

A Genomic study on mammary gland acclimatization to tropical environment in the Holstein cattle

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Short title

Genomics of Holstein mammary gland heat stress acclimatization

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SUMMARY

This study aims at identifying mammary gland genes expressed in Brazilian Holstein cattle produced under tropical conditions, as compared to the Portuguese Holstein cattle produced in a temperate region. For this purpose, cDNA microarrays and Real Time-PCR transcriptomic techniques were utilized in twelve Holstein cows from the same lactating phase and management systems divided in two groups: HB originated from Brazil, and HP from Portugal. Genomic results show that from a total of 4608 genes available from microarray slide (Bovine Long Oligo library – BLO), 65 transcripts were identified as differentially expressed in mammary glands. Twelve identified genes were associated with the development of breast parenchyma, heat stress tolerance and milk composition. The genes associated with mammary gland development and heat stress responses showed greater expression in HB animals. In the HP group, up-regulated genes related with apoptosis and vascular development and down-regulated genes related with resistance to heat stress were observed. Validation of microarrays results was done using RT-PCR. HB animals had higher blood levels of growth hormone than HP animals. Blood levels of prolactin and T₃ were similar for both groups. The results suggest a gene change towards long-term acclimatization of Brazilian Holstein cattle to cope with tropical heat stress conditions.