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Quality-assessment of *E. coli* diagnostics in Danish veterinary clinics

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SUMMARY

Vaccines can reduce the severity of mastitis caused by among others *E. coli*. However, vaccine success relies on proper diagnostics. This study examines the accuracy of *E. coli*-diagnostics in veterinary clinics in Denmark. The results show a need for increased diagnostic accuracy in mastitis control.

INTRODUCTION

Escherichia coli is one of the most frequently isolated pathogens in clinical bovine mastitis (1, 2). Vaccines such as Startvac improve the defence of cows against mastitis. However, proper diagnostics prior to the vaccine programme is a precondition for vaccine success (3, 4). Accordingly, failure of the vaccine might reflect inaccurate diagnostics. This study examines the accuracy of *E. coli*-diagnostics in veterinary practices in Denmark.

MATERIALS & METHODS

The study examined all milk samples from clinical mastitis diagnosed as *E. coli*, and all milk samples from clinical mastitis which caused diagnostic difficulties in 5 veterinary clinics. The milk samples were collected from late May until 1st of October 2018 and dispatched to the laboratory of Centre for Diagnostics, Technical University of Denmark (CfD) – a part of the Danish Udder Health Center. All milk samples were kept and shipped frozen and routinely processed for microbiological examination at CfD. Contaminated samples (≥ 2 pathogen-types) were omitted from the study. In total, 62 presumed *E. coli* milk samples and 256 milk samples of diagnostic difficulties were included in the study. All pathogens were analysed with matrix-assisted laser desorption/ionization- time of flight (Maldi-tof).

RESULTS

Out of the 62 presumed *E. coli* milk samples 56 were confirmed by Maldi-tof (diagnostic accuracy of veterinary clinic diagnosis = 90 %). Out of 265 milk

samples of diagnostic difficulties, 21 were confirmed as *E. coli* by Maldi-tof (rate of false negative *E. coli* = 8 %). Both false positive and false negative *E. coli* were mainly diagnosis as Gram-positives in the veterinary clinics.

DISCUSSION

This study focuses on the accuracy of *E. coli* diagnoses made in veterinary clinics as they lead to vaccination against *E. coli* and/or false suspicion of lack of vaccine-effect. Considering the importance and omnipresence of *E. coli* the present results are worrisome in two regards: 1) 10 % of the coli-diagnoses are false positives. False positives might lead to improper use of antibiotics and lack of vaccination/misplaced criticism of the vaccine. 2) 8 % of milk samples that cause diagnostic difficulties contain *E. coli*, despite that *E. coli* is not considered easily overlooked. Lack of proper Gram-status in particular points to insufficient diagnostics. These results indicate that diagnostic inaccuracy on *E. coli* might explain lack of vaccine success.

CONCLUSIONS

To improve veterinary diagnostics we need to evaluate the diagnostic quality of major pathogens such as *E. coli*. The Danish Udder Health Centre is currently establishing a large-scale study on the prevalence of mastitis-pathogens in Denmark and the associated diagnostic accuracies.

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