



## Application of a thermolysis capacity test for dry and lactating cows

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The heat stress has negative effects on animal comfort and productivity. Genetic progress in milk production is related closely to an increase in metabolic heat increment, which makes cows more affected by heat stress. Individual thermotolerance can be an important tool in genetic selection. The study aimed to validate a new proposal for assessing the ability of heat loss after sun exposure in cows and its application in dry and lactating cows kept or not on thermal comfort condition. The test consists in three days of sun exposure for one hour followed by one hour rest in the shade to determine the individual thermolysis capacity (TC) by the variables rectal temperature, body surface temperature, internal tail base temperature, respiratory rate, plasma cortisol and IGF-I. In the new proposal these physiological variables were measured before sun exposure, after 50 min in the sun and after one hour in the shade (T0, T1 and T2 consecutively). The test in which this new test was adapted lacked T1. The three day test was applied with similar meteorological variables as black globe temperature of 48.1°C (1.32), air temperature of 31.7°C (0.92) and relative humidity of 39.5% (3.38). The differences between dry and lactating cows were measured in 28 animals divided into two experimental groups housed in free-stall with and without evaporative cooling system (mist and fans). The animals remained at the facility for seven months (from spring to summer) then after they were subjected to heat stress and the TC ( $10 - [(T1 - T0) - (T2 - T1)]$ ) was determined. There was no difference between the TC of dry and lactating cows ( $P > 0.05$ ), but respiratory rate and IGF-I were greater and body surface was lower in dry cows during sun exposure ( $P < 0.01$ ). There was effect of collection time (T0, T1, T2) on all physiological variables ( $P < 0.01$ ). Although there was no difference in cortisol for time 1, the values on 0 and 2 were higher for lactating cows ( $P = 0.03$ ). The effect of cooling was observed in cortisol concentrations at time 0 and 2 ( $P = 0.03$ ), and on time 1 for rectal temperature ( $P < 0.05$ ) and IGF-I ( $P < 0.01$ ), and TC was higher in these animals ( $P < 0.01$ ). The relative humidity also had an effect on thermoregulatory responses, excluding cortisol and IGF-I ( $P > 0.05$ ). The thermolysis capacity test was validated and can be used for either dry or lactating cows. Milk production did not influence the thermoregulatory responses of Holstein cows, but when lactating and kept in cooling system they showed better thermolysis capacity index.

Key-words: cortisol, free-stall, IGF-I, rectal temperature, stress.

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