

Heat-related mortality in dairy cattle: A case crossover study

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Abstract

The relationship between mortality and stressful weather is not only a complex health, social and environmental issue, but also becomes an economical problem when considering livestock. Future-climate scenarios suggest that higher global mean temperatures could result in marked changes in the frequency of extreme temperatures. The relationship between high temperature and mortality is well known in people living in urban areas, but it has been poorly investigated in livestock such as dairy cows. The aim of this study was to quantify the relationship between heat and mortality from all causes among dairy cows in Italy. We studied 6697 adult (≥ 24 months) dairy cows that died during the summer in the 5-year period 2002–2006 in three Italian districts (Brescia, Cuneo, Rome) which were selected because of the high livestock production and the availability of weather data for these geographical areas. A case-crossover design was applied using the temperature-humidity index (THI) as exposure of interest. Pooled odds ratio (OR) of mortality at high exposure values versus low exposure values was estimated. An exposure over the THI cut-off increased the risk of mortality by 1.6 times, with a 4% increase in mortality for each THI degree increase above the threshold. We found no effect modification for age-class, herd size or breed, but a certain degree of geographical heterogeneity was identified. The increased dairy cow mortality highlighted in this study should be considered when adopting animal welfare and farm management measures. This phenomenon can be prevented by adopting appropriate interventions to mitigate environmental thermal challenges.

Keywords: Cattle; Cow; Mortality; Heat; Case-crossover; Dairy