The effect of season, month and temperature humidity index on the occurrence of clinical mastitis in dairy heifers

Andrea Vitali
mail@andreavitali.it

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Mastitis

Major endemic disease of dairy cattle which causes great economic losses in the dairy industry

Clinical mastitis occurred in the first 30 days of lactation resulted in a total economic cost of $444 (Rollin et al., 2015).

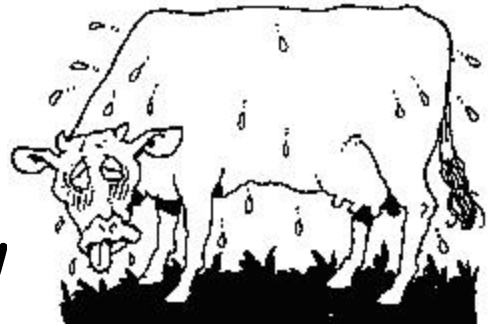
For a severe case of clinical mastitis occurred in UK dairy herds a total cost per case of £332 was estimated (Kossaibati & Esslemont, 2000).

Mastitis

Mastitis is a multifactorial problem and several aspects may be considered as risky factors

- **Animal**: production level, lactation number, genotype, etc
- **Herd management**: veterinary cares, bedding, milking, etc
- **Environmental condition**: temperature and humidity

Heat stress, SCC and mastitis in dairy cow

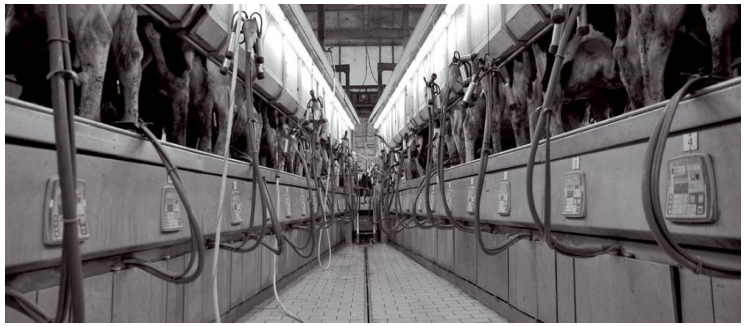


Studies indicated a higher Incidence Rate of clinical mastitis (IRCM) or higher milk somatic cell counts (SCC) in dairy cows exposed to hot environment

- In Florida, the IRCM increased to 3 cows/1000 cow-days as daily maximum THI increased above 75 (Morse et al. 1988).
- In Wisconsin, the SCC and the prevalence of the infections at udder level were higher in summer (Cook et al. 2002).
- In Norway, the heifers calving late in spring or during summer were at higher risk for CM than were those calving at other times of the year (Waage et al. 1998).
- In Italy, SCC in bulk milk were higher in summer and started to increase significantly above 57 THI (Bertocchi et al., 2014).

Aim

The study was aimed at assessing the relationships between season, month, THI and occurrence of CM in dairy heifers bred in a large commercial farm located in central Italy.



Cows data

- Cases of CM were recorded from January 2014 to December 2015
- Only the cases of CM recorded in primiparous cows were considered for the analysis
- CM was defined by the presence of clinical signs at udder level such as swelling, heat, hardness, redness, or pain and by abnormal changes of the milk such as a watery appearance, flakes, clots, or pus.
- Recording an occurrence of CM required milker identification and veterinary confirmation.
- All animals detected with CM received veterinary treatment.

Weather data

THI was calculated using temperature (T, °C) and relative humidity (RH, %) recorded at the nearest weather station (6 km) the day before the detection of CM.

$$THI=((1.8*T+32)-(0.55-(0.55*RH/100))*((1.8*T+32)-58)$$

(Kelly and Bond, 1971)

- Values of THI were grouped in four classes: <70; 70-74; 75-79 and >79.

- Heat stress threshold was set at 70 THI (Bouraoui et al., 2002; Bryant et al., 2007; Bernabucci et al., 2010). The other classes were chosen arbitrarily.

