

## RESEARCH ABOUT EVALUATION OF LOCOMOTORY SYSTEM OF SPORT EQUINE THROUGH DIGITAL INFRARED THERMOGRAPHY

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**Key words:** sport equine, lameness, locomotory injuries, digital infrared thermography, soft tissues injuries.

**Abstract.**The thermographic research has been made on a number of 16 sport equines, the majority of them were show jumping horses. Some of them were clinically sound, others were presenting clinical signs of different locomotory injuries. Thus, thermography was used for valuation purposes of locomotory system, in some cases, and in others, this method was very useful in assessing the localization and the extent of the pathological process. At the same time, thermography was used to assess and to monitor the healing process of some old locomotory injuries, in few cases.

Thermography proved to be a very sensitive and accurate method of diagnosis, in the same time being less invasive, very easy to apply in the field condition, and causing no stress or discomfort on examined animals.

### INTRODUCTION

Thermography is the pictorial representation of a surface temperature of an object (8).

It is a noninvasive technique, that measured emitted heat. The heat is generated continuously through the body, and spreaded to the skin, by radiation, convection, conduction and vaporisation. (4, 1)

For that, usually, the skin temperature is about 5 °C lower than the core body temperature (which is 37.5- 38 °C, on equine) (6).

The skin takes its heat from the local circulatory system, and from the tissues metabolism, which is usually constant, and that is why the variations on skin temperature is due to changes in the local circulation. (11, 12).

Normally, the veins are warmer than the arteries, because they are draining the blood from the areas with increase metabolic activity. (10, 13). That is why the medial regions of the distal limbs, that are crossed by epifascial veins, have usually bigger temperatures than the lateral parts. (2)

### MATERIAL AND METHOD

The thermographic screenings have been made by a MMSmed2000, with interface PC2000/e device. The research was made on 16 show jumping horses. The animals were examined on the stable, with respecting the following rules: out of daylight, in the dark, out of draught, in an ambiental temperature between 15-25 °C, in order to avoid the thermal losses through transpiration. The patients were adapted to the ambiental temperature, and were examined before the daily training. They were also out of cold showers, liniments, bandages

or other medication that could modify the skin temperature, with 48 hours before the examination.

The thermograms were made circumferential, from 4 different incidences, to establish if a „ cold spot” or a „ hot spot” is constantly present..

## RESULTS AND DISCUSSIONS

Among the 16 animals examined, 7 (43,75%) were clinically sound after physical examination, and 9 (56,25%) presented different locomotory injuries, with clinical expression. From 16 cases, 5 patients (31,25%) had joint problems, which had been localized through thermography, 2 patients (12.5%) had muscular tears, with no clinical expression, only a decrease of sport performances, 5 patients (31.25%) had tendons injuries, which were on the acute stage, on subclinical stage, or were recovering from older tendon injuries, 6 patients (31.5%) presented different foot problems- mostly on the hoof structures- usually without clinical expression yet, due to poor shoeing and hoof imbalances.

The first two images (fig. 1 and 2) represent the thermograms of a patient with podal troubles, without lameness, but with a decrease of performance activity. It can be noticed a temperature difference of 2.79°C between the thoracic hooves, with the highest temperature on the left fore hoof, these facts being of a pathological significance, because any difference of temperature, of more than 1 °C, between two symmetrically anatomical regions it is considered to be abnormal.

