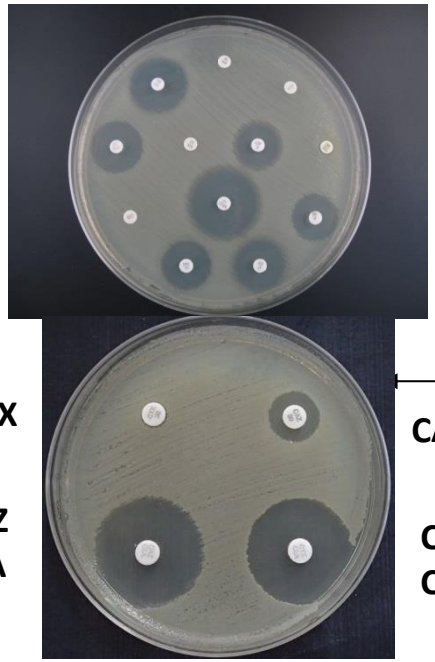
Let the dried surface 15'





Place the antibiotic disks

incubation



CTX

CAZ

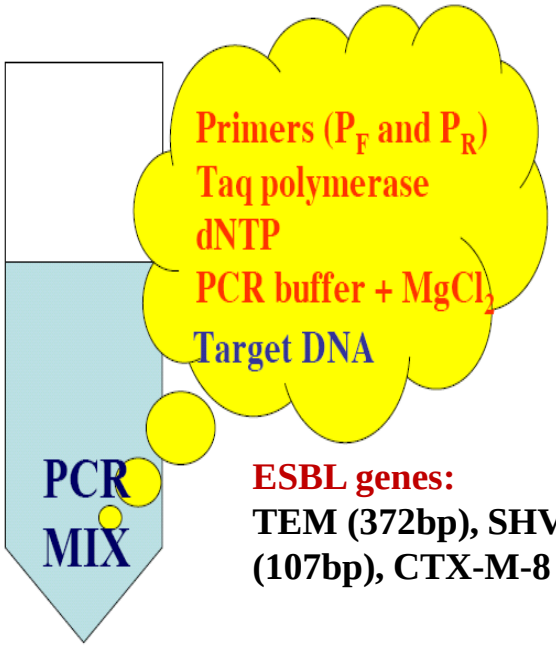
CAZ
CLA

CTX
CLA

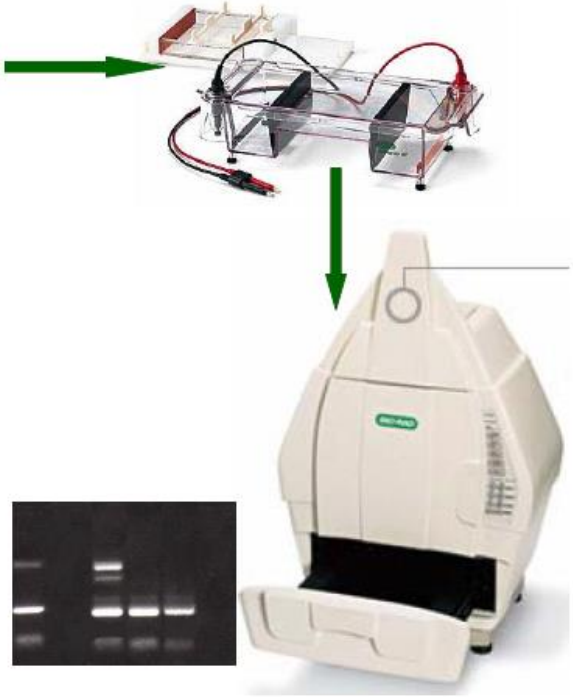
Read results

ESBL (+): differnce of zone diameter ≥ 5 mm between CTX/CLA and CTX or CAZ/CLA and CAZ

AmpC (+): R (Cefocitine)

