

Nationwide survey of methicillin-resistant *Staphylococcus aureus* harbouring *mecA*_{LGA251} (*mecC*) reveals a reservoir in ruminants



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Objective

To study the epidemiology of isolates harbouring the recently discovered *mecA*_{LGA251} (or *mecC*) in a MRSA low prevalence country

Methods

Retrospective and prospective search for phenotypic positive but genotypic negative MRSA was performed. Collections screened retrospectively included all human MRSA cases in Denmark since 1988 (n=7,200) as well as all Danish *S. aureus* bacteremia cases since 1975 (n=38,000). Isolates previously tested resistant to methicillin, oxacillin or ceftiofloxacin and negative for the *mecA* gene were tested for the presence of the recently discovered *mecA* gene variant, *mecA*_{LGA251} (or *mecC*) using a multiplex PCR detecting both *mecA*, *mecC*, *lukF-PV* and *spa*¹. The genetic background of all *mecC* positive isolates was determined by *spa* typing. Prospective screening for *mecC* was introduced as routine in the National Reference Laboratory at Statens Serum Institut by August 2011. Clinical data was obtained from 22 patients by interviews and review of discharge summaries in the Zealand region. Two of the patients had contact to live animals (cow, horse, dog and sheep) and samples were taken from these animals and analysed for the presence of *S. aureus*.

Results

In total, 112 persons infected or carrying *mecC* positive MRSA. Two *mecC* positive isolates were from 1975 and 1992, respectively. All other Danish isolates were derived from the period between 2003 and 2011, annual incidence: n=3, 7, 11, 12, 6, 5, 9, 21 and 36, respectively and constituting 2-3 % of the total number of MRSA in the period (Figure 1). Isolates were with few exceptions only resistant to beta-lactams and could be grouped in two genetic lineages CC130 (n=98) and CC1943 (n=14). Isolates containing *mecC* were predominantly found in more rural areas outside the major cities (Figure 2). Among 22 cases from Zealand, skin and soft tissue infection (n=11), postoperative infections (n=4), bacteraemia and bacteriuria (both n=2) and three symptom free carriers were found. 4/22 cases had a suggestive contact with animals: being butchers (n=2) or living on a farm with animals. Sampling of cows and sheeps at the farms revealed similar strains (t843, *mecC*+) as isolated from the owners.