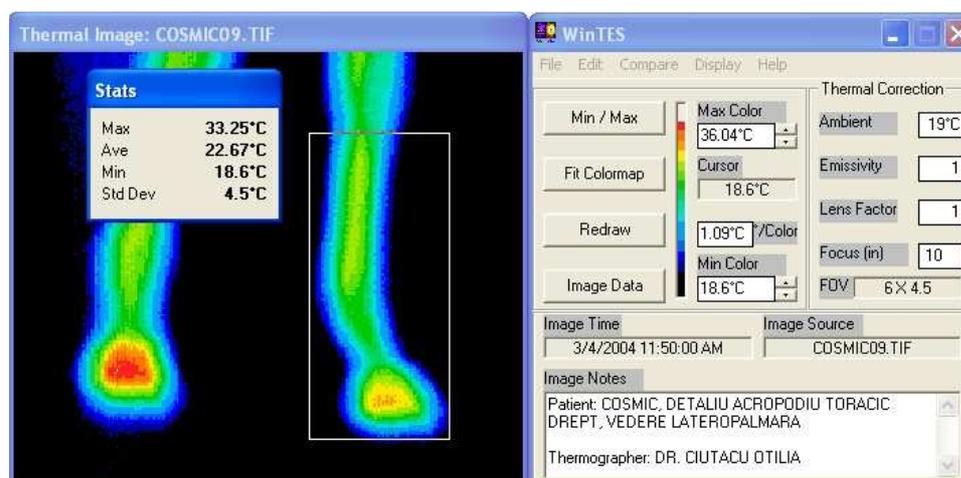


Fig.1.Cosmic, CSR, M, 14 years, right fore limb, lateral view

The third figure (fig.3) represents the thermogram of case 15, an old tendonitis of superficial digital flexor tendon of the right fore limb.

The temperature difference between the sound leg and the one we investigated, is about 2.62°C, which is indicating a recurrence of the old tendon lesion. In that case, thermography helps the trainer to adjust the training programme for that horse, in order to keep him safe, without overexertion of locomotory system.

The 4-th figure is the thermogram for the case 9, diagnosed with a muscle tear of the semitendinosus muscle on the right hind, and it is showing the difference of temperature of 2.7 °C between the right thigh and the left thigh.