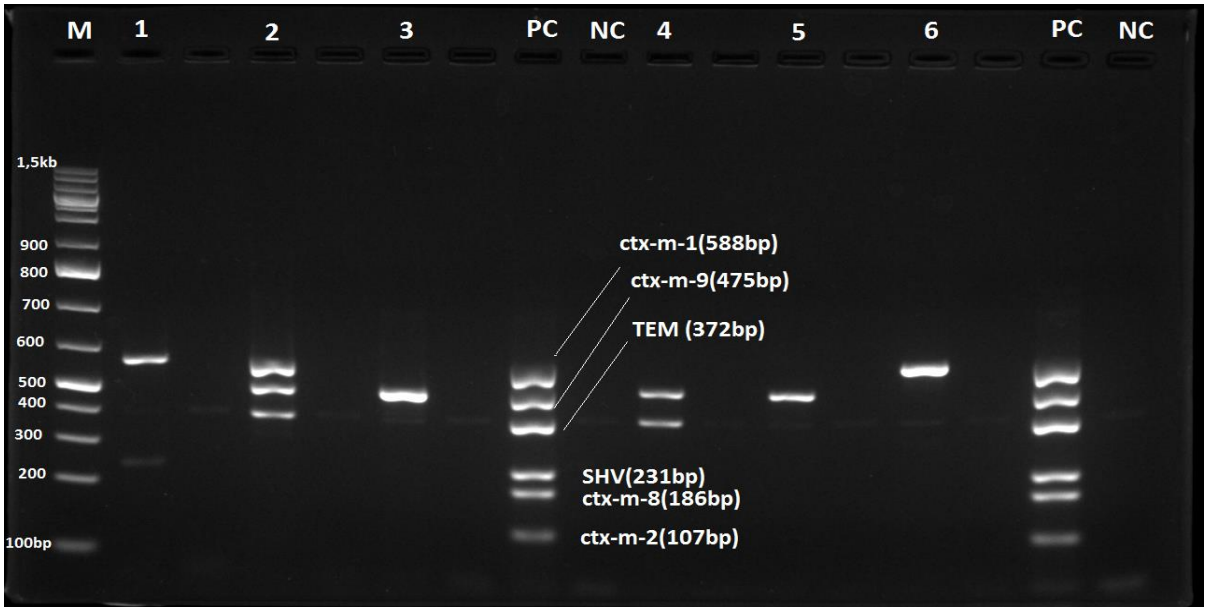


PCR
30X-40X
94°C/15s-1min
55-65°C/15s-1min
72°C/30s-3min



ESBL genes:
TEM (372bp), SHV (231bp), CTX-M-1 (588bp), CTX-M-2 (107bp), CTX-M-8 (186bp), CTX-M-9 (475bp).

Detection
- Size (etectrophoresis)
- Sequence (hybridization)



