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Heat stress (HS) is known to cause a strain on performances in dairy cows that experience high temperatures and humidity for long periods throughout the year. However, research on its consequences on dairy cows' production performances in colder areas of the globe is limited. Our objective was to examine the relation between the accumulative effects of HS and daily milk, fat, and protein yields (kg/d), and milk composition (%) in Holstein dairy cows located in eastern Canada. The initial data set used in this study comprised 606,031 test-day (TD) records from 16,446 Holstein dairy cows of different lactations ( $2.7 \pm 1.7$ ). Weather data (2010–2015) were retrieved from the closest meteorological stations. Daily maximum temperature-humidity index ( $\text{THI}_{\text{max}}$ ) was calculated using maximum ambient daily temperature and average relative humidity and merged with corresponding TD. This was also done for the 7 d before TD. The accumulative effects of HS were evaluated by calculating the number of consecutive d with a  $\text{THI}_{\text{max}} > 65$ . Number of consecutive days were then grouped in categories: 0 = 0 d with HS; 1 = 1 or 2 d; 2 = 3 or 4 d; 3 = 5 or 6 d; 4 = 7 or 8 d with HS. Effects of the categories on TD milk production and composition were assessed using the HPMIXED procedure of SAS. Fixed effects included in the model were DIM,  $\exp \text{DIM}$  (calculated as  $e^{-0.05\text{DIM}}$ ), genetic value, and categories of consecutive d with HS. Random effects were year(herd), calving month  $\times$  year(herd), the calving month  $\times$  year(herd(cow)). Cows subjected to more consecutive days with HS had lower ( $P < 0.05$ ) ECM, fat, and protein yields, and fat, and protein concentration in milk compared with cows subjected to conditions not susceptible to induce HS. The cows most impacted by HS were of third lactation and higher, with declines of 4.1 and 2.9% of fat and protein yields and 6.5 and 4.0% of fat, and protein concentration in milk between category 0 and 4. Establishing actual effects of HS on dairy cows' milk performances in cooler climates may help producers to better adapt to climate change and to develop appropriate management countermeasures.

**Key Words:** dairy cow, temperature-humidity index, heat stress

#### 94 Relationship between the accumulative effects of heat stress and Holstein dairy cows' milk performances in eastern Canada.

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