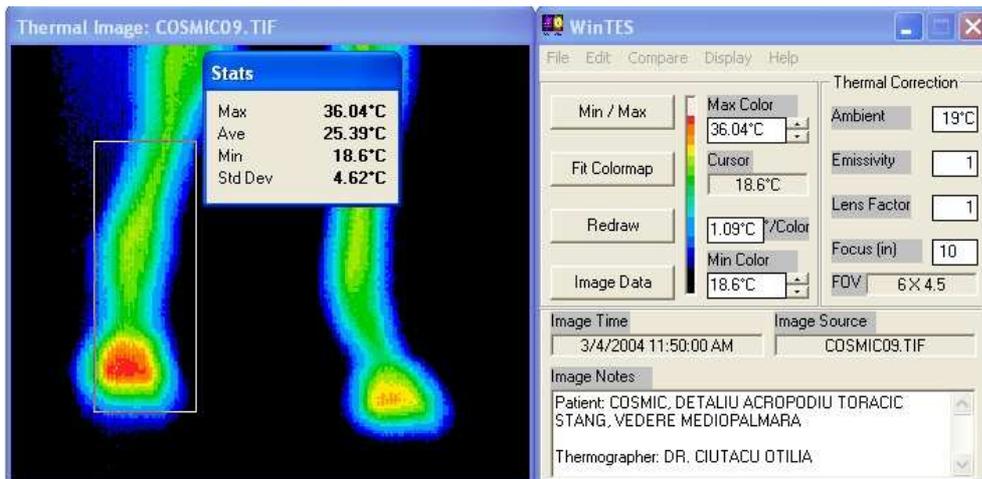


Fig. 2. Cosmic, CSR, M, 14 years , left fore leg, medial view

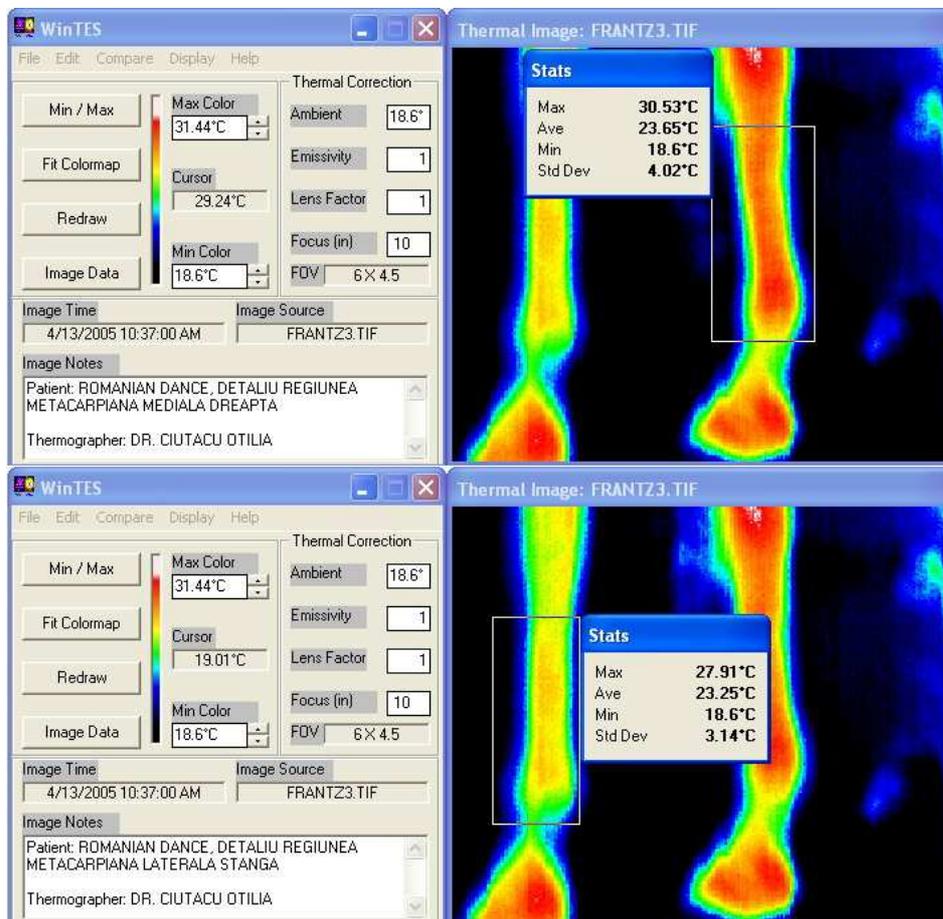


Fig.3. Romanian Dance, PSE, M, 15 years, thoraci limbs, metacarpal regions, right fore, medial view, up; left fore,lateral view, down.,

