

Live transport of sheep: animal welfare concerns

An analysis of recent studies concerned with the live transport (by land and sea) of sheep, and welfare implications.

By Lauren Drummer

Word count: 998

Introduction

The *Cormo Express* incident in 2003 focussed attention on the inadequacies surrounding the live transport of sheep (land and sea) and provided impetus for further research in this area. Animals in transit endure a variety of potential stressors, including variance in temperature, humidity and vibration levels, which can severely reduce their fitness (Stockman *et al.*, 2011; Miranda-de la lama *et al.*, 2011). In light of this, many welfare organisations endorse the slaughtering of animals close to their production site. Religious beliefs preclude this in some jurisdictions, such as Asia and the Middle East, where animals must be imported live so that they can be slaughtered in accordance with religious law (Wright & Muzzatti, 2007). Live transport is seen as an important animal husbandry practice and there is continuous investigation into methods of improving welfare standards.

Discussion

Physiological and behavioural responses have been used in many studies to evaluate the adverse effects of transportation on sheep and to gauge the degree of stress imposed. Zhong *et al.* (2011) have used the term "stress" to imply a reduction in fitness as a result of a disruption to homeostasis. They compared the meat quality and physiological responses of sheep (n=72), aged 6, 12 and 24 months, either transported or non-transported, over an 8-hour period. Transport was found to have no significant effect on blood cortisol concentrations, but these varied among different age groups, suggesting that age may affect a sheep's ability to recover from stress (Zhong *et al.*, 2011). Blood was collected only after transport. Monitoring of blood before transport and throughout the trip could be used to confirm a period of recovery and if age affects stress tolerance.

In the past, young animals have been found to suffer more stress during road transport than others (Broom, 2003). However, Zhong *et al.* (2011) found variation in different physiological responses to transport between the three different age groups, such as higher creatine kinase (CK) concentrations in older sheep (indicative of exhaustion) and yet increased 2-thiobarbituric acid reactive substances (indicative of oxidation stress) in the blood and muscle of six-month old sheep. A better understanding of exact responses of different ages of sheep to transportation will facilitate development of specific transport regulations based on age. Transporting sheep separated by age group, rather than with all ages together, may have yielded different results. Further investigation is needed to confirm this hypothesis and ascertain whether there are welfare benefits associated with separating sheep by age (Zhong *et al.*, 2011).

There is further evidence to suggest that sheep tolerance to transportation may be a product of the intensity of the potential stressors and the duration of transit. Stockman *et al.* (2011) investigated the physiological responses of Merino wethers (n=12) to simulated conditions of high heat and humidity that would arise during extended live transport from Australia to the Middle East. Wethers were placed in pens and exposed to gradually increasing temperatures and then two exposures of three-four days to sustained high heat and humidity (up to a maximum of 31°C wet bulb temperature). There was one day at thermo-neutral temperatures between heat exposures (Stockman *et al.*, 2011).

Sustained high heat and humidity resulted in significant physiological changes, such as increases in core temperature, respiratory rate and alterations to blood gas concentrations. However, most homeostatic mechanisms, including blood electrolyte concentrations, were maintained and the wethers recovered quickly (Stockman *et al.*, 2011). Their apparent resilience should not detract from developing strategies to manage the acute physiological changes. Further research in this area should not only focus on how sheep react to intense conditions, but also the effects of prolonged transport and thus the accumulation of heat. It must be noted that sheep are often exposed to more severe environmental conditions during live transport than those synthesised during this study, hence greater physiological responses may arise.

Previous studies have shown that the quality of driving affects the welfare of sheep during road transit. Rapid braking and acceleration around curves have been associated with increased stress and injury to sheep

(Greger, 2007). Recent data place additional emphasis on the importance of route optimisation for improving animal welfare. Miranda-de la lama *et al.* (2011) compared the physiological responses and meat quality of male Rasa Aragonesa lambs (n=48), transported on either smooth two-lane roads or unpaved rural secondary roads for three hours. Vehicle vibrations over the set limit of 7m/s² were measured, blood samples were collected after slaughter (for plasma analysis), and carcasses were analysed (for meat quality). Lambs that were transported on unpaved roads, where sheep were exposed to a high frequency of maximum oscillations, displayed physiological responses such as high cortisol and CK concentrations. They also presented some characteristics of dark firm dry (DFD) meat. This shows that increased magnitude and frequency of floor vibrations are associated with an increased stress response and poorer meat quality (Miranda-de la lama *et al.*, 2011).

Most livestock vehicles are not designed to reduce vibrations (Peeters *et al.*, 2008), so it is imperative that further research is undertaken to improve vehicle design and reduce the vibrations transmitted to the animals. More emphasis must also be placed on route-planning especially with regards to road condition and type. The primary incentive to improve welfare standards may be the associated profit (Miranda-de la lama *et al.*, 2011).

Conclusions

It is evident that sheep show both behavioural and physiological responses to transport indicative of stress. Conditions such as fluctuating heat and humidity and high vibration levels are adverse to sheep health (Stockman *et al.*, 2011; Miranda-de la lama *et al.*, 2011). To improve welfare standards, further research must focus on determining ideal conditions and maximising stress tolerance. This may be affected by factors such as age, intensity of the stressor and duration of transit (Stockman *et al.*, 2011; Zhong *et al.*, 2011). It is often believed that there is an inverse correlation between profit and improved welfare standards, but these studies help to show that improved animal welfare can translate into better meat quality (i.e., economic gain).

References

- Broom, B.M. (2003) Causes of poor welfare in large animals during transport. *Veterinary Research Communications* 27, 515-518.
- Greger, M. (2007) The long haul: Risks associated with livestock transport. *Biosecurity and Bioterrorism: Biodefence Strategy, Practice and Science* 5:4.
- Miranda-de la lama, G.C., Monge, P., Villarroel, M., Olleta, J.L., Garcia-Belenguer, S., Maria, G.A. (2011) Effects of road type during transport on lamb welfare and meat quality in dry hot climates. *Tropical Animal Health Production* 43, 915-922.
- Peeters, E., Deprez, K., Beckers, F., De Baerdemaeker, J., Aubert, A., Geers, R. (2008) Effect of driver and driving style on the stress responses of pigs during a short journey by trailer. *Animal Welfare* 17, 189-196.
- Stockman, C.A., Bames, A.L., Maloney, S.K., Taylor, E., McCarthy, M., Pethick, D. (2011) Effect of prolonged exposure to continuous heat and humidity similar to long haul live export voyages in Merino wethers. *Animal Production Science* 51, 135-143.
- Wright, W., Muzzatti, S.L. (2007) Not in my port: The "death ship" of sheep and crimes of agri-food globalisation. *Agriculture and Human Values* 24, 133-145.
- Zhong, R.Z., Liu, H.W., Zhou, D.W., Sun, H.X., Zhao, C.S. (2011) The effects of road transportation on physiological responses and meat quality in sheep differing in age. *Journal of Animal Science* 89, 3742-3751.