Transmission of MRSA ST398 between pigs during transport from farm to a slaughterhouse and during time spent in the holding area at the slaughterhouse

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Abstract

A distinct clone of MRSA, Multi Locus Sequence Type 398, was found in pigs and people in contact with pigs recently. In The Netherlands, a discrepancy is found between prevalences for MRSA ST398 in individual pigs on slaughterhouses and individual pigs on farms. Four batches of 30 slaughter pigs from 4 MRSA negative farms were selected and sampled before and after transport to the slaughterhouse and after resting time in the slaughterhouse to evaluate the possibility of pigs getting MRSA positive during this short-time period. Additional samples were taken from the environment, i.e. transport lorry and lairage. Pigs that stayed in a contaminated environment, either contaminated lorry or lairage or both, had a higher chance of becoming MRSA positive than pigs that stayed in areas that tested negative for MRSA. It was concluded that transmission of MRSA ST398 takes place in the short-time period of transport to the slaughterhouse and during time spent in lairages.

Introduction

A distinct clone of methicillin resistant Staphylococcus aureus (MRSA ST398) was found in pigs and people in contact with pigs [1]. A study on Dutch slaughterhouses tested 81% of farms and 39% of pigs positive for MRSA ST398 [2]. Another study on Dutch pig farms reported prevalences of 39% at farm level and 11% at pig level [3]. In The Netherlands, pigs from different farms are transported together in the same lorry and at the slaughterhouse pigs originating from many different farms are present at the same time. So (in)direct contact between pigs from different origin is feasible. For Salmonella spp. it is reported that short-term exposure to a contaminated environment, such as transport lorries and lairages in slaughterhouses, is sufficient to result in Salmonella positive pigs [4, 5]. The discrepancy between prevalences for MRSA ST398 found on slaughterhouses and on farms might be explained by the same causative process. The objective of this study was to evaluate the possibility of negative tested pigs becoming MRSA ST398 positive during transport from farm to slaughterhouse and/or during their stay in lairages.

Material and Methods

Four batches of 30 slaughter pigs, from 4 MRSA negative farms, were selected. Pigs were delivered to 3 different commercial slaughterhouses. A nasal swab was taken from the pigs just before loading for transport, at arrival at the slaughterhouse and just after stunning. Transport and resting time varied from 4 to 16 hours. Transport lorries and lairages were sampled with 3-5 wipes (Sodibox) to test for MRSA ST398.

All samples (swabs and wipes) were analyzed individually. Samples were first enriched in Mueller Hinton Broth with 6.5% NaCl. After incubation for 18h at 37°C 1 ml of the Mueller Hinton Broth was put into 9 ml Phenol Red Mannitol Broth with aztreonam (75 mg/L) and ceftizoxime (4 mg/L). After another 18h incubation time at 37°C a loopful was streaked out onto sheep blood agar and MRSA screen
agar (Oxoid). Suspected colonies were confirmed by multiplex PCR for the S. aureus specific-gene [6], the meca gene [7] and the Panton-Valentine-Leucocidin toxin genes [8]. Spa types [9] and antimicrobial susceptibilities are to be determined.

Results

Results show that all pigs tested negative at the moment of loading before transport. In 2 out of 4 batches, several animals were tested positive at the moment of arrival at the slaughterhouse; in these batches the transport lorries were tested positive as well. Environmental wipes of 3 out of 4 lairages tested MRSA positive as well. Finally, in all batches a number of animals was tested positive at stunning. Preliminary analysis showed that pigs that stayed either in a MRSA contaminated lorry or lairage had a higher chance of being MRSA positive than pigs that stayed in a MRSA negative environment.

Data collection and analysis will be completed soon and presented at the conference.

Discussion

From these preliminary results it can be concluded that transmission of MRSA takes place in the short-term period of transport to the slaughterhouse and during the time spent in lairages. This might be an explanation for the discrepancy found in The Netherlands between prevalences for MRSA ST398 found on slaughterhouses and on farms. The change of MRSA-status of the individual pigs might be explained by (1) exposure to a contaminated environment, i.e. lorry and/or lairage, (2) secretion of MRSA by latent carriers due to stress caused by transport and/or (3) transmission of MRSA between pigs from different farms.

The results implicate a possible health hazard for slaughterhouse personnel, as contact with MRSA positive pigs is an indicated risk factor for human MRSA carriage [10]. The (in)direct contact of pigs from various farms on transport lorries and in lairage facilities seems to be an important factor for the dissemination of MRSA between pigs and with that cross-contamination of MRSA in the slaughterhouse. The presence of MRSA on raw meat products, including pork, was reported recently [11], and might imply a possible health hazard for people handling pork meat, including consumers. Further studies need to point out critical control points.

Acknowledgements

We thank the farmers, the lorry drivers and the slaughterhouse personnel for their kind cooperation. Lab workers of the Animal Health Service are acknowledged for their contributions to the laboratory analysis.

The study was part of a MRSA research project funded by the Dutch Ministry of Agriculture, Nature and Food Quality.

References


Safe pork 2009 - Québec city, Québec, Canada