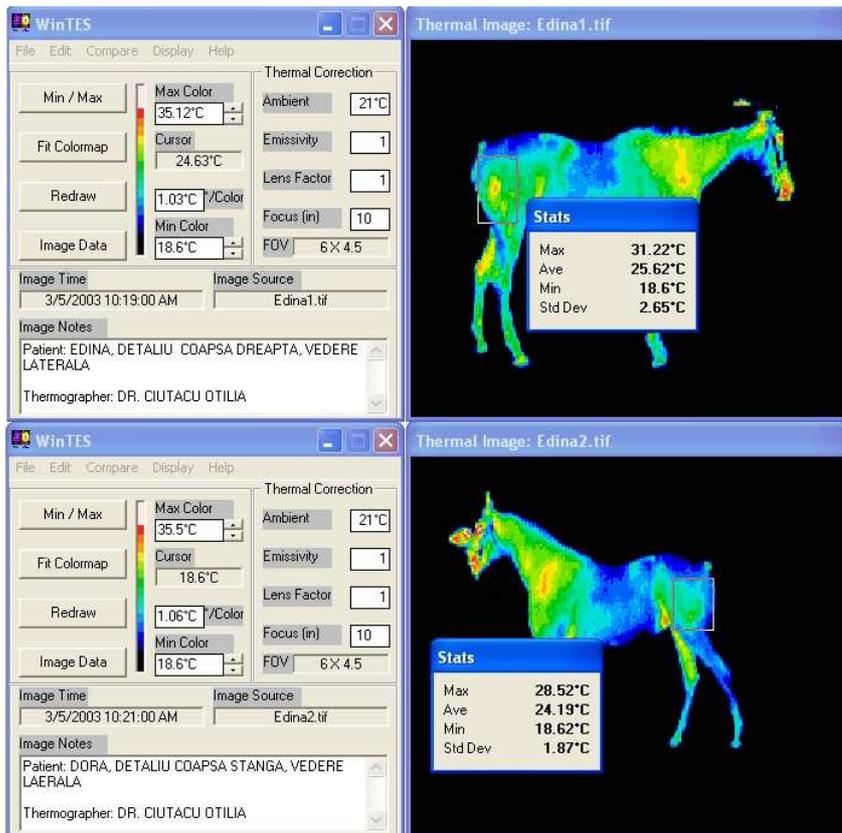


Fig. 4. Edina, F, 11 years, CSR, lateral view of the right thigh, up; lateral view of the left thigh, down

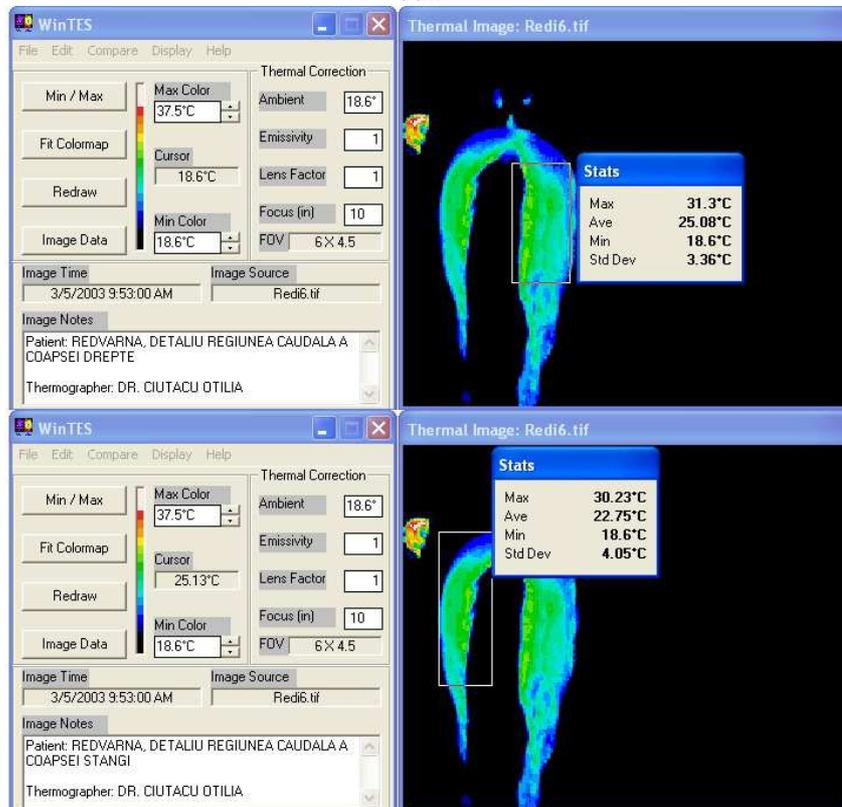


Fig. 5. Redvarna, PSE, F, 5 years, caudal view of the right thigh, up; left thigh, down

The 5-th figure (case nr. 14), is also a thermogramme of an old muscle tear, in the caudal part of the semitendinous muscle. The temperature difference between the two symmetrical regions is about 1.1 °C. In that case, the muscle lesion is about to heal up.

In *table 1* I presented a shynthesis of the analised cases, with the clinical and thermographical diagnoses (the 1-st Annex to „RESULTS AND DISCUSSION”)

## CONCLUSIONS

Thermography, when combined with a thorough clinical examination, is an excellent modality for the assesement of lameness. It is particularly helpful when determining areas of inflammation in the upper limbs, but can also be readily used to assess inflammation on lower limbs.

It has been useful in assessing cases of palmar foot pain and has helped to identify areas , other than the navicular bone , that may be the source of pain.

