

Osteopontin Gene Is Associated with Johne's Disease

N. Bissonnette

Dairy and Swine Research and Development Centre, Agriculture and Agri-Food Canada, Sherbrooke, QC, J1M 0C8

Email: nathalie.bissonnette@agr.gc.ca

The Canadian dairy industry is aware of the importance of considering resistance to bovine paratuberculosis as a target trait for genetic improvement. The objective of the study was to detect and assess whether DNA polymorphisms in the bovine candidate gene, osteopontin (**OPN**), are associated with susceptibility to infection *Mycobacterium avium* ssp. *paratuberculosis* (**MAP**), the causative pathogen of the Johne's disease (**JD**). Bovine paratuberculosis causes significant economic losses to the Canadian dairy industry. Because of the limited sensitivity of the available diagnostic tests, early diagnosis of JD is difficult. However, animals remain asymptomatic for years whereas they become infectious. In a previous, genetic variations (single nucleotide polymorphisms; SNP) were found associated with somatic cell score. In order to detect SNP in JD cows, the 10-kilobase DNA fragment carrying the encoding OPN gene has been sequenced using 168 adult Holstein cows. The JD status of the cows was determined using serum or milk ELISA (enzyme-linked immunosorbent assay) combined to fecal culture assays. Fifty seven infected cows were positive to both tests and 111 JD negative cows were ELISA and bacterial culture negative for 2 consecutive tests over a 12-months period. Logistic regression was used to determine the association of SNPs with JD infection status. A total of 14 informative SNPs were identified. The SNPs *SPP1c.-1301G>A* ($P = 0.088$, Chi-Square; numbering according to GeneBank no. AY878328) and two other new SNPs (confirmed tightly linked; $P = 0.0150$ and 0.0415) were found associated with JD infection status. In our previous study, *SPP1c.-1301G>A* was associated with the mammary health status of lactating cows whereas in JD cows, two additional SNPs were found.

Implications: OPN is now recognized as an important proinflammatory cytokine with pleiotropic beneficial functions, including intracellular pathogen clearance. The presence of genetic variations and their association with Johne's disease confirms the importance of this candidate gene in MAP infection. It may be possible to use OPN gene in selective breeding strategies to enhance health status including resistance to MAP infection.