

The Effects of Prolonged Live Transportation on Young Beef Cattle: Are Welfare and Production being Compromised?

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Introduction

Transportation of livestock is a growing social and scientific concern and animal rights groups are pushing governments to further improve standards as research confirms poor welfare implications. There are many reasons for beef cattle being transported live, such as access to slaughterhouses and availability of quality pasture for fattening (Werner *et al.*, 2013). Live transportation is an acute stressor to animals (Swanson & Morrow-Tesch, 2001) and many studies are being conducted to define the welfare and production implications of such activity. This paper discusses three studies on young beef cattle by Earley *et al.* (2012), Werner *et al.* (2013) and Fazio *et al.* (2012), which explore the effects of transportation of young beef cattle with different variables.

Discussion

Stress is a major aspect of animal welfare and can be assessed using many quantitative physiological variables, including heart rate, respiratory rate, cortisol concentration, β -hydroxybutyrate (BHB), urea, packed-cell volume (PCV), creatine kinase (CK), haptoglobin and body temperature (Broom, 2003). Cortisol concentrations are used extensively as an indicator of stress because cortisol is released during the activation of the hypothalamic-pituitary-adrenal (HPA) axis in response to stressful stimuli (Swanson & Morrow-Tesch, 2001). Reduced appetite is another indicator of stress and can be detected by increased BHB and urea; increased total protein, albumin and packed-cell volume (PCV) indicate dehydration (Broom, 2003). The study by Earley *et al.* (2012) investigates these responses as displayed by weanling bulls and heifers transported under EU legislation standards. Heifers (n=52) and bulls (n=26) were transported by road, held in lairage for a day and then transported by sea. The study found that the heifers had no significant changes in plasma cortisol concentration, but elevated levels of BHB, urea, total protein, albumin and PCV indicated that transport had had a negative effect on both heifers and bulls.

The study by Werner *et al.* (2013) investigated the effects of transport on beef calves (n=86) under the standards of Southern Chile. The conditions were markedly different: no food or water was provided for the 63-hour journey. The study found that cortisol concentrations significantly increased prior to loading, suggesting that handling may be even more stressful than travel; during travel, cortisol concentrations remained constant. This finding agrees with Earley *et al.* (2012), discussed above. Similarly, total protein and PCV increased dramatically. Recovery time was also analysed and it was found that it took 3 weeks for these two variables to reach pre-transport levels, contrary to another finding of recovery time being within 17 hours (Pettiford *et al.*, 2008); however, this may be due to the much longer time spent on the road and the fact that food and water was unavailable. Both Werner *et al.* (2013) and Earley *et al.* (2012) also observed a marked increase in CK during transportation. CK is an indicator of muscle bruising or physical exertion (Broom, 2003; Earley *et al.*, 2012) and increases in association with transport duration (Swanson & Morrow-Tesch, 2001). In both studies, bruising may have been caused by vehicle structure, uneven roads and high stocking density. Since duration cannot easily be decreased, changes in these factors may significantly improve welfare.

The third study by Fazio *et al.* (2012) investigated the physiological effects of prolonged transport on young beef bulls (n=13) and also evaluated the outcomes for varying temperaments (i.e., calm versus temperamental subjects). Transportation occurred over two days with a 1-hour rest period every eight hours; hay and water was provided *ad libitum*. The study, interestingly, found an increase in cortisol concentrations in calm bulls as opposed to a decrease in the more temperamental group. Fazio *et al.* (2012) also investigated changes in adrenocorticotropic hormone (ACTH). ACTH is released by the activation of the HPA axis and is a better measure of the intensity of a stressor (Marti & Armario, 1998). Significant ACTH increase was observed in calm bulls. Temperamental bulls had higher initial ACTH concentration, suggesting that the stressor did not increase in intensity from the time of being

handled to being transported. Fazio *et al.* (2012) supports the findings of previous studies that temperament influences the stress responses of bovine livestock. With further assessment, this information may be used to improve welfare by selective breeding for temperament in cattle.

Transportation always appears to result in a decrease in live weight because while stock cannot eat, they can still defecate. Weight loss is a major welfare indicator, if long term, and is probably the most significant economic cost. Ongoing exposure to stressful or unfamiliar stimuli results in delay of recovery and insufficient weight regained (Werner *et al.*, 2013). As discussed above, stress can lead to reduced appetite, an additional cause of weight loss. Earley *et al.* (2012) observed that heifers lost on average 7.6% of their initial weight and bulls, 7.0%, further implying increased stress levels. Werner *et al.* (2013) found a 10.5-11.9% decrease in weight, which affected carcass yield, resulting in economic losses to farmers. This, however, is to be expected as the calves were deprived of feed and water. Fazio *et al.* (2012) observed the largest range of weight loss of 5-14% between calm and temperamental bulls, but it is difficult to avoid weight loss without removing the stressors of transportation.

Conclusion

The three recent studies discussed provide an in-depth analysis of the welfare and economic implications of live transport for young beef cattle. Findings support previous studies, reiterating that transport involves stressful stimuli and significant weight loss. Werner *et al.* (2013), however, is specific to the Chilean industry, where standards for animal welfare may be lower than in other nations. The study recommends specialised vehicles and drivers to handle livestock transportation over the rough Chilean terrain. A possible strategy to improve welfare is to implement international standards and to make the industry more aware of the economic consequences poor standards may have on producers. The effect of temperament should be further researched and, if these findings regarding ACTH are confirmed, selective breeding for calmer animals may improve welfare as they generally show a lower stress response to being transported.

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