It has also been useful in the assessment of joint problems, as well as tendon and ligament problems.

Since thie methode is noninvasive, it can readily be used , and with recent technological advances, the equipment is completely portable and can readily be taken to farms, arenas and so on.

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Case no.	Horse name	Age	Sex	Service	Clinical diagnosis	Thermographical diagnosis	Type of lesion
1	ADA	8	F	Show jumping	Hock arthroses	Chornical, degenerative arthritits	Chronic, degenerative, with locomotory disfunction
2	ANDA	13	F	Show jumping	Sound	Subclinical inflammation, of left fore, right hind	Subclinical inflammation, without locomotory disfunction
3	BETTY GREEN	5	F	Galop races	Chronical tendonitis of Superficial digital flexor of left fore leg	Old tendonitis of the superficial digital flexor tendon	Chronical inflammation, with tendon fibrosis, without functional signs
4	BOSS GREEN	12	M	Galop, show jumping	2-nd degree lameness left fore leg	Acute inflammation of the scapulo-humeral joint of the left fore leg	Acute inflammation, with lameness
5	CONTE	8	M	Show jumping	2-nd degree lameness left fore leg, with acute tendonitis of the superficial digital flexor tendon	Acute tendonitis of the superficial digital flexor tendon, on the left fore leg	Acute inflammation, with 2-nd degree lameness,
6	COSMIC	13	M	Show jumping	Sound	Subclinical inflammatory process on the left hind distal limb, due to poor shoeing	Subclinical inflammation, without locomotory disfunction
7	DAN	8	M	Show jumping	2-nd degree lameness right hind hoof	Acute inflammation on the right hind hoof	Acute inflammation on the right hind hoof, with lameness
8	DORA	8	F	Show jumping	Sound (stiff gait )	Subclinical inflammatory process on the left fore-hoof and pastern; subclinical inflammation right hock	Subclinical inflammation, without locomotory disfunction
9	EDINA	11	F	Show jumping	Sound	Inflammatory process on the right tight, in the semitendinous muscle, with elevated temperatures on the entire right hind leg	Subclinical inflammation/muscle tera, right hind leg, tight region
10	ENOL	5	M	Show jumping	Sound	Very good thermal pattern; right dorsal carpal region with a skin scar,healed	Old skin scar healed, on the right dorsal carpal region
11	FELAH	14	M	Show jumping, dressage	Chronic, nodulous tendonitis on the both fore legs, healed, without lameness	Subclinical inflammation on both check ligamanets on the fore legs ; recurrence of the old lesions	Chronical nodulous tendonitis of the boht check ligaments of the fore legs , with recurrence
12	GARIBALDI	8	M	Show jumping	Sound	Subclinal inflammation on the left hind hoof, on the heels region	Subclinical inflammation, without locomotory disfunction
13	IALOMI TA	13	F	Show jumping	3-rd degree lameness left hind leg; abcess on the coffin joint of the left hind hoof	Acute inflammatin on the coffin region of the left hind leg hoof	Acute inflammation, with lameness
14	REDVARNA	5	F	Show jumping	Sound	Healed muscle tear in the semitendinous muscle, right hind leg	Subclinical inflammation; healing muscle tear
15	ROMANIAN DANCE	14	M	Show jumping	Old tendonitis of the superficial digital flexor tendon , right fore limb	Acute inflammation on the caudal metacarpal region of the right fore leg	Recurrence of the old tendonitis, with subclinical inflammation by the time of exmination
16	VALAH	12	M	Leisure horse	Acute tendonitis superficial digital flexor tendon , on the right fore leg; vesicle spavain, left hind leg,	Acute inflammation on the superficial digital flexor tendon, right fore limb; subclinical inflammation on the left hock	1-st degree lameness, right fore leg, with acute inflammation; subacute inflammation on the left hock .

The 1-st annex to „RESULTS AND DISCUSSIONS”: Table 1: Synthesis of analised cases, with clinical and thermographical diagnosi