Annual MRSA cases in Denmark

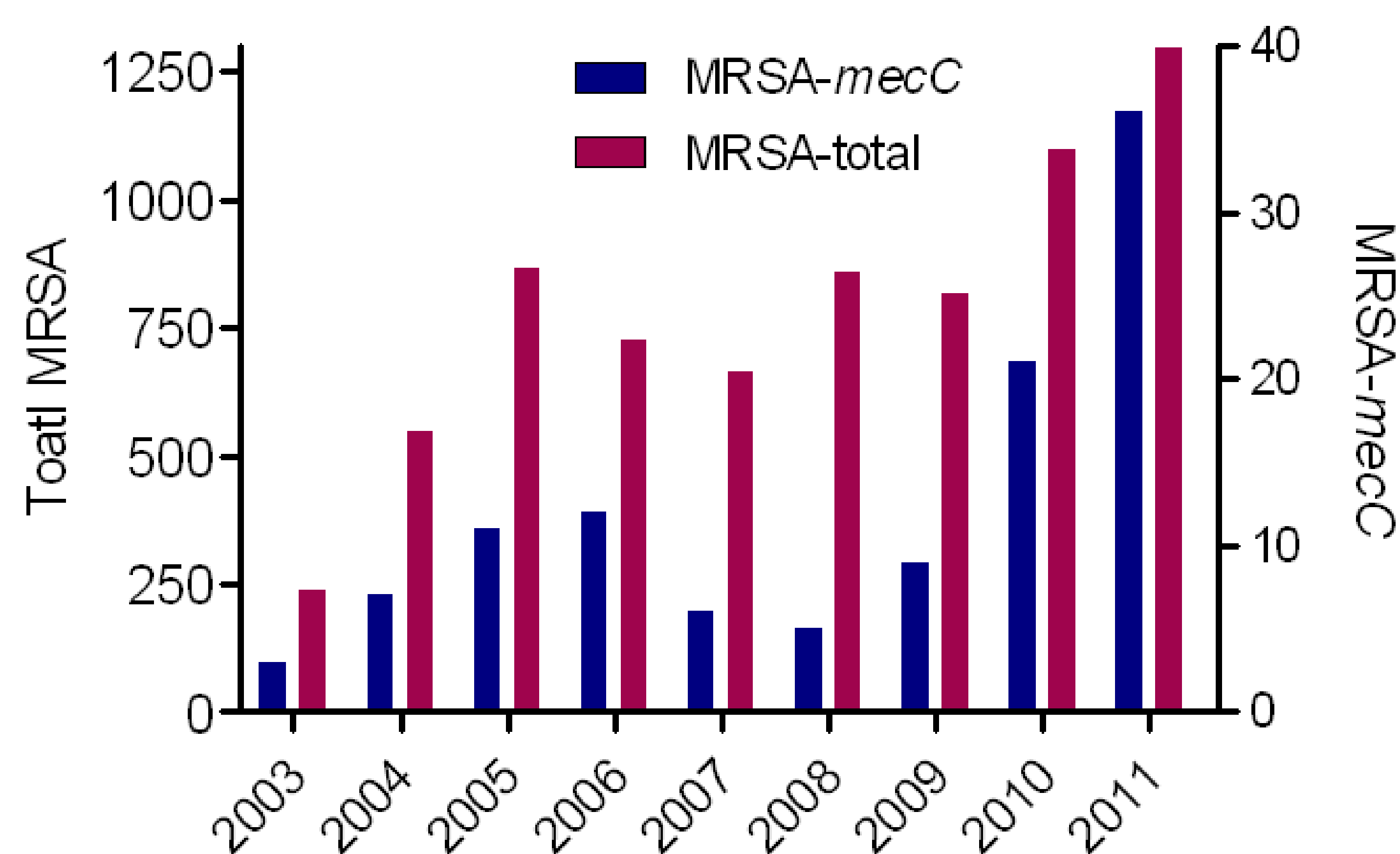


Figure 1. Number of total MRSA and *mecA*_{LGA251} harbouring isolates /year

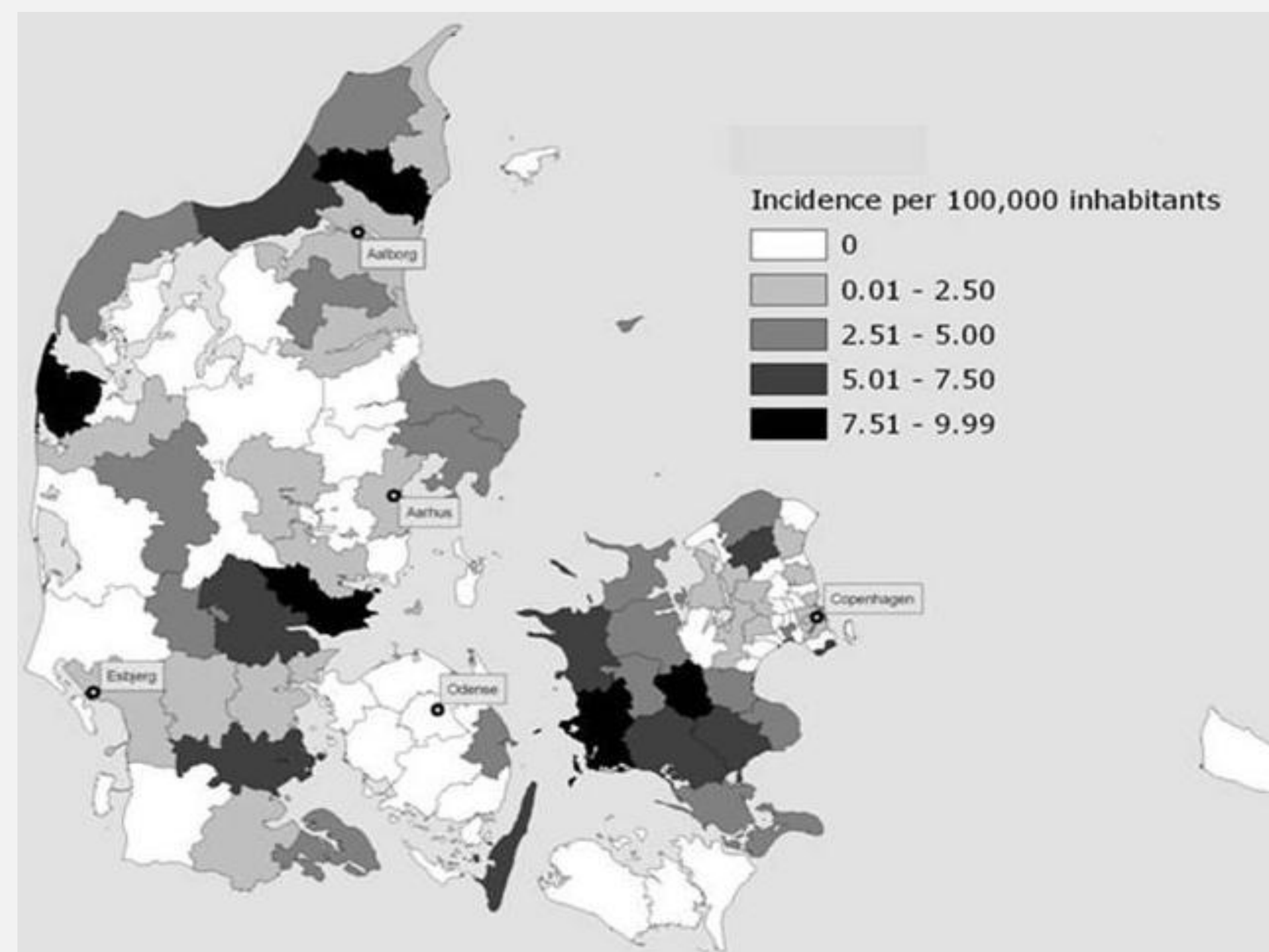


Figure 2. Accumulated Incidence of MRSA- *mecC* cases found in Danish municipalities (2003-11).

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Conclusions

Since 2003 the number of isolates containing *mecC* has increased and now constitutes 3.9 % of all new MRSA cases in Denmark. The finding of *mecC* positive isolates in ruminants confirm livestock animals as a reservoir for *mecC* MRSA and indicates that transmission between animal and persons may occur.

Reference

1) Rapid detection, differentiation and typing of methicillin-resistant *Staphylococcus aureus* harbouring either *mecA* or the new *mecA* homologue *mecA*_{LGA251}
M. Stegger, P. S. Andersen, A. Kearns, B. Pichon, M. A. Holmes, G. Edwards, F. Laurent, C. Teale, R. Skov, A. R. Larsen
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