



Autogenous vaccination reduces antimicrobial use and mortality in a herd facing severe exudative epidermitis outbreaks in weaned pigs

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Introduction

Staphylococcus hyicus is recognised as the primary pathogen that causes exudative epidermitis (EE) – one of the most common skin diseases encountered by pigs. The most important factor in the pathogenesis of EE in pigs is the presence of virulent bacterial strains that express exfoliative toxins known as ExhA, ExhB, ExhC, ExhD, SHETA and SHETB.

A common finding in herds affected by EE outbreaks is the presence of *S hyicus* isolates that exhibit broad spectrum resistance to antimicrobials. The presence of these isolates together with the fact that EE can cause morbidity of up to 90 per cent often complicates the treatment of affected pigs.

A current goal of the pig industry is to reduce antimicrobial use. Therefore, there is an urgent need to investigate the efficacy of alternative solutions for the control of EE under field conditions. Given that no commercial vaccine against *S hyicus* infection is available, autogenous vaccines might be able to fill this gap.

The objective of this study was to investigate the efficacy of vaccinating gestating sows of a breeding herd with an autogenous vaccine against *S hyicus* to control EE in the offspring of those sows.

Approach

The study was conducted in a commercial Belgian breeding herd with 1000 sows, where severe and recurrent outbreaks of EE have been reported since June 2014. Outbreaks occurred only during the nursery period and no clinical problems occurred during the suckling period, before or during the study.

From June 2014 until October 2015, morbidity and mortality remained above 20 and 6 per cent, respectively. In

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This is a summary of a paper that is published in full at veterinaryrecord.bvapublications.com

Published Online First 29 March 2018

Veterinary Record (2018) 182, 744. Cite as doi: 10.1136/vr.104720

KEY FINDINGS

- Autogenous vaccination of sows with a vaccine based on *Staphylococcus hyicus* isolates positive for the exfoliative toxin *exhB* gene reduced metaphylactic treatment with antimicrobials as well as morbidity and mortality in nursery pigs compared to pigs from unvaccinated sow batches.

October 2015, bacteriological culture and antimicrobial susceptibility testing (AST) were performed for the first time. Skin swabs from 13 affected and non-treated nursery pigs were collected. *S hyicus* was isolated from nine of the 13 pigs sampled. Five of these *S hyicus* isolates were submitted for typing and were all found to be positive for the *exhB* gene. Then, three of these isolates were used to produce a formaldehyde-inactivated autogenous vaccine against *S hyicus*. Additionally, following the AST results only injectable ceftiofur was used for the metaphylactic treatment of the affected nursery pigs. The prophylactic administration of antimicrobials during the nursery period was ceased.

To test the vaccine, four consecutive farrowing batches of sows were included in the study. Vaccination of the batches was applied in an alternating way, so that each unvaccinated batch was followed by a vaccinated batch. In the vaccinated batches, all gilts and sows were vaccinated twice, at five and two weeks before farrowing. Vaccination efficacy was primarily determined by comparing the levels of metaphylactic antimicrobial use during the nursery period, and the morbidity and mortality data between the pigs of the unvaccinated and vaccinated sows. Weight gain and average daily weight gain (ADG) of the nursery pigs were secondary parameters.

Results

The total amount of antimicrobials used metaphylactically against EE in pigs among the unvaccinated and vaccinated

farrowing batches was 88,550 and 39,600 mg, respectively. The used daily dose pig to animal daily dose pig ratio for the pigs originating from the unvaccinated and vaccinated sow batches were 1.79 and 1.31, respectively (a ratio of 0.8 to 1.2 is indicative of correct dosing). Nursery morbidity and mortality were: unvaccinated=14.36, vaccinated=6.50, $P=0.008$; and unvaccinated=5.02; vaccinated=2.59, $P=0.000$, respectively. Over the entire nursery period, the weight gain and ADG were (unvaccinated=18.99 kg; vaccinated=19.66 kg, $P=0.628$) and (unvaccinated=354 g/kg/day; vaccinated=364 g/kg/day, $P=0.131$), respectively.

Skin swabs were collected from necropsied as well as untreated live pigs with clinical signs of EE, originating from both the unvaccinated and vaccinated sow batches. Typing in eight of 16 *S hyicus* isolates obtained revealed that two of eight, one of eight and four of eight isolates were positive for the exfoliative toxin-encoding genes *exhA*, *exhB* and *exhC*, respectively.

Interpretation

The results suggest that autogenous vaccination of the sows can lead to reduced antimicrobial use, morbidity and mortality during EE outbreaks. However, the vaccine was not able to fully protect against EE in the pigs of the vaccinated sow batches or fully prevent death. The different *S hyicus* isolates obtained during the study were found to be positive for the exfoliative toxin-encoding genes *exhA*, *exhB* and *exhC*. This shows the difficulty of keeping autogenous vaccines updated according to the different *S hyicus* strains circulating in different time periods, which can influence the efficacy of the vaccination.

Significance of findings

The results of the study suggest that autogenous vaccination could serve as a way to control severe EE outbreaks without using antimicrobials. Nevertheless, the use of autogenous vaccines still needs to be optimised, thus more herds facing recurrent EE outbreaks need to be investigated.