**Supplementary table – Monitoring skin temperature in endurance horses**

**Summary of a total of 30 selected studies measuring the surface T*sk* in horses.**

* 11 studies at rest
* 19 studies related to exercise including:
  + Seven studies continuous monitoring using T*sk* **contact sensors**:
    - One field study using i-Button® (Klous et al., 2020)
    - Five laboratory-based studies in the 1990’s: Marlin et al. (n = 3, using thermistor probe) & Geor et al. (n = 2, using thermocouple)
    - One recent study using dynamic infrared thermography (IRT) camera (Soroko et al., 2018)
  + 12 studies measured T*sk* post-exercise at a single point including one study with T*sk* both pre- and post-exercise

**Monitoring continuous or not continuous**

A total of nine studies monitored T*sk* continuously (C) (including two studies at rest) and 21 studies monitored T*sk* not continuous (N/C) (T*sk* at a single point).

**Overview of the T*sk* equipment**

* 19 studies used IRT
* Five studies used thermocouples
* Seven studies used thermistors including two studies using the i-Button®

**Supplementary Table S1.** **Overview of selected equine studies measuring T*sk* (°C) at rest (R) or during exercise (E), non-continuous data points (N/C, at a single point) or monitoring continuously (C).** Only essential data are presented. T*sk*: skin temperature; TCV: central venous blood temperature; T*re*: rectal temperature; T*RA*: right atrial blood temperature; T*PA*: pulmonary artery blood temperature; T*a*: ambient temperature; max.: maximum; min: minutes; IRT: infrared thermography; ROIs: regions of interest; *italic*: data related to the skin and coat characteristics; n =: = number of horses involved in the study; field: field studies; - : data not available; BSA: body surface area; QH: Quarter Horse; TB: Thoroughbred; BM: body mass; TX: therapy; HH, HD, CD: hot-humid, hot-dry, cool-dry T*a*.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Publication** | **Thermo-sensor type** | **C**  **N/C** | **Tc Y/N;** | **Number of locations- ROIs** | **Delta T*sk* exercise** | **Hottest location & conclusion** | **Exercise / Rest**  **Aim of the study**  **Number of horses (n=)** |
| 1 | (Domino et al., 2022) | IRT camera | N/C | N | 15 | NA | horse T*sk* > then donkey due to difference *skin thickness* | R - compare donkey & horse *skin*; n=18 & n=16 |
| 2 | (Maśko et al., 2021) | IRT camera | N/C | N | 10 ROIs: e.g., chest, hoofs | - | No T*sk* difference in mares nor *coat length* | R - compare pregnant and non-pregnant mares & effect of *coat length*; n=40 mares |
| 3 | (Zielińska et al., 2021) | IRT camera | N/C | N | 1: Legs | NA | *Non-pigmented* > T*sk* | R - compare effect of laser TX on T*sk* *pigmented vs non-pigmented* |
| 4 | (Brownlow and Smith, 2021) | IRT camera | N/C | N | 3: neck, shoulder, thorax | - | > 39°C = higher risk EHI | E - **field,** post exercise T*sk*; n=260 |
| 5 | (Giannetto et al., 2020) | IRT camera | N/C | Y, single point Tre | 5 ROIs | ~5°C | T*sk* not aligned with Tre | R - assess daily rhythm; n=5 |
| 6 | (Klous et al., 2020) | i-Button® & glue | C | Y: C T*re*  N | 2: Shoulder, rump | -3°C | Pre-cooling -> T*re* median 0.3°C difference & T*sk* mean -3°C difference | E - **field,** evaluate 8 min pre-cooling to 8.5 min eventing; n=10 eventers |
| 7 | (Meisfjord Jorgensen et al., 2020) | IRT camera | N/C | N | 10 ROIs: incl chest, hoofs | - | Abdomen and flank; individual difference | R- compare 2 seasons and *coat length*;n=21 |
| 8 | (Takahashi et al., 2020) | IRT camera | N/C:  1x prior cooling | Y: TPA  N – only single point | 1: left thorax | -  At T*PA* 42°C, mean T*sk* > 40-41°C | When T*PA* 42°C, best T*sk* at 17e ICS > 40°C  Aim until T*PA* < 39°C: Shower is best | E - treadmill – run to 42°C T*PA* – compare difference post-cooling methods; n=5 TB |
| 9 | (Wilk et al., 2020) | IRT camera | N/C | Y, single point Tre  N | 7 ROIs | ~ 6°C | > 20% of BM -> higher T*sk* | E - ridden – compare BM riders; n=12 |
| 10 | (Redaelli et al., 2019) | IRT camera | N/C | N | 7 |  | Crown T*sk* correlation intensity | E - correlate endurance intensity with T*sk* & stress markers; n=8 |
