



Increased expression of a novel splice variant of the complement component 4 (*C4A*) gene in mastitis-infected dairy cattle

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ABSTRACT. The complement system helps in the direct lysis of invading pathogens and modulates phagocytic, humoral and cellular immune responses. Complement 4 is a critical component in complement activity and protection against many bacterial pathogens because it is essential to classical and lectin activation pathways. We used reverse transcription and PCR to investigate alternative splicing and expression of the complement component 4 (*C4A*) gene in Chinese Holstein cattle. The PCR products were cloned and sequenced. A novel splice variant involving intron 10 was identified, which we named C4A-AS. To examine how *C4A* gene activity is affected by bovine mastitis, six Chinese Holstein cattle were divided into healthy (non-mastitic) and *Staphylococcus aureus*-induced mastitic groups. Real-time quantitative PCR (qRT-PCR) revealed that the C4A-complete and C4A-AS transcripts are expressed at significantly different levels in healthy cows, while there were no significant differences in the mastitic

group ($P = 0.257$). Expression of C4A-AS increased significantly when mastitis developed. We also examined the expression of C4A-complete and C4A-AS in several tissues (liver, heart, spleen, lung, kidney, tongue, and muscle). The two transcripts were expressed in all of these tissues but there were no significant differences in expression between healthy and mastitic cows. We therefore conclude that the C4A-complete transcript is the main transcript under normal physiological conditions, while C4A-AS is augmented when mastitis develops.

Key words: *C4A* gene; Alternative splicing; Transcription pattern; Dairy cattle; Mastitis