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The influence of land transport on animal welfare in extensive farming systems

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Abstract The land transport of animals can have 3 types of influence on their welfare. First, the handling, loading, and novelty of the transport environment and experience can induce a psychological stress response in animals. Second, the withdrawal of feed and water and the need to stand and maintain balance for transport periods can cause a physiological and fatigue challenge to the animals. Finally, the thermal and physical conditions of the vehicle and journey can present a risk to the physical integrity of the transported animals.

The key determinant of animal welfare is the way in which transport is conducted. The stress response during loading and the initial stages of transport may be minimized by careful handling, good design of facilities, and appropriate stocking densities and driving techniques. Where animals are not fed and watered during land transport, they vary in their ability to cope with periods of feed and water withdrawal, depending on their species, age, physiological state, and pre-transport access to feed and water. Journey conditions can also be an influence, with cold conditions exacerbating the effects of feed withdrawal and hot conditions increasing the risk of dehydration. The facilities containing the animals on the vehicle should minimize the risks of physical injury caused by falls, knocks, bruising, and the protrusion of body parts. Stocking density can also be managed to lessen the influences on animal welfare caused by hot conditions. In a well-ventilated vehicle, it is the stationary periods rather than periods in motion that present the greatest risk of heat stress. The opposite is true for very cold conditions. The land transport of livestock is neither inherently good nor inherently bad for their welfare. Rather, it is the way that it is done, and the management of the risks involved, that determine the level of welfare of the animals involved.

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Introduction

The land transport of livestock is an essential element of extensive farm production systems. Particularly for sheep and cattle, widely spread, pasture-based farming systems

result in the need to move animals to central points, whether for sale or slaughter. Livestock may be transported within properties, between properties, and between a property and saleyard, abattoir, feedlot, and pre-export assembly depot. Livestock can be transported to growing and finishing properties, markets, or to make best use of seasonal conditions. In this way, the need to transport sheep and cattle from many disparate points of origin differs from the way in which many other commercial goods are moved from concentrated points of origin, or the more concentrated and vertically integrated pig and poultry industries. For example, in

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Australia, government data indicate that there are more than 70 000 properties with cattle in Australia, and more than 45 000 properties with sheep (ABARE, 2008). In contrast, there are fewer than 2000 pig farms.

Of course, the transport of live animals is completely different from the movement of other commercial goods, because animals have the capacity to suffer. This is recognized in Australia through the development of legislation and in animal welfare codes, in the development of quality assurance (QA) within the livestock trucking industry (ALTA, 2007), and in the QA program for Queensland Rail, which is the only rail network to still transport livestock, specifically cattle (Queensland Rail, 2005). The fact that livestock transport can present specific animal welfare risks also probably influenced the move to have land transport of livestock as the first set of standards and guidelines for animal welfare developed under the new Australian system (de Witte, 2008).

It is the contention of this paper that the land transport of livestock is neither inherently good nor inherently bad for their welfare. Rather, it is the way that it is done, and the management of the risks involved, that determine the level of welfare of the animals involved.

So what are the risks to animal welfare during land transport? We suggest that the animal welfare risks fall into 3 categories: (1) stress and fear due to handling, loading, and the conditions and novelty of transport; (2) hydration, energy, and fatigue challenges that increase with transport duration; and (3) risks to the thermal comfort and physical integrity of the animals. In this paper, each of these areas is reviewed in turn, with a focus on the livestock species.

Stress and fear due to handling, loading, and the conditions and novelty of transport

The challenge posed by the conditions and novelty of the transport experience can be influenced or modified by several factors. These factors include: (1) the selection of animals that are fit for the intended journey; (2) the way the animals are mustered, handled, and loaded; (3) the standard of yard, ramp, and vehicle facilities; and (4) the previous experience and genetic background of the animals.

In general, there is a lack of published scientific literature on the influence of fitness on the welfare of livestock during land transport. Fitness in this context means being of appropriate health and vigor for the intended journey and conditions. Common sense would suggest that animals in poor condition, such as drought-affected animals in reduced body condition, would not have the same capacity to cope with extended transport durations, but this situation has rarely been scientifically investigated outside the confines of practical experiences of transporting drought-affected stock.

A survey of cattle transported by rail in Queensland in the late 1970s (Tobin, 1981), revealed a mortality rate of

0.36%. Cattle, particularly older cows that were in poor body condition at the start of a journey, were at greater risk of death.

There are practical guidelines available for the preparation of stock and determining fitness for transport. For example, to assist in determining whether animals are in a fit state to travel (MLA 2006), a publication for transport operators and animal producers was developed to provide pictorial representation of animals that should not be transported. The guidelines stated that an animal was fit to travel if it: could walk normally, bearing weight on all 4 legs; was not suffering from any visible disease or injury that could cause it harm during transport; was able to keep up with the group at both loading and unloading; could see out of at least 1 eye; and was not in late pregnancy. Similar guidelines were developed in a European context by the Federation of Veterinarians in Europe, and modified by the European Commission Scientific Committee on Animal Health and Animal Welfare (EC SCAHAW, 2002).

Inappropriate mustering and handling can result in animals that are significantly stressed at the beginning of a journey. If mustering has been prolonged, it is recommended practice to allow animals some time to rest before transport. The presence of well-designed and -maintained facilities for loading livestock is critical for promoting smooth animal flow and minimizing stress. Finally, it is important to realize that animals that are less domesticated or that have not been handled very much will be more at risk of stress during mustering, loading, and transport, and more at risk of injuring themselves (or handlers) due to excessive flight responses or fear-induced aggression.

Animals may be managed under extensive conditions with minimal contact with humans so that even the slightest contact can initiate a substantial fear response. Grandin (1997) proposed that previous experience may affect an animal's fear response and may be responsible for the variable results reported in transport studies. For example, extensively reared animals may experience more psychological fear during loading than intensively reared animals. In a study using steers that were not familiar with human contact, handling during loading was associated with an increased cortisol response, which was suggested to be more disturbing than the truck ride itself (Tennesen et al., 1984). For extensively reared livestock, Grandin (1997) suggests that rest stops where livestock are removed from the transport may compromise welfare due to the stress associated with loading and unloading. It may therefore be beneficial to familiarize stock with human handlers on a regular basis to reduce the stress of handling. An important example is that of feral goats, which need to be kept and fed within fenced compounds for some time until they are settled before loading and transport.

In general, loading has been shown to be more stressful than unloading, with more adverse effects on the animals' welfare (Maria et al., 2004). Unloading does not appear to produce a significant stress response, with no increase in

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