

Infrared thermography in Crossbred (Holstein x Gyr) dairy heifers differing in phenotypic residual feed intake

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The aims of this study were to determine the relationship of body surface temperature measured using infrared thermography (IR) with the residual feed intake (RFI). Thirty-six animals (146.7 ± 28.2 d of age and 152.3 ± 21.7 kg) were randomly housed in four paddocks, each one equipped with electronic feed bins (INTERGADO®) in Embrapa Dairy Cattle facilities. Diet (75:25, corn silage:concentrate, 195 g CP/kg, DM basis) was fed *ad libitum* during 113 d of test. Feed intake was measured daily, body weight (BW) measured weekly. RFI was calculated for each animal as the difference between actual dry matter intake (DMI) and expected DMI. Expected DMI was computed for each animal by regressing average daily DMI (72 ± 10.9 d) on mean $BW^{0.75}$ and ADG over a 113 d period. Thirty-six animals were ranked according to the RFI in low (efficient) and high (inefficient) group. IR (FLIR T420; FLIR Systems) was performed approximately in the middle of the efficiency test. Infrared images were taken of eye, snout, ribs and flank. Thermographs were interpreted using the FLIR Tools 5.6 software (FLIR Systems). For each body locations thermographed, a specific shape was used to delimit a constant sub-area and the maximum temperature with these areas defined the IR traits. Data were analyzed as a completely randomized design by ANOVA ($P < 0.05$) using the GLM procedure of SAS software and correlation coefficients between IR and RFI were calculated using the CORR procedure. Average maximum temperature from eye (-0.308 , $P = 0.09$) and snout (-0.426 , $P < 0.05$) were moderately correlated with RFI. Low RFI heifers had high temperatures than high RFI heifers for eye (38.26 v. 37.85°C), ribs (34.42 v. 33.63°C), flank (34.90 v. 33.93°C) and snout (33.62 v. 32.67°C , $P = 0.09$). Eye and snout temperature appear to be the most promising body locations for indirectly assessing feed efficiency in dairy heifers.

Key Words: body surface temperature, feed efficiency

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Parâmetros	Baixo RFI	Alto RFI	EPM	P - valor
CAR	- 0,208 ^b	+0,208 ^a	0,04	0,001
Canto do olho Máx., °C	38,08	37,72	0,12	0,14
Olho Máx., °C	38,26 ^a	37,85 ^b	0,09	0,02
Mandíbula Máx., °C	34,83	34,55	0,15	0,37
Ponta do focinho Máx., °C	35,63	34,72	0,28	0,11
Narina Máx., °C	34,05	33,14	0,33	0,17
Espelho do focinho Máx., °C	33,62 ^a	32,67 ^b	0,28	0,09
Costela Dir. Máx., °C	34,42 ^a	33,63 ^b	0,18	0,03
Flanco Direito Máx., °C	34,90 ^a	33,93 ^b	0,09	0,03
Flanco Esquerdo Máx., °C	34,63	34,32	0,22	0,48
Pata Direita Máx., °C	32,94	33,07	0,23	0,79
Ânus Máx., °C	39,37	39,05	0,11	0,15
Vulva Máx., °C	37,97	37,99	0,13	0,93

P < 0,10, Teste Tukey-Kramer

Correlação

Parâmetros	CAR
Canto do olho Máx., °C	- 24,20 ^{ns}
Olho Máx., °C	- 30,80 ^b
Mandíbula Máx., °C	- 10,80 ^{ns}
Ponta do focinho Máx., °C	- 43,40 ^a
Narina Máx., °C	- 41,50 ^a
Espelho do focinho Máx., °C	- 42,60 ^a
Costela Dir. Máx., °C	- 24,70 ^{ns}
Flanco Direito Máx., °C	- 24,20 ^{ns}
Flanco Esquerdo Máx., °C	- 5,40 ^{ns}
Pata Direita Máx., °C	- 13,4 ^{ns}
Prega Caudal Máx., °C	- 7,60 ^{ns}
Ânus Máx., °C	- 19,8 ^{ns}
Vulva Máx., °C	3,2 ^{ns}

^{ns} P > 0,05, ^a 0,10 < P > 0,05, ^b P CAR = consumo alimentar residual.