EFFECTS OF TRANSPORTATION STRESS ON SOME PHYSIOLOGICAL INDICATORS IN SPORT HORSES

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Our research monitored the response of some welfare indicators in sport horses during transport by assessing the intensity of stress during travel time, changes in heart rate, cortisol, lactic acid and creatinine levels. The horses included in the study were separated into 2 groups: horses that were transported for the first time (A n: 12) and horses that had been previously transported (B n: 10).

The values of the indicators varied between the two groups regardless of the fact that travel length and transport conditions were almost identical. The heart rate and cortisol levels were elevated in horses from group A as compared to the ones in group B while the latter showed increased levels of these indicators upon repeating the loading and unloading (100-130 nmol/l). The recorded value of lactic acid was higher for the first group (2,2 mmol/l), only until the moment when the horses adapted to the effort, after which it decreased (1,8 mmol/l).

Transport of horses under certain conditions related to their adjusting to manhandling during loading and unloading operations, as well as the animals’ temper, may be considered a stress factor with significant depreciating effect on horse welfare.

Keywords: horse, stress, transportation, and welfare

Introduction

The necessity of animal transport with different purposes – commercial, sports related, towards slaughtering or other activities – has imposed the health and welfare assessment of horses during long or short distance transport. Transport related stress effects determine in most cases different physiological and behavioural responses, depending on the horses’ ability to adapt. Broom (2000), stated following research that physiological responses are difficult to assess due to the complexity of stress factors the animals are subjected to during transport, such as loading, unloading, the transport vehicle itself, the microclimate on the vehicle, the loading surface, fodder and water deprivation.

An important welfare factor in sport horses during transport is the vehicle, which must be appropriate, according to the animals transported, must be well
maintained and the transport equipment must be kept clean and perfectly functional. Loading and unloading manoeuvres are important as well, as they may reduce fear that is relatively easily installed in horses during transport and may generate and account for a high percentage of limb lesions when handled improperly. Loading/unloading do not represent a problem for most horses, which are more than happy to climb on the platform or walk into the trailer. Easy loading of the horses is a result of caretaker’s experience that uses different methods to direct and handle the animals. Some horses are extremely difficult to load particularly because they had been exposed to prior negative travelling experiences, insecurity, which all are conducive of fear and refusal to be loaded.

Oikawa (1995) state that the health condition of transported horses decreases with travel duration, thus increasing the occurrence of respiratory diseases.

This research monitored the assessment of sport horses response to various stress factors during transport on short distances and their impact on the animals’ welfare.

**Materials and Methods**

The research was carried out on 22 sport horses (male and female), 3 to 14 years old and weighing on average 510 kg ± 10kg. The horses were transported from their stables to other farming or temporary training facilities.

The horses that participated in the study were grouped in two categories: animals that had been transported for the first time A (n: 12) and animals, which had previously had this experience B (n: 10). We completed our research in spring over the course of eight weeks and the distance covered during travel time varied between 200 and 400km (2-5h depending on quality of road).

Specialized horse vehicles with two or more places transported the animals. The horses’ caretakers handled loading and unloading manoeuvres as well as blood sample drawing.

Horse protection norms and standards were observed during transport, in terms of handling manner, allotted surface on the vehicle, vehicle characteristics, fodder and water supplies.

Blood samples were taken by jugular vein puncture on the morning of the journey prior to loading and immediately following unloading, in 1,3 ml Vacutainer tubes with Lithium-Heparin (LH/1,3) that were kept according to working protocol during travel time. This manoeuvre was carried out in the presence of the animals’ caretaker, which minimized their stress during blood sampling. Working and analysis of blood tests was performed in the laboratory.

The level of plasmatic cortisol was obtained by ELISA method and level of plasmatic lactate by means of chemical analysis (IDEXX Vet Test 8008).

