

The warning system of heat discomfort forecast for dairy cattle in Italy

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In a general context of climate change often occur conditions of strong meteorological variability accompanied by an increasing of spread and intensification of the extreme events. This situation suggests an even greater use of agro meteorological applications to sustain agricultural and livestock activities.

In the last years, the Italian climatic conditions are characterized by the increase of intensity and frequency of the heat waves marked by several days with high temperatures, above normal values. Regarding livestock species, it is well recognized that hot temperatures can strongly affect their physiological performance and wellbeing and that they show clear disease signals in dissipating part of the accumulated warm, leading to physiological and metabolic alterations, like reduced feed intake, growth, efficiency, reproduction and decrease qualitative and quantitative of milk production. In Italy, particularly during summer months, for livestock species are more frequent situations of heat discomfort associated with heat waves.

To evaluate and to forecast the heat discomfort on livestock, the Italian Agricultural Research Council - Research Unit for Agricultural Climatology and Meteorology (CRA-CMA) is carrying out an innovative Warning System of heat discomfort forecast on dairy cattle, using the THI-Temperature Humidity Index, that combine the simultaneous effects of both temperature and relative humidity, commonly used to quantify the degree of heat stress.

We present the Heat Warning System (SAC) developed by implementation of THI algorithm in the agrometeorological forecast Data Assimilation Limited Area Model (DALAM). The system provides the THI forecast maps for six days (for day and night time) that show four hazard levels (null, minimum, alert and danger) to recognize negative effects on production and mortality in dairy cows.

Before it make public, the Heat Warning System was tested throughout the national territory and at the agrometeorological station level, to verify its reliability. Results of the SAC verification are satisfactory: considering that the forecasts are a national scale, the system can estimate the risk conditions of heat stress with a good approximation. Of course, enterprise-wide microclimatic conditions may change in relation to type of farming and diary farm structures.

The SAC is available on the website <http://www.cra-cma.it/sac>, where forecast maps of the heat discomfort, uploaded every day, are displayed. The website also provides useful information to farmers for the calculation of the THI in its stable and to monitor the THI in time; moreover, are suggested several effective prevention measures to limit the effects of stress due to high temperatures on dairy cattle. The implementation of the alert system about the heat discomfort on dairy cattle and their spread by Internet with other valuable information about the livestock management in warning heat wave situation can be an important tool for farmers and operators to improve their decision-making processes, like to plan the breeding and decide on the appropriate mitigation measures that can preserve the health, welfare and performance of livestock and to ensure the quality of production.