Typeability of MALDI-TOF assay for identification of non-aureus staphylococci associated with bovine intramammary infections and teat apex colonization

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Matrix-assisted laser desorption/ionization time of flight (MALDI-TOF), a culture-dependent assay, has recently been implemented for routine identification of non-aureus staphylococci (NAS) species from milk, but the assay has never been investigated for NAS from nonmilk or environmental samples. The objective of this study was to evaluate the typeability of the MALDI-TOF assay for the identification and differentiation of bovine-associated NAS species on aseptically collected quarter milk and teat skin samples in dairy herds. In 8 herds, 14 to 20 cows with elevated somatic cell count were randomly selected for teat skin swabs and foremilk samples from right hind and left front quarters. Teat skin swabs and milk samples were collected aseptically for preliminary identification using bacterial culture on chromogenic and calf blood agars. Colonies from milk and teat skin samples with suspicion of having NAS were identified to species-level by MALDI-TOF assay. Out of 511 isolates from 284 quarters (142 cows), 78% (n = 399) were identified by MALDI-TOF. The percentage of correctly identified NAS from milk (91%, 105/115) using MALDI-TOF was higher than the percentage from teat skin (68%, 268/396). Out of the identified isolates, 93% (n = 373) were successfully identified as NAS, whereas the remaining 26 (7%) were shown to be other bacterial species. Out of 26 NAS isolates, 1 originated from milk (Corynebacterium stationis), whereas 25 originated from teat skin representing Aerococcus viridans (n = 7), Bacillus pumilus (n = 13), Enterococcus saccharolyticus (n = 1), Clostridium septicum (n = 1), Corynebacterium stationis (n = 2), and Corynebacterium casei (n = 1). The MALDI-TOF identified 85 (98/115) and 62% (245/396) of the isolates in the first test. Isolates that were not identified to species-level at first test were subjected to a second test, and 47 (8/17) and 32% (48/151) from milk and teat skin, respectively, were identified. After 2 rounds of MALDI-TOF, 22% (n = 112) of the isolates were not identified, representing 103 from teat skin and 9 from milk. Eighteen isolates without identification by MALDI-TOF were successfully identified to species-level using sequencing, where 16 were correctly identified as NAS, whereas the other 2 were Corynebacterium stationis. In conclusion, MALDI-TOF is a reliable assay for identification and typeability of NAS species from aseptically collected quarter milk samples. The assay may be used for identification of NAS species from teat skin swabs. However, confirmation using nucleic acid-based tools is vital for accurate species identification of some species and strains.

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