Multiplex-PCR for detection ***ESBL genes***

Results

1. Prevalence of ESBL-producing *E. coli*

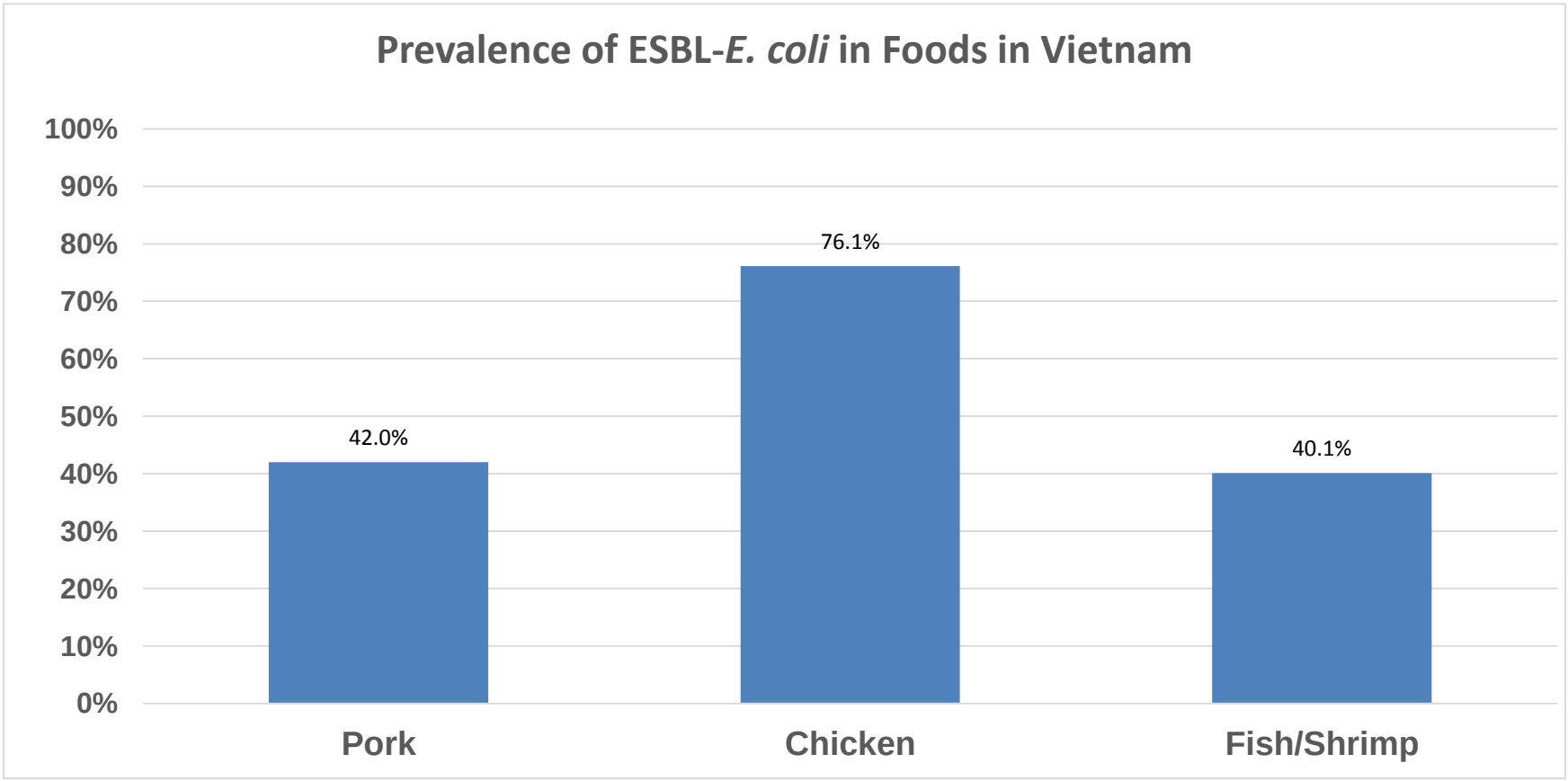


Fig 1a: The prevalence of ESBL-*E.coli* between food matrixs

