

# DAIRY COWS HEAT STRESS INDEX INCLUDING AIR SPEED PARAMETER

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## 1. INTRODUCTION

### 1. Introduzione

The negative effect of high temperature on dairy cows yield performance during is well known. Heat stress, besides determining a relevant milk yield loss, causes also a dramatic decrease of fertility and milk quality [3]. The decreases of milk quality is particularly deleterious in Italian areas devoted to «grana» cheese production (Grana Padano and Parmigiano-Reggiano), where a high quality of milk is necessary for successful milk processing and cheese manufacturing [2, 6].

While the effect of air temperature and humidity on dairy cows has been investigated, little information is presently available on the effect of air speed in different microclimatic conditions, particularly in the presence of artificial ventilation, with or without air conditioning.

There is no doubt in assuming that ventilation, under heat stress conditions, has positive effects on the physiological state and on the general performance of lactating cows. A wide and articulate literature exists on the subject [1, 4, 5, 7].

More difficult instead is to determine optimal

levels of ventilation inside the barn. Apparently, this is correlated to temperature and air dampness humidity.

This is very important both for evaluating the microclimatic conditions to be created inside the barn, and for planning an adequate and efficient plant of ventilation.

The latter, in fact, more than aiming to change air in the building, should be designed to create a sufficient and homogeneous air current in the different districts of the barn, to permit the animals the dispersion of heat surplus due to the environmental high thermal contents. In any case, the most important element to know is the air speed that is created near the animals.

Besides two indicators commonly considered (temperature, air humidity) the purpose of this research (based on a series of data obtained in a two year trial) is to determine an index of heat stress that considers air speed.

## 2. MATERIALS AND METHODS

### 2. Materiali e metodi

Trials were carried out in an experimental barn located nearby Piacenza (Italy) and hosting 100 Holstein cows. The animals were divided in groups of 15 individuals and located in areas having different conditioning systems (natural ventilation, artificial ventilation with and without air cooling). During summer 1994 and 1995, some environmental and animal physiological parameters (air temperature, relative humidity and air speed) were measured within each differentially conditioned area.

The cows were at intermediate phase of lactation with an average production of 28 kg/day *pro capite*. The barn had cubicles in the rest area, and the building was partially open: one of the larger side was completely open, while the other was half closed by a masonry wall (fig. 1). Two boxes were endowed with a forced ventilation system set up by axial high flow fans that

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Memoria presentata il 6.12.96; accettata il 24.4.97.

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Dr. FERDINANDO CALEGARI, Titolare di Borsa di Studio per una ricerca finanziata dalla regione Emilia-Romagna su: *Produzioni di latte e ambiente di allevamento* svolta dagli istituti di Genio Rurale e di Zootecnica, Facoltà di Agraria, Università Cattolica del Sacro Cuore, Piacenza.

*Ricerca eseguita in parte con fondi MURST 40%, ed in parte con finanziamento della regione Emilia-Romagna e realizzata presso la stalla dell'Azienda Sperimentale V. Tadini, Gariga di Podenzano (PC).*

