A multicenter study examining different culturing methods to detect carbapenemase-producing *Enterobacteriaceae*

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We evaluated the performance of six selective agar plates for the detection of carbapenemase-producing *Enterobacteriaceae* (CPE) from samples of animal origin using a multicenter study.

METHODS

A pre-ring trial was performed among 3 of 11 laboratories to reduce the number of bacteria-gene combinations, incubation temperatures and selective agar plates to be included in the final ring trial. The final ring trial contained eight samples, four turkey meat and four pig caeca samples, spiked with different bacteria-gene combinations. Three samples from each matrix were spiked with bacteria from either one of six CPE: *Escherichia coli* bla_{OXA-48}, *E. coli* bla_{IMP}, *E. coli* bla_{VIM-1}, *Klebsiella pneumoniae* bla_{OXA-48}, *K. pneumoniae* bla_{KPC-2} and *Salmonella* Kentucky bla_{NDM-1}. The method is outlined in Fig 1 and the selective agar plates in Fig 2.

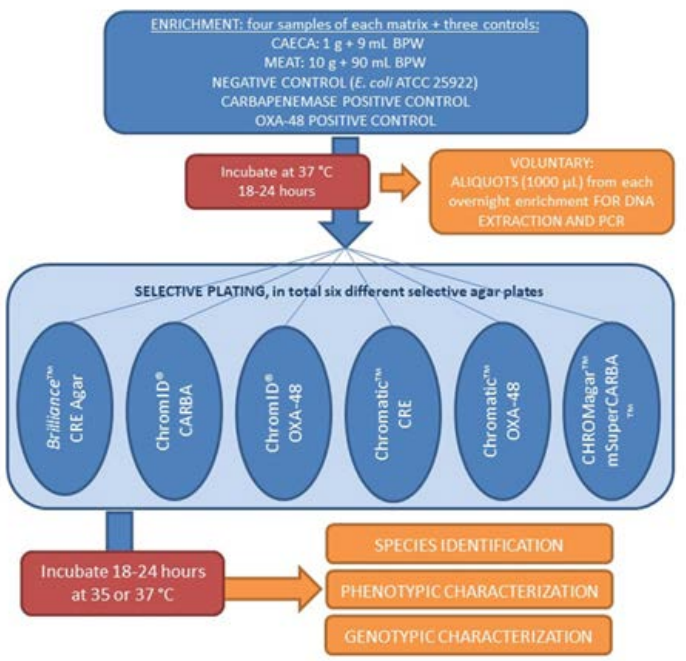

Fig 1 Illustration of the outline of the multicentre study.

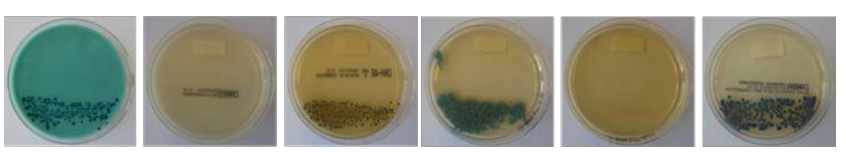

Fig 2 The six selective agar plates investigated in the study inoculated with K. pneumoniae bla_{OXA-48}. *From left: Brilliance™ CRE Agar, CHROMID® CARBA, CHROMID® OXA-48, Chromatic™ CRE, Chromatic™ OXA-48 and CHROMagar™ mSuperCARBA™ (photo by RIVM)*

RESULTS

The performance of each plate was evaluated by scoring the detection of the correct a) bacterial species and b) bacterial species AND genotype.

Misunderstandings regarding the performance led to exclusion of results from 3 and 4 labs regarding species identifications and genotyping, respectively. Consequently, only 8 of 11 laboratories were evaluated in the species identification and 7 of 11 in the species identification and genotyping, shown in Fig 3.

None of the laboratories detected any CPE in the two blank samples from meat (M-1) and caeca (C-1). Meat sample spiked with *S.* Kentucky bla_{NDM-1} and caeca sample spiked with *E. coli* bla_{VIM-1} were omitted from the evaluation due to contamination and problematic genotype, respectively.

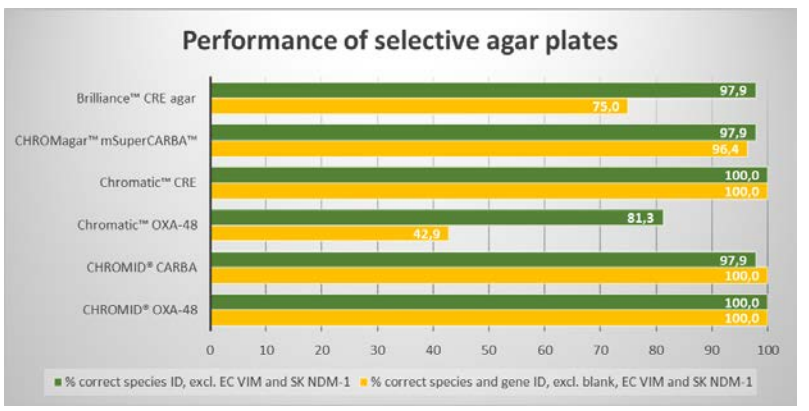

Fig 3 Illustration shows the results in percent of ***correct species identified*** *on each selective agar plate reported from 8 of 11 laboratories in the dark green bars, and percent* ***correctly identified species AND gene*** *reported from 7 of 11 laboratories in the yellow bars.*

Three selective agar plates performed 100% in both bacterial and resistance gene identification shown in yellow bars in Fig 3; CHROMID® OXA-48, CHROMID® CARBA and Chromatic™ CRE. The second best selective agar plate was the CHROMagar™ mSuperCARBA™ (96.4%). The poorest performing medium was Chromatic™ OXA-48, where even the Chromatic™ CRE performed better at detecting the two bla_{OXA-48} strains included.

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