Prevalence of ESBL-producing *E. coli* in food in some countries

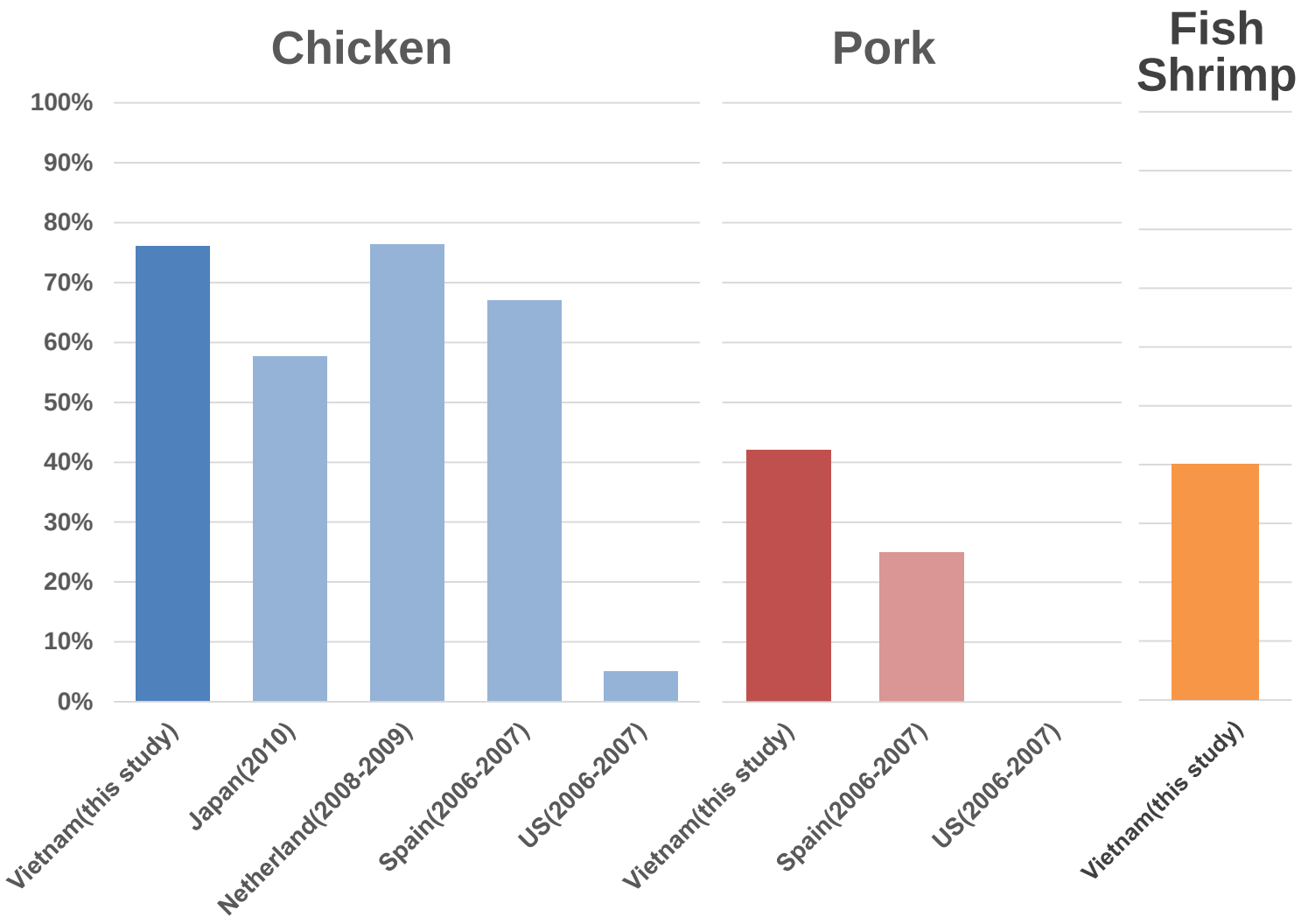


Fig 1b: The prevalence of ESBL-*E.coli* in some countries

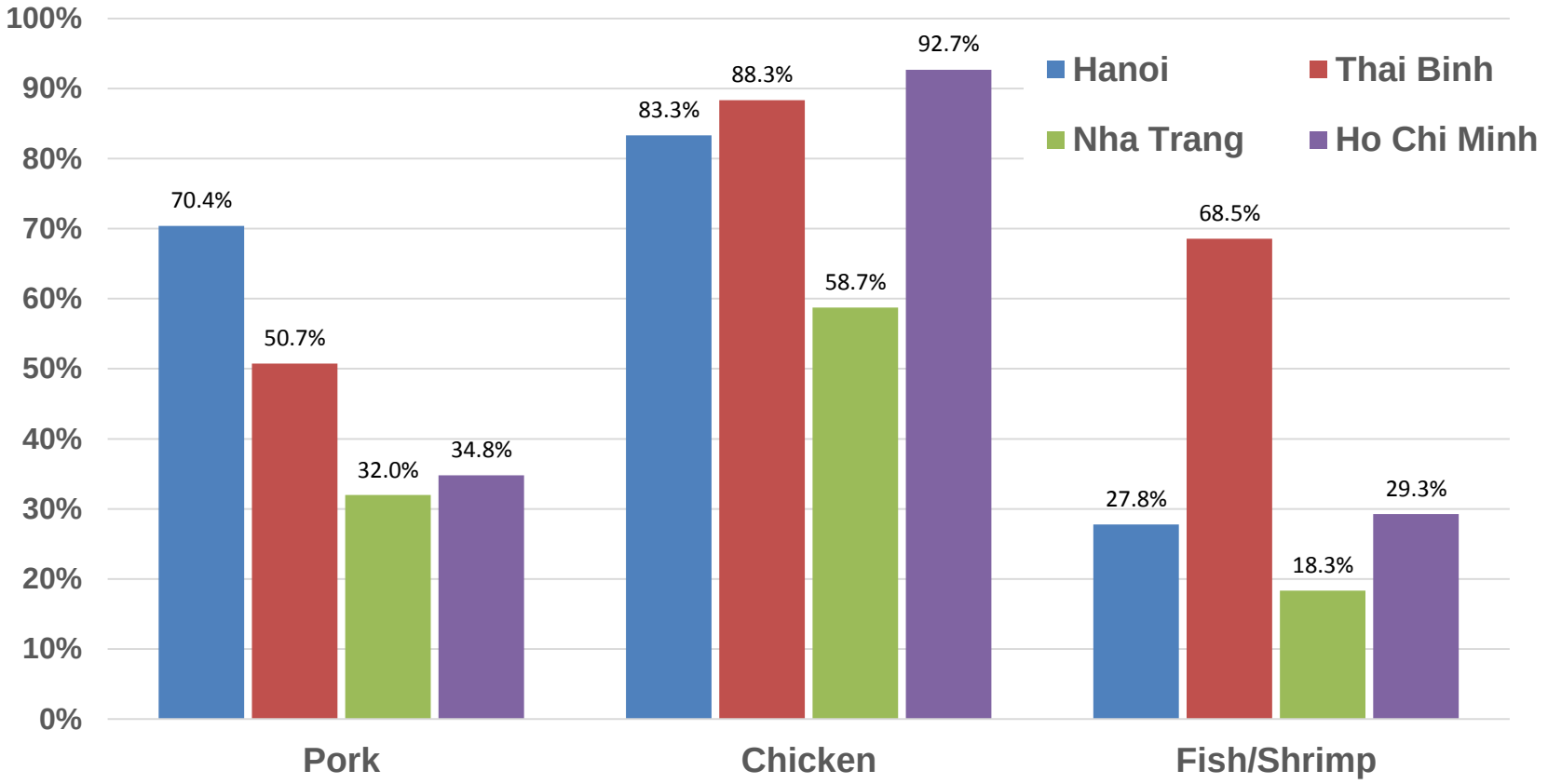


