

Physiological responses of horses in transit and the effect on welfare.

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Introduction

Research examining long distance transportation of livestock, whether cattle, sheep or horses, clearly shows physiological and behavioural signs of stress. Long-haul transport (in excess of 24 hours) is common for breeding and eventing horses. The monetary value of these animals and the reason for transportation demand that the health of the horse on arrival at the destination is not compromised. Welfare issues on transporting animals via sea, air or land will be improved by understanding the physiological responses associated with transportation. The research articles reviewed, investigated the physiological responses of horses undergoing more than 24 hours of transit.

Potential stressors for horses during transportation originate from a number of sources including physical factors such as space, noise, motion and road conditions; psychological stressors and climatic factors such as air temperature and relative humidity and health status (Stull and Rodiek, 2000). The environmental conditions may be detrimental to both the horses immediate welfare (e.g. heat or cold stress) and the related physiological responses effecting post-transport health and performance. Respiratory diseases and even death have been reported in horses following transport (Austin et. Al. 1995). Racklyeft, Raidal and Love (2000), concluded that transportation of any mode, especially over long distances, is the most important predisposing factor for the initiation of disease and pleuropneumonia.

Climatic Conditions

Physiological responses in mature, healthy horses were assessed during 24 hours of transportation and in a posttransport period, using a commercial van, under typical Californian summer conditions (Stull and Rodiek, 2000) A pretransport period (of 2 days) was used to obtain baseline values for data collected. Body weight, rectal temperature and white blood cell (WBC) counts are used as general indicators of good health and demonstrate the horse's ability to handle heat during transport. Rectal temperatures remained constant whilst ambient temperatures exceeded 30°C and relative humidity exceeded 50% - levels that further impair the ability to dissipate heat (Stull and Rodiek, 2000). Weight loss has been documented at 4% in horses undergoing commercial transportation to slaughter in summer conditions (Stull, 1999). A 3% loss in body weight loss persisted 24 hours after transit in commercial vans (Stull and Rodiek, 2000). This findings supports the notion that horses respond to heat stress during transit through respiration and sweating.

International transportation of horses has been associated with observable stress effects on the horses. Delays at airports, ambient environmental conditions and cargo hold temperature all effect the welfare of the horse in transit. The use of containerised horse boxes compared to open containers has helped to reduce some of these stressors. An investigation into the microclimate in an enclosed container (Airstable, Instone Air Services, Crawley, Sussex, UK) during international air transport showed no discernible ill effects on the horses studied (Thornton, 2000). Ventilation in the containers is controlled by air-conditioning units fitted to the roof or by air intake fans also fitted to the roof to draw fresh air from outside or from the plane's air-conditioning system. The temperature in the container was relatively constant during each flight and significantly warmer than in the cargo hold. Relative humidity fluctuated depending on the ambient humidity during airport stops (Thornton, 2000). Temperature control within the containers would contribute to reducing heat or cold stress during transit.

Dehydration

Biochemistry and haematology tests showed no significant changes in electrolytes in the horses undergoing international travel (Thornton, 2000) suggesting that no discernible ill

effects were caused on the horses studied. Horses in commercial vans are more directly affected by ambient environmental conditions. Dehydration measures of haematocrit and total protein increased during transport and returned to baseline during the posttransport period (Stull and Rodiek, 2000). Effects of dehydration due to environmental temperature and limited water consumption during transport diminished remarkably within a few hours of the cessation of transport. However, elevated glucose concentration and lactate produced by anaerobic metabolism are indicators of muscle fatigue and may alter energy metabolism during competition or exercise performed within 24 hours after transit (Stull and Rodiek, 2000). Friend (2000) also found that transporting healthy horses for more than 24 hours even with periodic access to water is likely to be harmful due to increasing fatigue.

Stress Indices

Heart rates monitored during international flights reflected any agitation exhibited by the horses. Agitation was mild and generally associated with take-off, landing and some of the longer stops at airports. Mean plasma concentrations of β -endorphins changed little during the flights and any increases were associated with take-offs and landings (Thornton, 2000).

Stressful situations such as exercise or transportation activate the hypothalamic-pituitary-adrenal axis resulting in an increase in plasma cortisol. Stull and Rodiek (2000) found that plasma cortisol concentration continued to rise throughout the 24 hour period of transit, to peak at the termination of transport and dramatically decline after the stressor (transportation) had been removed. Plasma cortisol concentrations increased during travel for horses with and without water but was greatest in the horses without access to water (Friend, 2000). Cortisol release due to stress may lead to neutrophilia and lymphopenia and increase the neutrophil:lymphocyte ratio. An increase in neutrophil:lymphocyte values, increased white blood cell counts and glucocorticoid release can be indicative of disease, inflammation, surgery and many other types of stress. Large increases in these factors were measured during commercial transportation and it is suggested that this may contribute to disease susceptibility following long-term transport (Stull and Rodiek, 2000).

Other factors that may contribute to increased stress during transportation are adequate headroom for neck movement and forms of restraint for natural head, neck and wither posture. Confinement of horses with their heads continuously elevated above normal standing position for periods of 12 to 24 hours is associated with accumulation of purulent secretions in the lower respiratory tract and the presence of bacteria in these secretions (Racklyeft et.al., 2000). Thornton (2000), found that the numbers of bacteria and fungal spores in the air of the enclosed container varied during flights but were of no apparent significance to the horses' health. Although microorganisms may not exist in significant numbers to cause disease the combination of a compromised respiratory system due to dehydration, air pollutants and a reduced immune system from increased cortisol levels should be considered. The lack of physical clearance of material from within the lower respiratory tract when horses are restrained during transportation and unable to lower their heads is a predisposing factor to lower respiratory tract disease and pleuropneumonia (Racklyeft et.al. 2000).

Conclusions

Physiological stress indices during transportation are important to the welfare of the horse. Horse trainers, handlers and equine veterinarians should be aware of the effects of transportation and understand the impact on athletic performance immediately after travel. If stress is minimised during transit the likelihood of disease and poor performance in the posttransport period will also be reduced

References

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