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MAPPING DAIRY COW HEAT STRESS IN SOUTHERN ONTARIO—A COMMON GEOGRAPHIC PATTERN FROM 2010–2012

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10.1136/jech-2014-205217.12

In Southern Ontario, climate change has resulted in an increased occurrence of heat waves, causing heat stress among humans and livestock, with potentially fatal consequences. Heat waves are defined as three consecutive days of temperatures greater than or equal to 32°C. Maps visualizing the distribution of heat stress can provide information about related health risks and insight for control strategies.

Weather data were collected from weather stations throughout Southern Ontario for dry bulb temperature and dew point temperature. The Dairy Cow Heat Stress Index (HSI) was estimated by averaging the first three days for three heat waves, during 2010, 2011 and 2012. Geostatistical kriging was used to map three-day averages

of maximum heat stress over periods involving a heat wave and control periods three weeks prior to and following heat waves.

Average HSI for each period across Southern Ontario ranged from 55 to 78 during control periods, and from 65 to 84 during heat waves, surpassing levels where mortality is known to increase substantially. Heat stress followed a consistent geographic pattern with the most affected areas in the southern region of the study area, surrounding major metropolitan areas.

These HSI maps indicate areas which are less optimal for dairy farming within the study boundary. Thus, some areas currently used for dairy farming and at high-risk for heat stress mortality may require heat abatement strategies to sustain dairy cow production as heat waves become more frequent and intense due to climate change.