| 11 | (Soroko et al., 2019a) | IRT camera | N/C | N | 7 muscle regions | ~1-2°C | Higher T*sk* in ridden horses | E - treadmill pre & post T*sk* compare ridden/ non ridden & correlation blood parameters; n=9 ponies |
| 12 | (Soroko et al., 2019b) | Dynamic use IRT camera q15s | N/C | N | Saddle area: 6 ROIs |  | Saddle ‘pressure’ | E – field, saddle thermal pattern; n=18 racehorses |
| 13 | (Soroko, 2018) | Dynamic use IRT camara q15s | C | N | 4: SH, neck, croup, chest |  | Neck | E – 25 min treadmill, 15 min trot (9.1 km/h); n=5 ponies |
| 14 | (Soroko et al., 2017) | IRT camera | N/C | N | 2: joints | ~25°C and Ta delta ~20°C | - | R - influence of T*a* on T*sk* difference between joints; n=64 |
| 15 | (Edner et al., 2015) | Thermistors and IRT camera | N/C | N | Local T*sk*under blanket – IRT overall thermography | - | No T*sk* difference | R - magnetic blanket effect; n=10 |
| 16 | (Yarnell et al., 2014) | IRT camera | N/C | N | Semitendinosus muscle | ~20°C | T*sk* during Dry treadmill ~ muscle activity | E - compare water treadmill; n=8 |
| 17 | (Holcomb et al., 2013) | Thermocouple - held | N/C | Y, single point T*re* | 2-L+R triceps | ~1°C in sun | Sun: T*re*& cortisol WNL (sun 37.8°C vs 37.5°C), more sweating | R - compare T*sk*, sweating in shade vs non-shade; n=12 |
| 18 | (Wallsten et al., 2012) | Thermistor probes  with sensors on skin | N/C | N | 2: neck, biceps, tail | ~10-20°C | *unclipped* & blanket higher thermoregulation based on RR & T*re* (38.2°C) | E - ridden outside several trot/canter periods over 1000m, effect of *clipping &* blanket in cold T*a*; n=3 |
| 19 | (Ramey et al., 2011) | IRT camera | N/C | Y, single point Tre  N | 2: mucous membranes, trunk | - | Significant variation in T*sk* readings | R - IRT vs T*re*; n=40 |
| 20 | (Jodkowska et al., 2011) | IRT camera | N/C | Y, single point T*re*  N | 36 ROIs to cover whole BSA: and 25 ROIs post- exercise | ~5°C (post exercise: 25-35°C) | Head, neck, trunk.  T*re* WNL | E - Tmax on BSA compare before and after jumping; n=35 |
| 21 | (Robinson et al., 2008) | implantable  microchip |  | C at rest | 1: nuchal ligament | - | Correlation influenced by T*a*; only 55% sensitivity at lower T*a* | R - compare implant T*sk* to T*re* to detect fever;  N=52 foals, n=30 QH |
| 22 | (Simon et al., 2006) | IRT camera | N/C | N | 2: FL & HL | ~5-6°C | None – all return to base T*sk* in 45min | E - treadmill, determine time to return to base T*sk*; n=6 |
| 23 | (Morgan et al., 2002) | IRT thermometer | N/C | N | 1 | - | *Clipping* result in better heat loss | E - treadmill, effect of *coat clipping* on T*CV*, T*sk*, T*sk* used to calculate heat loss;  n=6 SB |
| 24 | (Geor et al., 2000) | Thermocouples with sticky tape | C | Y: TPA  N | 1- Shaved at thorax | ~2.5°C | No difference in delta T*sk* in HH, HD, CD (no TPA correlation & always ~3°C difference) | E -submax. & heat storage post acclimation under HH comp to CD, HD; n=6 |
| 25 | (Marlin et al., 1999a) | Thermocouple with glue | C- not exercise! | N | 2: neck & gluteal | ~ 2-6°C | T*sk* significant correlation sweating onset (35°C) and rate at neck | R - adrenaline anhidrosis; n=10 compared to control |
| 26 | (Marlin et al., 1999b) | Thermistor probe | C | Y: T*RA*  N | 1: tail skin (T*RA*, T*re*) | ~7°C | T*sk*indicates sweating rate | E - treadmill training acclimation & sweating rate at T*sk*/T*RA*; n=5 |
| 27 | (Marlin et al., 1998) | Thermistor probe | C | Y: T*RA*  N | 2: tail skin, coat | ~5°C | Response of T*sk* and T*RA* to cooling | E - treadmill  cooling study; n=5 |
| 28 | (Marlin et al., 1996) | Thermistor probe | C | Y: T*RA*  Y | 1: tail skin (T*RA*, Tre) | ~6°C | T*sk* follows T*RA* pattern | E - treadmill  Cool compared to hot T*a*; n=4 |
| 29 | (Geor et al., 1995) | Thermocouples sticky tape | C | Y: T*RA*  N | 1- Shaved lat thorax |  | T*sk* diff from Tc | E - response to submax. (50% Vmax) under HH comp to CD, HD; n=5 |
| 30 | (Morgan, 1995) | i-Button® taped | C - at rest | N | 5 ROIs: spread over body | NA | Extra energy at lower T*a* | R - lab study climate demand at different T*a* |

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