

Use of Infrared thermography to monitor calf health and welfare

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Infrared thermography (IRT) has shown potential as a non-invasive tool for detecting pathological states in animals. However, its application to identify enteric diseases remains poorly understood. Developing reliable and non-invasive indicators is crucial to improving early diagnosis and promoting calf health and welfare, especially in intensive farming systems. This study aimed to evaluate whether lacrimal caruncle temperature, measured via IRT, could serve as an indicator of the onset of enteric pathologies in dairy calves.

A total of 22 Holstein-Friesian calves from 2 dairy farms in Northern Italy were included. At either 7 or 21 days of age, each calf underwent a comprehensive clinical examination, including fecal scoring and temperature measurement. Infrared thermographic images (at least 3) were captured for both eyes using a FLIR Thermal Camera, and the hottest point within the lacrimal caruncle area was recorded. The mean temperature value was calculated for each eye (left and right). Eleven calves showing clinical signs of enteric disease (based on fecal consistency) were compared to 11 clinically healthy calves, defined as having a negative fecal score and no fever, sampled during the same period.

Kruskal-Wallis tests and two-way ANOVA were conducted to analyze the effects of health status (healthy/sick), fever (present/absent), and side (left/right). No significant differences in lacrimal caruncle temperature were found based on health status ($p = 0.347$) or fever ($p = 0.473$). Similarly, ANOVA revealed no significant effects of health status ($F(1, 40) = 0.349$), side ($F(1, 40) = 0.660$), or their interaction ($F(1, 40) = 1.747$).

These findings suggest that lacrimal caruncle temperature alone is insufficient as an indicator of enteric pathologies in calves. Possible reasons include the variability in thermal response or the limited sensitivity of this anatomical site to enteric conditions. Future research should explore alternative anatomical sites that might exhibit more pronounced thermal changes and assess how etiological agents and disease severity influence body temperature dynamics. Additionally, incorporating larger sample sizes and diverse environmental conditions could help refine the application of IRT in the diagnosis of calf diseases.

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