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Paper Poster Session V

Assaying and explaining multidrug resistance in Gram-negative bacteria

The effect of microbiological methods on the measured prevalence of antimicrobial-resistant Enterobacteriaceae in a national survey of Israeli cattle, 2013

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Objectives: National programs for surveillance of antimicrobial resistance among Enterobacteriaceae (ARE) in livestock exist in several European countries. The proportion of Enterobacteriaceae that are resistant is estimated using a non-selective method: *E. coli* isolates are randomly picked from surveillance cultures, and tested for resistance. Our objectives were: a) to establish a selective method for surveillance of gentamicin-resistant (GNRE), ciprofloxacin-resistant (QRE) and ESBL-producing Enterobacteriaceae (ESBLPE) in livestock; b) to measure the prevalence of these ARE in a national survey of cattle and c) to compare prevalence as measured by the non-selective and selective methods.

Methods: This was a point-prevalence study conducted from July to October 2013 in Israel. Stool samples from individual cows were collected from cowsheds of all breed types. Samples were inoculated into enrichment broth and incubated overnight. For the selective surveillance method (SSM), broth aliquots were sub-cultured onto the following selective media: MacConkey agar with either gentamicin 5 mg/L or ciprofloxacin 10 mg/L for GNRE and QRE, respectively; CHROMAgar ESBL™ plates for ESBLPE; CHROMAgar VRE™ plates for vancomycin-resistant enterococci (VRE). The non-selective surveillance method (NSSM) was applied in a subset of samples: broth aliquots were sub-cultured onto MacConkey agar and *E. coli* isolates were randomly selected for testing. Identification was done by the ENTEROTEST™ kit and antimicrobial susceptibility testing was done by disk diffusion.

Results: The study included 1226 cows from 40 farms. Using SSM, GNRE, QRE and ESBLPE were identified in 840 (68.5%), 609 (49.7%) and 291 (23.7%) samples, respectively. VRE were not detected. The two methods were compared in a subset of 128 samples. Using SSM, GNRE QRE and ESBLPE were identified in 40 samples (31.2%) each. Using NSSM, GNRE QRE and ESBLPE were identified in 3 (2.3%), 6 (4.6%) and 1 (0.7%) samples, respectively. Accordingly, compared to NSSM,SSM increased the measured prevalence between 6.6 fold (QRE) and 40 fold (ESBLPE). Using NSSM, non-susceptibility to other agents was high: tetracycline-70 isolates (54.6%), streptomycin-33 (25.7%), trimethoprim-sulfamethoxazole-32 (25%), chloramphenicol-11 (8.5%) and cefazolin-7 (5.4%); non-susceptibility to ertapenem and colistin was not detected.

Conclusions: Our study revealed a high prevalence of GNRE, QRE and ESBLPE carriage in beef cattle. Although more cumbersome, use of SSM is crucial for accurate measurement and should be used for AMR surveillance of antimicrobials with epidemiologic importance.