Analysis

- The incidence rate of CM (IRCM) was calculated as:

  IRCM= (cases of CM per day/number of animal at risk per day)*1,000

- Weather and cows data were merged by date

- Seasonal, monthly and THI variation of IRCM were evaluated by means of GLM where IRCM was set as the dependent variable and season, month, class of THI as independent variables. Significance was set for p values <0.05.

Results

Descriptive statistics of the study	
Cows consistency, n	1,100 ± 127
Heifers consistency, n	498 ± 62
Heifers in the herd	45%
Holstein in the herd	100%
Total CM for cows	872
Total CM for heifers	415
Housing	Free stall cubicle
Bedding	Digestate from biogas plant
Feeding	TMR twice a day
Milking	Twice a day

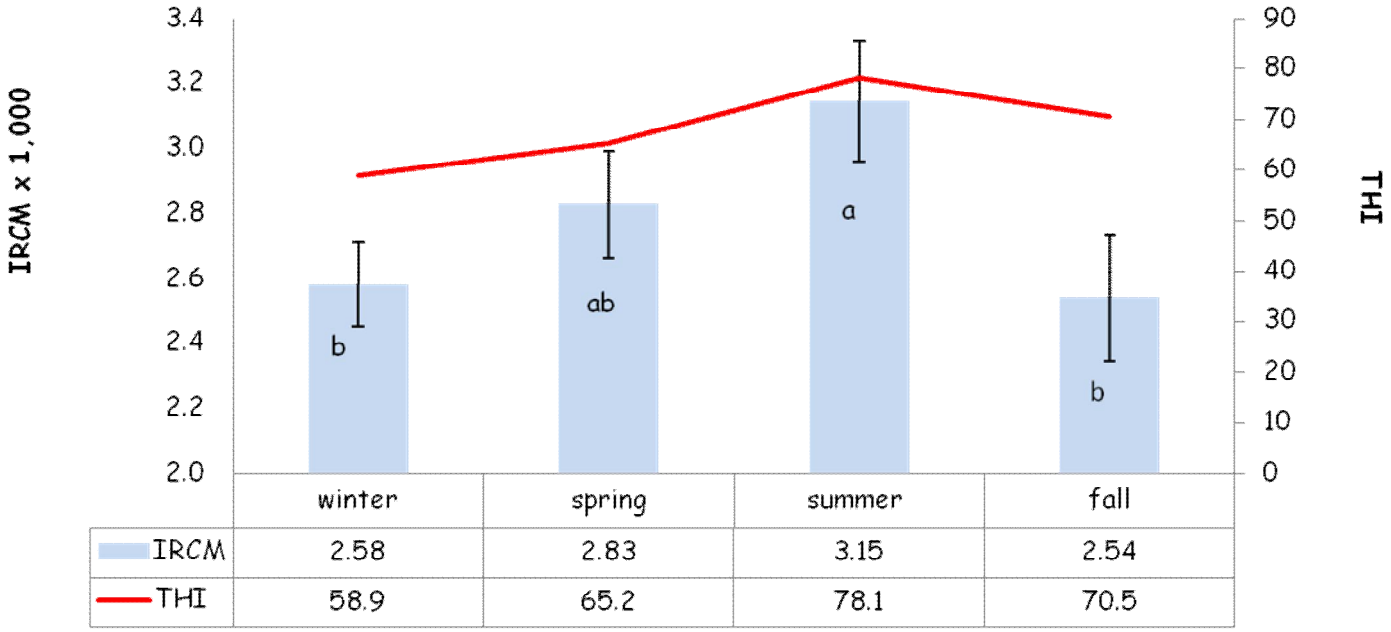
Results

- Heat stress conditions were recorded from May (69.8±3.5) until October (70.7±4.1) and July (79.2±3.4) and August (78.8±2.4) were the hottest months.

