Heat stress in dairy cattle

Typically, the level of heat stress in cattle is estimated by using the temperature-humidity index (THI), this index describe ambient temperature and humidity that cause heat stress on cattle

THI = (1.8 x T +32) – (0.55 - 0.0055 x RH) x (1.8 x T – 26)

National Research Council [1971]

T = ambient or dry-bulb temperature in °C, RH=relative humidity expressed as a proportion

Brown Swiss cattle: 74 - fat-corrected milk production, 75 - Protein yield and cheese production (Maggiolino et al., 2020)

Holstein-Friesian cattle: 72 - production losses (Ravagnolo et al., 2000), 67 - activity changes (Heinicke et al., 2018)

**There is considerable variability in** **THI threshold among different research on Holstein cows: THI 68 (Herbut et al., 2015), THI 60 (Brügemann et al., 2012)**

Simmental: 77 – daily milk yield (Gantner et al., 2017)

The heat stress forecast map made by US. Meat Animal Research center using the breathing rate as an indicator for heat stress.

Breathing Rate = (2.83 x Temperature) + (0.58 x Humidity) - (0.76 x Wind Speed) + (0.039 x Solar Radiation) - 196.4

|  |  |
| --- | --- |
| **Predicted Breathing Rate** | **Heat Stress Category** |
| Less than 90 | Normal |
| From 90 - 110 | Alert |
| From 110 - 130 | Danger |
| Above 130 | Emergency |

They assume all the cattles have very similar heat resistance, thus they did not establish different standards for different breeds of cows

**Reference**

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