Fig 1b: The prevalence of ESBL-*E.coli* between sites in Viet Nam

2. Genetic Characterization of ESBL-producing E. coli

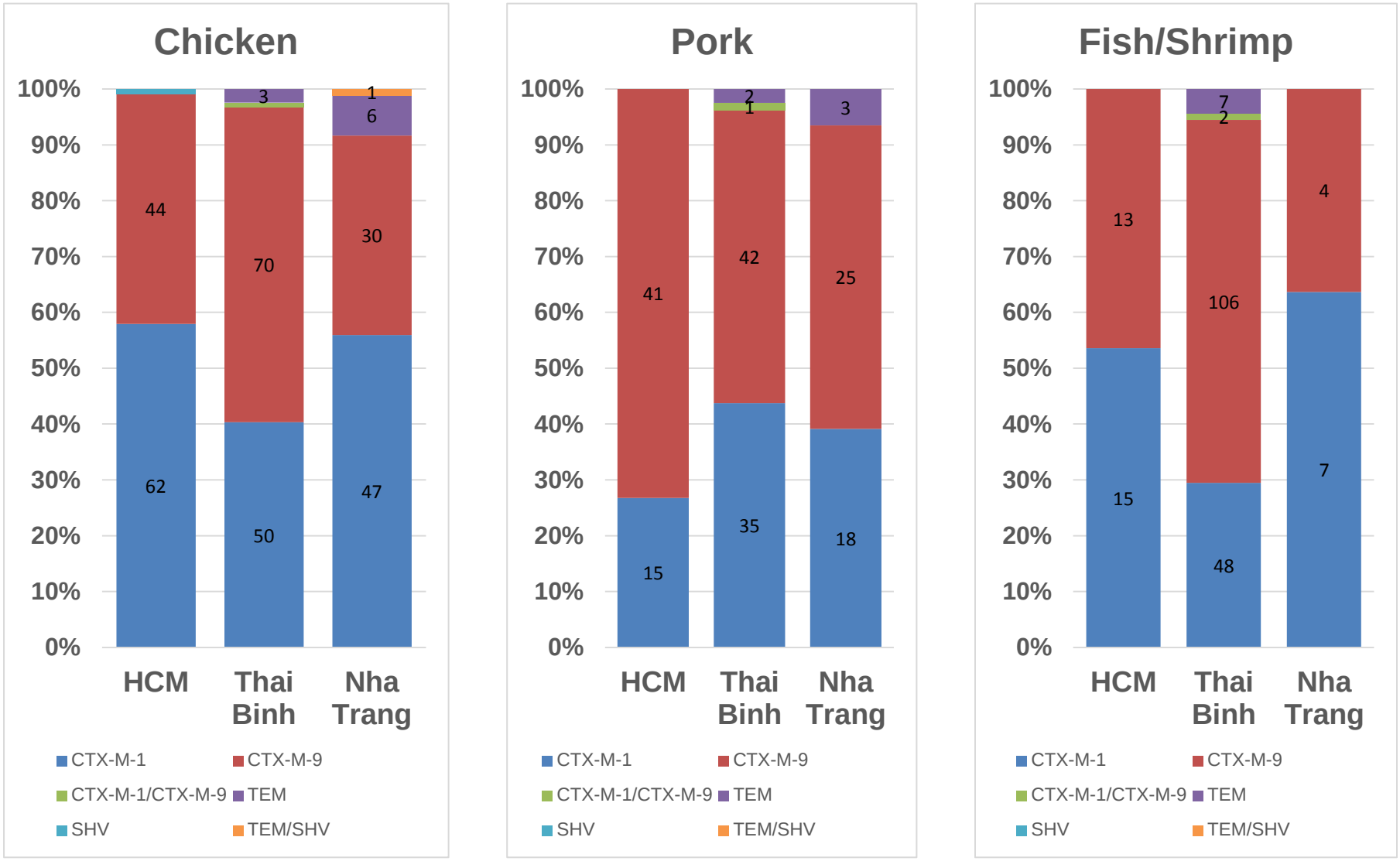


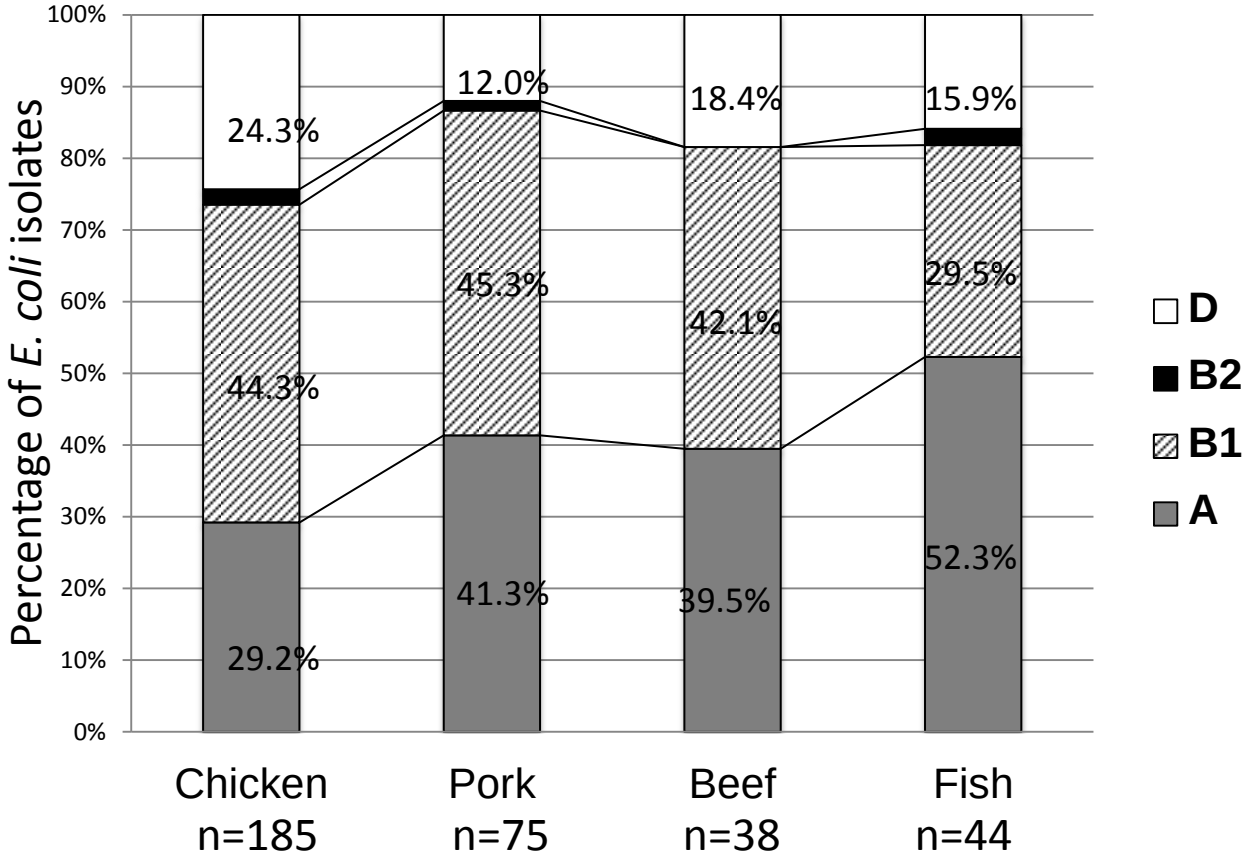
Fig. 2 Distribution of ß-lactamase genes in ESBL-producing *E. coli* isolates in food in Vietnam

Results of ESBL/pAmpC-producing *E. coli* isolated from 150 of 330 food samples corrected from HCM

Dissemination of extended-spectrum ß-lactamase- and AmpC ß-lactamase-producing *Escherichia coli* within the food distribution system of Ho Chi Minh City, Vietnam.

Nguyen Do Phuc et al., 2016.

