

Abstract

# Association of Thermotolerance with Milk Production, Feed Saver, Fertility and Fat Percentage Breeding Values in Holstein Friesian Dairy Cattle<sup>†</sup>

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**Abstract:** In Australia, heat waves are becoming hotter and longer, and more frequent, compromising dairy cattle welfare and productivity. Selection for heat tolerance (HT) may help to ensure sustainability of production under hot summer conditions. In a study at the University of Melbourne’s Dookie Robotic Dairy Farm, we identified the 20 most heat-sensitive and 20 most heat-tolerant cows in a herd of 150 Holstein Friesian lactating cows based on phenotypic responses (increase in body temperature, panting score, and decline in milk production) of dairy cows grazing pasture and given concentrate at milking during hot summer conditions for 3 months. Hair samples were collected from the tip of the tail according to a standard protocol for genotyping (Zoetis). Results based on 36 successfully genotyped cows indicated a significant variation in feed saved (FS) genomic estimated breeding values (GEBVs) across age indicating a potential for its selection. The thermotolerant group had relatively higher GEBV for FS and fat% but lower milk production potential. Highly significant ( $P \leq 0.05$ ) negative correlations ( $-0.39$  to  $-0.69$ ) were observed between heat tolerance and current dairy industry economic indices (Balanced Performance Index (BPI), Type Weighted Index (TWI), Australian Selection Index (ASI) and milk production), while positive correlations exist between HT and feed saved (0.44) and fertility (0.27). These findings indicate a positive association between HT and feed saved, fertility, and fat percent breeding values. However, a more extensive study including large number of lactating cows is required to confirm these genomic associations and incorporating in future breeding objectives.

**Keywords:** heat stress; feed efficiency; dairy cattle; selection index

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