



## **Towards an assessment of heat stress risk: regionalization and classification of bioclimatic zones in Italy**

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The importance of assessing the effects of critical heat stress (HS) conditions during summer over ecosystem, animals and humans has increased rapidly in the last few years, due to enhanced frequency and intensity of summer heat waves (HW). In countries like Italy, where HWs are a familiar feature of the summer climate, their number, intensity and duration increased over the last 50 years, increasing the risk of HS, and therefore with adverse effects on human health, on agriculture, and on animal production and reproduction with severe economic losses. Focusing on livestock, it is well known that environmental conditions, such as high temperature and humidity, lasting for several days, can cause stress to animals and have a negative impact on their production, reproduction, and health. Therefore, it is necessary to distinguish and describe homogeneous bioclimatic zones in order to evaluate areas in which probability of extreme events and therefore risk for an impact on production and reproduction is more elevated in order to assess the entity of economic losses. Summer daily meteorological observations from 100 stations in Italy have been re-organized in a database, and a quality control on humidity and temperature series covering the period 1971-2006 has been completed, and the daily maximum and minimum temperature-humidity index (THI) for each station have been calculated and the results mapped on a domain covering the Italian peninsula. The analysis of trends and variability of THI show an increase of extreme events in the last decades. Using a hierarchical cluster analysis, based on Ward's method, applied to each pixel of the domain, we found 6 classes describing the whole domain. Each cluster has been analyzed and described

through its own average bioclimatic features. With this methodology geographical areas with similar bioclimatic characteristics and similar probability of HS risk have been distinguished. Finally, the weight of the last few years on the long term trend is also evaluated.