

Thermographic study of the ovine mammary gland during different working vacuum levels

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ABSTRACT

Thermography is a non-contact, non-invasive technique that detects surface heat emitted as infrared radiation. Because skin temperature reflects the status of underlying tissue metabolism and blood circulation, abnormal thermal patterns can signify areas of superficial inflammation or circulatory impairments (i.e. congestion). In sheep different methods have been adopted to measure udder blood circulation and the effect of cold exposure and lactation on the distribution of blood flow. The effect of milking procedures on udder and teat skin temperature was investigated in cows through thermographic scanning. Thermography results in a very useful tool to evaluate, estimate and differentiate short and longer-term tissue reactions to machine milking. The objective of this study was to evaluate the influence of working vacuum level on udder and teat temperature changes during milking procedures and the recovery by indirect monitoring of the circulatory impairments of teat tissue via infrared thermography. Two groups of six lactating Sarda ewes were milked experimentally at two vacuum levels (28 and 42 kPa) and same pulsation parameters (120 cycles/min and 60% ratio). Thermographic images (Flir System, ThermaCam P25, sensitivity of 0.08 °C) of posterior udder area (PUA) and teats (teat base – TB; mid teat – MT and teat tip – TT) were taken pre-milking (PM), during milking (M) (only for PUA), and immediately after milking (IAM) up to 2 minutes after milking (AM+). Temperatures were recovered by processing the thermographic images in ThermaCam Researcher Basic 2.8 SR-1 Software (Flir System). The PUA showed a drop of 1°C in both treatments between PM and M. After milking, values did not show remarkable changes. The vacuum level effect on teats temperature results to be different between treatments. Results during IAM indicate a general drop of the teats temperatures and specifically for high vacuum level (from 39.82 to 37.92 °C and from 39.71 to 37.75 °C for low and high vacuum level respectively). During AM+ (monitored up to 60 sec - AM +30; up to 90 sec - AM+60 and up to 120 sec – AM+90) the increase of teat temperatures were different (P<0.05) between vacuum levels (AM+30: 38.12 vs 37.54 °C; AM+60: 38.19 vs 37.96 °C and AM+90: 39.02 vs 38.58 °C for low and high vacuum level respectively). Differences among TB, MT and TT were evident also at AM+90 only for the high vacuum level while in low one, at the same time, it was persistent only the difference between TT and TB. The higher teat temperature for the low vacuum level could be attributable to a faster return to a normal condition of the blood flow in all teat locations. Teat circulation impairments due to milking procedures need further surveys.