- The incidence of CM was 41 cases for 100 milking heifers/year

- The analysis indicated an effect of season, month and THI on IRCM ($p<0.05$)

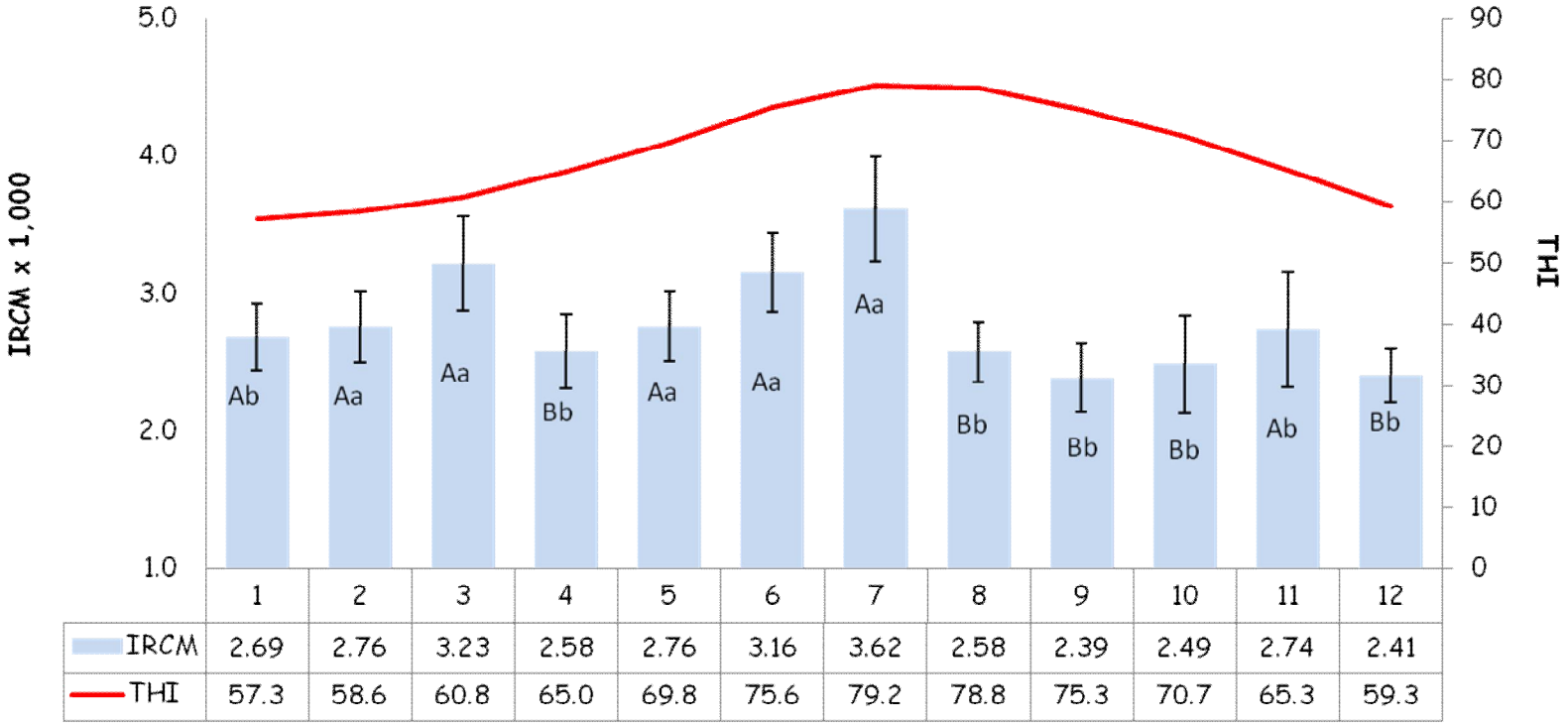
Season



	winter	spring	summer	fall
IRCM	2.58	2.83	3.15	2.54
THI	58.9	65.2	78.1	70.5

Different lowercase $p<0.05$

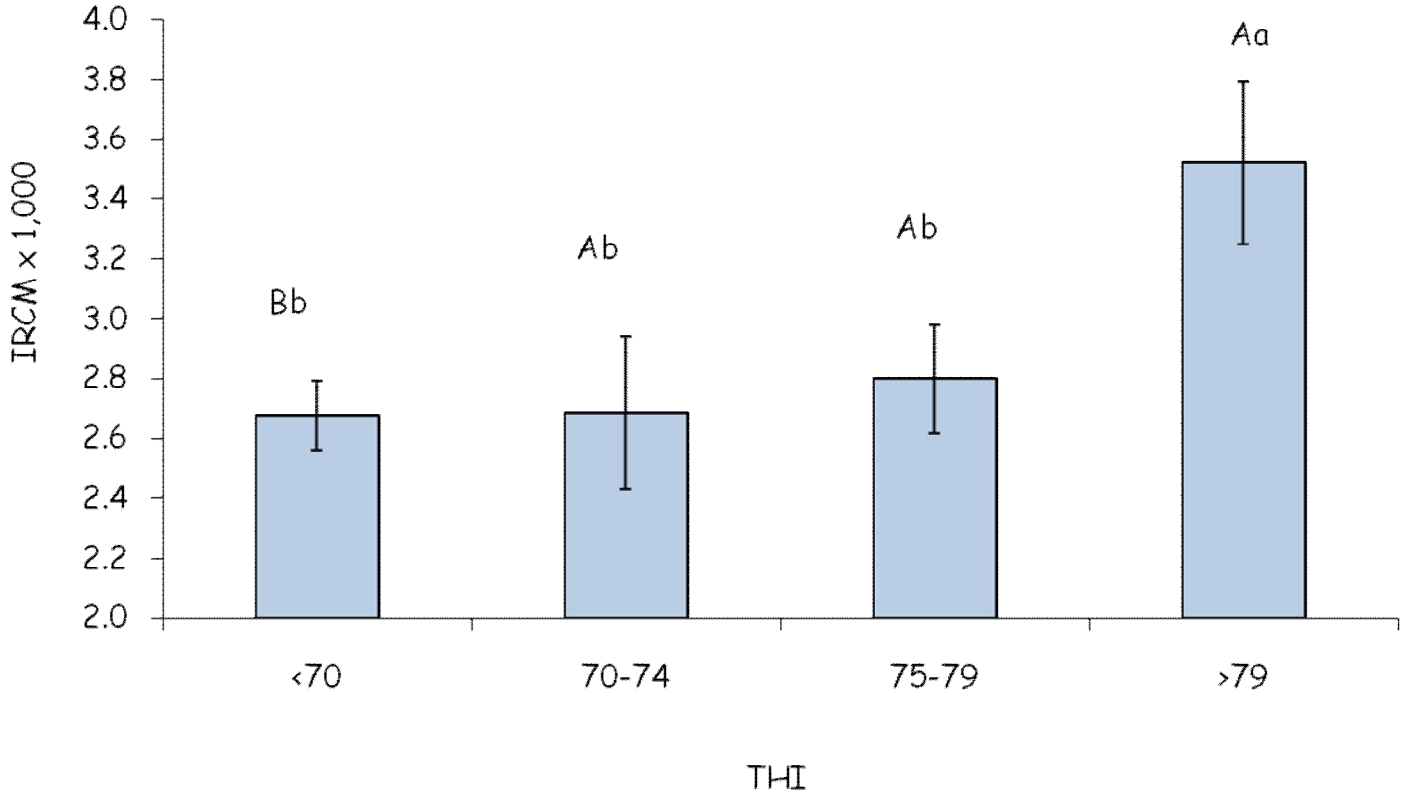
Month



	1	2	3	4	5	6	7	8	9	10	11	12
IRCM	2.69	2.76	3.23	2.58	2.76	3.16	3.62	2.58	2.39	2.49	2.74	2.41
THI	57.3	58.6	60.8	65.0	69.8	75.6	79.2	78.8	75.3	70.7	65.3	59.3

Different uppercase $p<0.01$
Different lowercase $p<0.05$

Classes of THI



Different uppercase $p<0.01$
Different lowercase $p<0.05$

Conclusion

- Summer was most risky for the occurrence of CM and July was the month more dangerous for udder health in the dairy heifers

- The exposure of primiparous dairy cows at THI greater than 79 may result risky for the occurrence of CM.

- The lower incidence of CM during the hot months of August and September may suggest a culling effect due to the higher incidence of animals sick in early summer months. In addition to this aspect, a certain capacity of the animals to adapt to the heat condition during the hot season can not be excluded.

- These results strongly support the implementation of adaptation strategies which may ensure animal welfare and limit economic losses due to hot weather

Thanks' for your attention

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