

The Italian website for the forecast of bioclimatic index THI about the dairy cattle

Maria Carmen Beltrano (1), Stanislao Esposito (1), Riccardo Scano (1), Andrea Vitali (1) and Valentina Primi (2)

(1) CRA – CMA Italian Agricultural Research Council - Research Unit for Climatology and Meteorology applied to Agriculture, Rome, Italy (mariacarmen.beltrano@entecra.it)
(2) University of Tuscia, Department of Animal Production, Viterbo, Italy

OVERVIEW

Meteorological variability and climate change, often accompanied by an increasing spread and intensification of extreme events, suggest an even greater use of agro meteorological applications to sustain agricultural and livestock activities.

About warm extreme events, in Italy in the last decade an increase of heat waves was observed, characterized by temperature above certain threshold values and persistence for several days or weeks. In the same last period also the average length of each heat wave event increased about of ten- fifteen days.

Particularly during summer months, for livestock species, are more frequent situations of heat stress associated with heat waves.

In order to support the farmer in business management during the summer, in Italy the Research Unit for Climatology and Agrometeorology of the Agricultural Research Council (CRA-CMA), developed the National Heat Warning System (SAC), a forecast system broadcasts by Internet which represents a technical tool to sustain farmers in planning strategies to mitigate the heat effects on health and performance of animals and in deciding the appropriate application of measures which may ensure productions and welfare in livestock.

DATA AND METHODS

The forecasts system about heat warning is based on a bioclimatic index commonly used, the THI -Temperature Humidity Index-, that combine the simultaneous effects of both temperature and relative humidity to quantify the degree of heat stress on animals, using the commonly used formula elaborated by Kelly & Bond in 1971

$$THI = (1.8 \times T + 32) - (0.55 - 0.55 \times RH/100) \times [(1.8 \times T + 32) - 58]$$

where T= Air temperature (°C) and RH=relative Humidity (%)

The system provide six days forecast maps for Italian territory and each shows several THI hazard levels for welfare and production in dairy cows, for day and night time. To forecast the THI, was used the forecast model DALAM (Data Assimilation Limited Area Model) that operates on a spatial domain which includes Western Europe and describes, through a series of primitive equation, atmosphere motion and thermodynamics and their temporal evolution, starting from input data supplied by the European Centre for Medium-Range Weather Forecasts - ECMWF. The Dalam provides forecast data of temperature and humidity which are the input for the calculation of the THI:

- Day time maps of THI are obtained from the forecast maximum daily temperature and relative humidity at 03.00 p.m.;
- Night time maps of THI are obtained from the forecast minimum daily temperature and relative humidity at 03.00 a.m.

THE WEBSITE

Structured in several sections, it offers several information about forecast, monitoring, calculating THI and livestock management.

THI FORECAST

From the SAC Home page it is possible to display heat warning forecast maps about productivity or mortality for the following six days.



Introduction page to productivity forecast maps



Pattern of National forecast map about productivity



The system also displays the forecast zoom at local scale.

ADVICES

For each risk class the interactive map legend lists symptomatic behavior in the animals and preventive measures to reduce the negative effects of the heat stress.



THI MONITORING

A section of website is dedicated to the monitoring of the territorial THI distribution in the last 10 days, giving the farmers an additional tool to control progress and evolution of THI values and to choose the most appropriate measures of mitigation, to reduce the discomfort on the animals.



HOME PAGE

<http://www.cra-cma.it/sac>



THI RISK CLASSES

The heat stress risk during day and night time is represented by different colors, corresponding to four classes of THI values.

Risk classes (THI)	Stress level
null	No stress
minimum	Moderate Stress
medium	High Stress
maximum	Emergency

CALCULATE THI OF YOUR COWSHED



Inputting the cowshed air temperature and relative humidity values, the SAC calculate the THI indoor value, indicating the risk class. In comparing the values of THI outdoor with those real in the stable, farmer obtains specific advices, to plan appropriate management adaptations strategies.

The Heat Warning System -SAC- is an innovative forecast tool on the national scene, carried out specially for dairy cows. Visiting the website <http://www.cra-cma.it/sac/>, farmers access to alert bioclimatic bulletins and to specific technical information in support to livestock management.

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