The statistical data analysis included the T student test in order to compare the biochemical and haematological parameters of the two horses groups whereas.
Heart rate was measured by a non-invasive method using a cardio-monitor (Polar Electro Oy, Finland). Its electrodes were placed under the girth on each side of the animal and in contact with its skin by means of a gel. The transmitter was horizontally placed on the withers, fixed on the harness together with the recording device. The data recorded throughout the transport was downloaded on a computer and processed by the Polar Equine SW software installed.

**Results and Discussion**

Horse physiological responses during transport may appear following a large number of stress factors, which impact their welfare.

Rose, (1977) state that during endurance exercises, the increase of heart rate in horses shows metabolic diseases, and proves to be a practical, simple and precise method in assessing the „stressed” horses.

The heart rate monitored during transport on horses that participated in the research shows an obvious increase in those loaded for the first time and unaccustomed with this manoeuvre, compared the other animals, which had previously had this experience (fig 1).

![Figure 1. Heart rate variation (bpm) during horse transportation](image)

The increase in heart rate was recorded also in group A horses, as transport was an underlying chronic stress factor. However, the heart rate decreased between loading and unloading time, which shows that animals adapted fairly quickly to the new transporting conditions on the vehicle. The anxiety exhibited by the group B horses was caused by loading onto/unloading from transport vehicles and less by the journey itself.

The heart rate varied with travel time (fig 2), where we noticed the same increase in-group A horses. Hyperpnea and decrease of neurovegetative system
control of the heart rate during transport may result in increased heart rate prevalence.

Measurement of heart rate immediately following unloading of the horses from the transport vehicle may be an important indicator of their health condition and physical performance.

![Figure 2. Heart rate variation (bpm) after different journey hours](image)

The cortisol (corticosteroid hormone produced by adrenal cortex) is directly involved in the bodily response to stress factors by an increase of brachial pressure and glycaemia levels. Blood level cortisol ranges with the circadian rhythm, so that the maximum level is recorded in the morning and the minimum level at night (Evans, 1977). Change in cyclic evolution is directly connected to ACTH hormone activity, stress factors, clinical depression, surgical procedures, anxiety, and pain.

The level of plasmatic cortisol measured during transport in the two horse groups showed an increase in concentration (fig 3). Recorded cortisol values were not low in the horses previously exposed to transport either. The recorded level of plasmatic cortisol did not vary with the travel duration and the horses’ effort to adapt to transport conditions were probably the same, as a consequence of the relatively short travel time (2-5h).
Figure 3. Cortisol level (nmol/l) of horse before and after transport at different hours of the journey

The increased cortisol concentration recorded even after unloading time confirms the fact that this is a stress indicator, as we have showed in other studies. Irvine (1994) state that the cortisol levels in horses removed from their environment increases due to the disruption of the circadian rhythm.

The levels of plasmatic cortisol together with the heart rate may be used as stress indicators in assessing horses’ welfare during transport.

Stress, fear, anxiety may elevate lactate concentration at blood levels as glicogenesis is stimulated by catecolamine.

The level of plasmatic lactate in horses participating in the study showed a drop, particularly in those accustomed to transport (1,9mmol/l) as compared to the ones, which had not previously been exposed to it (2,7mmol/l). This fact is probably due to the former group being used to the handling manoeuvres, which indicates high adjusting abilities.

Conclusions

Horse transport and particularly the loading/unloading time determine changes in the physiological indicators of welfare such as heart rate and cortisol.

The heart rate may be considered a physiological marker, an efficient method in assessing the horses’ welfare level, as its variation indicates the horses’ response to loading/unloading stress.

Under different transport conditions and short travel time, plasmatic cortisol concentrations showed different levels in horses accustomed to transport as compared to the ones travelling for the first time, which were not used to transport related handling. These levels also varied with transport duration.

Lactic acid levels show a drop in horses accustomed to transport thus indicating that a correlation with cortisol levels does not constitute a stress indicator during transportation.


