

DETERMINATION OF COWS' HOOVES HEALTH APPLYING THERMOGRAPHY

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Abstract. The aim of this study is to apply thermographic method for scanning high dairy yielding cows' hooves while keeping cows in the free-stall cowshed during the year, to create a thermographic map (model) of cows' healthy hooves under the positive and negative environmental temperatures by applying FLIR system thermographic Therma CAM P640 camera, to diagnose functional status of the cows' hooves (lameness), to perform an orthopaedic diagnosis and to identify pathological changes.

Different average temperatures ($P < 0.001$) of hooves' skin surfaces in the areas of cows' front hooves *metacarpus phalangia (mcp)*, *interphalangia proximalis (mcip)*, and *interphalangia distalis (mcid)* and hind hooves *metatarsus phalangia (mtp)*, *interphalangia proximalis (mtip)*, and *interphalangia distalis (mtid)* were diagnosed under the environment conditions. The temperature of the healthy front and hind hooves' surface of the skin was 15.49 ± 0.16 and 18.30 ± 0.40 °C, and the temperature of pathologically affected hooves was 23.24 ± 0.29 and 26.35 ± 0.16 °C, under the negative environment temperature. Under the conditions of positive ambient temperature, healthy cows' temperature of the front and back surface of the hooves' skin was 18.81 ± 0.09 and 20.17 ± 0.16 °C, and the temperature of cows with deteriorated condition of hooves was 26.52 ± 0.25 and 28.55 ± 0.10 °C. Temperature alterations of hooves were determined in 54.80 % of cows under the negative ambient temperature conditions and in 44.30 % of cows under the positive ambient temperature conditions.

The lameness was diagnosed by applying positive ambient temperature. In a herd insignificant lameness was established in 12.90 %, average degree of lameness in 62.90 %, significant lameness 33.87 % and very significant lameness in 6.45 % of cows. In case of lameness with locomotion score 3–5, the isotherm of the front hooves was from 7.08 to 7.35 °C and of the hind hooves from 7.65 to 7.85 °C higher in comparison with cows' healthy hooves.

During the orthopaedic analysis, there were established 12 different pathology types under the conditions of positive ambient temperature; the temperature of front and hind surfaces of hooves varied from 26.52 ± 0.25 to 28.55 ± 0.10 °C. In cases of pathologic alterations, the temperature of the surface of cows' front hooves was by 7.71 °C and hind hooves 8.38 °C higher than healthy cows' hooves.

It is expedient to use thermography for examination of cow's hooves health condition because in the early stage it is possible to diagnose the latent development of inflammatory processes and failure of the circulatory system, which are in good correlation with clinical signs.

Keywords: thermography, temperature, cow, hoof