

Methicillin-Resistant Staphylococci and Dairy Food

NMC Research Committee Note

A recent letter to the editor of the Journal of Dairy Science (Walther and Perreten 2007) reported that a dairy cow on an organic farm in Switzerland was diagnosed with subclinical mastitis caused by methicillin-resistant *Staphylococcus epidermidis*. *Staphylococcus epidermidis* was isolated on two occasions within a two-month period. Antibiotic use on the farm was restricted. The first *S. epidermidis* isolate was resistant to chloramphenicol and carried resistance genes for both streptomycin and trimethoprim, and the second isolate contained an additional gene for resistance to aminoglycosides. Both isolates had identical pulsed-field gel electrophoresis fingerprints suggesting that the same strain had acquired further resistance by horizontal gene transfer. The letter concluded, "The presence of methicillin-resistance *S. epidermidis* in organic food producing animals should convince farmers, veterinarians, public health authorities, cheese producers and cheese retailers to take adequate measures to limit the spread of antibiotic-resistant bacteria to humans via the food chain." The origin of the isolates was not discussed and is of importance, particularly in light of the authors' final remarks.

While the case documents the potential for multi-drug resistant organisms to occur in milk and thus identifies milk as a potential source for multi-drug resistant organisms, the letter does not address the source of the methicillin-resistant organism that caused the intramammary infection. Given the restricted use of antibiotics in cattle on the farm, it is likely that the resistant organism originated from a human. Data gathered to date demonstrate interspecies transmission of methicillin-resistant staphylococci. Some studies suggest that human epidemic strains are responsible for animal colonization (Khana et al. 2007), while other studies suggest that animals may serve as a reservoir for infection of humans (van Loo et al. 2007).

Gastroenteritis caused by consumption of coleslaw contaminated with methicillin-resistant *Staphylococcus aureus* (MRSA) has

been reported, but the source of the food contamination was a colonized food handler who intermittently visited a nursing home (Jones et al. 2002). A recent Italian study showed that MRSA was present, albeit at a low rate (0.36%), in foods of animal origin (Normanno et al. 2007). In that study, MRSA was detected in four milk samples and two cheese samples. Three of the isolates belonged to a non-host specific biovar and three belonged to a sheep biovar suggesting that MRSA of animal origin may be present in dairy products. All isolates were capable of producing at least one enterotoxin, a leading cause of human food poisoning.

These reports demonstrate that interspecies transmission of methicillin-resistant staphylococci clearly occurs, while the source of the resistant staphylococci varies depending on the study. Foodborne illness following consumption of contaminated product is also a possibility.

The question is where should critical control points be implemented to prevent contamination of dairy products? Colonization of the hands appears to be a major contributor to transmission of *S. aureus* and MRSA in hospitals, and *S. aureus* has been shown to colonize milkers' hands. It would seem prudent, therefore, that milkers wear gloves during milking and wash their hands frequently to prevent interspecies transmission in the milking parlor. Post-harvest contamination of products is another possible mechanism for adulteration of food as illustrated by Jones and co-workers (2002). Hence, appropriate hygiene needs to be exercised by food processors and food handlers.

References

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MRSA Infections in the U.S.

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of staphylococci that is resistant to a class of antibiotics called beta-lactams. Beta-lactam antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin.

Approximately 32% (89.4 million persons) of the U.S. population is colonized with *S. aureus* and 0.8% (2.3 millions persons) is colonized with MRSA.

Invasive (i.e., serious) MRSA infections occur in approximately 94,000 persons each year and are associated with approximately 19,000 deaths. Of these infections, about 86% are healthcare-associated and 14% are community-associated.

http://www.cdc.gov/ncidod/dhqp/ar_mrsa_surveillanceFS.html