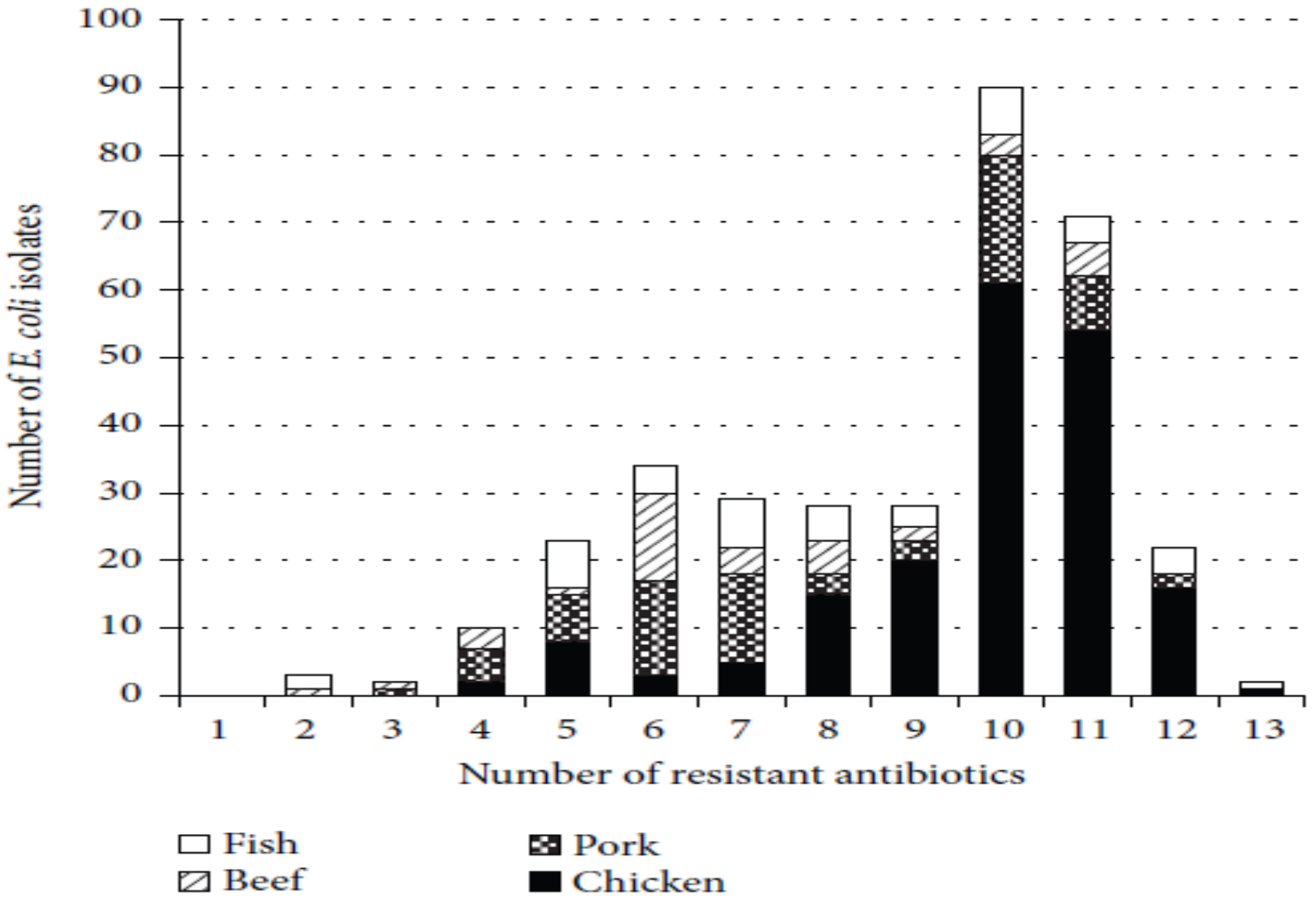
Fig. 3 Phylogenetic group distribution of ESBL-producing *E. coli* isolates from food (n=342) in HCM



Phylogenetic analysis showed that :

- Group B1 (42.1–45.3%) was the most prevalent among isolates from chicken, pork, and beef,
- whereas group A (52.3%) was predominant among isolates from fish/shrimp.
- Phylogenetic group B1 was most frequently detected among all isolates (42.4%), followed by groups A (36.0%) and D (19.9%). As expected, phylogenetic group B2 (1.8%) was detected at low frequency among isolates from all food types. Although the phylogenetic groups were not linked to definite CTX-M group or resistance patterns, 5 of the 6 isolates that belonged to clinically relevant B2 group were found to contain pAmpC genes

Fig 4. Multidrug-resistance distribution among food isolates of ESBL- producing *E. coli* (n=342) in HCM



Conclusion

This study showed:

1. A high prevalence of ESBL-producing *E. coli* isolates among chicken, pork, and fish/shrimp samples collected within the food distribution system in VN.

2. These findings demonstrate that animal based food products in VN represent a major reservoir of ESBL-producing *E. coli.*

3. Multidrug-resistant *E. coli* isolates: resistant to at least 6 to 10 antibiotic agents

THANK YOU FOR YOUR ATTENTION