

INTISARI

Deteksi Gen Penyandi Enterotoksin *Staphylococcus aureus* Isolat Asal Susu Sapi Perah di Wilayah Boyolali

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Staphylococcus aureus merupakan penyebab utama mastitis pada sapi perah dan mampu memproduksi *staphylococcal enterotoxins* (SE) yang dapat menimbulkan keracunan pangan ketika mengontaminasi susu mentah atau produk olahannya. Penelitian ini bertujuan mendeteksi dan mengkarakterisasi gen penyandi SE pada isolat *S. aureus* asal susu sapi perah menggunakan metode *multiplex polymerase chain reaction* (mPCR). Sebanyak 30 sampel susu dikumpulkan dari peternakan sapi perah skala kecil di Boyolali, Indonesia. Isolasi dan identifikasi fenotipik dilakukan melalui kultur pada agar darah, pewarnaan Gram, *mannitol salt agar* (MSA), serta uji katalase dan koagulase, kemudian dikonfirmasi secara molekuler menggunakan gen spesifik spesies (23S rRNA dan *nuc*) serta karakterisasi gen *coa*. Deteksi 17 gen penyandi *classical* dan *new* SE (*sea-ser*) dilakukan menggunakan mPCR. Hasil identifikasi fenotipik dan genotipik menunjukkan bahwa 80% sampel positif *S. aureus*. Profil gen enterotoksin mengungkapkan prevalensi tinggi *sec* (75%), *seh* (50%), *sen* (46%), *sej* dan *sep* (33%), *sea* dan *sem* (17%), *seg* (13%), serta *sed*, *see*, *sei*, dan *sek* (4%). Sebagian besar isolat membawa lebih dari satu gen SE (75%), sementara 16,7% membawa satu gen SE dan 8,3% tidak membawa gen SE. Gen yang paling sering terdeteksi adalah *sec* dan *seh*. Temuan ini menunjukkan bahwa *S. aureus* dari susu sapi perah di Boyolali memiliki keragaman gen penyandi enterotoksin yang tinggi, sehingga berpotensi menimbulkan risiko keamanan pangan. Hasil ini menegaskan perlunya pemantauan rutin dan strategi pengendalian dalam rantai produksi susu di peternakan sapi perah skala kecil di Boyolali.

Kata kunci: enterotoksin, keracunan pangan, *Staphylococcus aureus*, susu sapi perah

ABSTRACT

Detection of Enterotoxin-Encoding Genes *Staphylococcus aureus* Enterotoxin Isolated from Dairy Cow Milk in Boyolali

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Staphylococcus aureus is the main cause of mastitis in dairy cattle and is capable of producing staphylococcal enterotoxins (SE), which can cause food poisoning when contaminating raw milk or dairy products. This study aims to detect and characterize SE-encoding genes in *S. aureus* isolates from dairy cow milk using the multiplex polymerase chain reaction (mPCR) method. A total of 30 milk samples were collected from small-scale dairy farms in Boyolali, Indonesia. Isolation and phenotypic identification were performed using blood agar culture, Gram staining, mannitol salt agar (MSA), and catalase and coagulase tests. Then, molecular confirmation was carried out using species-specific genes (23S rRNA and *nuc*) and *coa* gene characterization. Detection of 17 classical and new SE-encoding genes (*sea-ser*) was carried out using mPCR. The results of phenotypic and genotypic identification showed that 80% of the samples were positive for *S. aureus*. Enterotoxin gene profiling revealed a high prevalence of *sec* (75%), *seh* (50%), *sen* (46%), *sej* and *sep* (33%), *sea* and *sem* (17%), *seg* (13%), and *sed*, *see*, *sei*, and *sek* (4%). Most isolates carried more than one SE gene (75%), while 16.7% carried one gene SE and 8.3% carried no SE genes. The most frequently detected genes were *sec* and *seh*. These findings indicate that *S. aureus* isolated from dairy cow milk in Boyolali exhibits a high diversity of enterotoxin-encoding genes, potentially posing a significant food safety risk. These results underscore the importance of implementing routine monitoring and control strategies throughout the dairy production chain in small-scale dairy farms in Boyolali.

Keywords: dairy cow milk, enterotoxin, food poisoning, *Staphylococcus aureus*