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The effects of land transport on animal welfare.

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Summary

Animal welfare during and as a result of transport can be assessed using a range of behavioural, physiological, pathological and carcass quality indicators which are described. Measures of the extent of any disease, injury or mortality resulting from, or exacerbated by, transport are important because health is an important part of welfare. Many of the indicators are measures of stress in that they involve long-term adverse effects on the individual. Factors affecting the welfare of animals before, during and after transport which are discussed are: definition of responsibilities and competence, attitudes to animals and the need for training of staff; planning of journeys and methods of payment of staff; laws and retailers' codes; genetics especially selection for high productivity; rearing conditions and experience; the mixing of animals from different social groups; handling and loading procedures; driving methods; space allowance; increased susceptibility to disease and efforts to minimise spread of disease.

Key words: Welfare, stress, transport, handling, loading, cattle, sheep, pigs, poultry, equines.

1. Introduction

A high proportion of all farmed animals are transported at some stage in their lives, sometimes to places where food is more readily available, sometimes to a different owner and a different place of keeping, and sometimes to slaughter. The handling, loading, transporting and unloading of animals can have very substantial effects on their welfare. The welfare of an individual is its state as regards its attempts to cope with its environment (7) and includes both the extent of failure to cope and the ease or difficulty in coping. Health is an important part of welfare whilst feelings, such as pain, fear and various forms of pleasure, are components of the mechanisms for attempting to cope so should be evaluated where possible in welfare assessment (12,17,22). Where an individual is failing to cope with a problem, it is said to be stressed. Stress is an environmental effect on an individual which overtaxes its control systems and reduces its fitness or appears likely to do so (21). If the effect of the environment is just stimulation, or useful experience, or an adrenal cortex response which has no adverse consequences, the individual is not stressed. Animal protection is a human activity which is directed towards the prevention of poor welfare in the animals. Where poor welfare associated with the transport of animals is prevented, there is an immediate financial advantage because mortality rate and carcass downgrading are reduced. There can also be a long-term economic advantage because many of the general public, being aware of animal transport and concerned about animal welfare during transport, take account of this when deciding whether or not to buy animal products (9,10,11,32).

In this paper the methodology for assessing the welfare of the animals during handling and transport is briefly explained (19). Some of the various factors which affect the likelihood of

poor welfare, including the effects of disease, are then discussed. These are the factors which have been taken into account in formulating O.I.E. Guidelines on animal welfare in relation to transport.

2. Assessing welfare

Welfare indicators which can be used to assess the welfare of animals which are being handled or transported are listed in Table 1. Some of these measures are of short-term effects whilst others are more relevant to prolonged problems (14,21,27). Where animals are transported to slaughter it is mainly the measures of short-term effects such as increased physiological responses, behavioural responses, injury, or mortality which are used but some animals are kept for a long period after transport and measures such as increased disease incidence or suppression of normal development give information about the effects of the journey on welfare.

Table 1 Measures of welfare during and after transport

Behavioural measures of aversion (29,30,31,64,65)

Behaviour measures indicating difficulty in coping (28,38,40,44, 51,53,59,71)

Physiological measures: difficulty in coping (1,14,20,37,40,42,45,49,56,58,59,60,62,71,72)

Measures of immune system function (14,25,43)

Measures of injury in live animals (33,67,68)

Measures of clinical disease (14,22,69,74)

Carcass measures (3,14,33,55,67,68)

Mortality measures (14,48,73,74)

Measures of later reproduction or growth (24,66,67)

As Hall and Bradshaw (35) explain, information on the stress effects of transport is available from five kinds of study:

1. Studies where transport, not necessarily in conditions representative of commercial practice, was used explicitly as a stressor to evoke a physiological response of particular interest (41,66).
2. Uncontrolled studies with physiological and behavioural measurements being made before and after long or short commercial or experimental journeys (2,3,24,50).
3. Uncontrolled studies during long or short commercial or experimental journeys (34,55).
4. Studies comparing animals that were transported with animals that were left behind to act as controls (48,57).
5. Studies where the different stressors that impinge on an animal during transport were separated out either by experimental design (5,20,23) or by statistical analysis (38).

Each of these methods is of value because some are carefully controlled but less representative of commercial conditions whilst others show what happens during commercial journeys but are less well controlled.

3. Disease, welfare and transport

The transport of animals can lead to increased disease, and hence poorer welfare, in a variety of ways. There can be tissue damage and malfunction in transported animals, pathological effects which would not otherwise have occurred resulting from pathogens already present, disease from pathogens transmitted from one transported animal to another, and disease in non-transported animals because of pathogen transmission from transported animals.

Enhanced susceptibility for infection and disease as a result of transport has been the subject of much research, see review by Broom and Kirkden (22). In transported cattle, especially those transported for long distances, there are substantial welfare problems and economic losses caused by “shipping fever”: *Pasteurella* species, bovine respiratory syncytial virus, infectious bovine rhinotracheitis, and para-influenza virus 3. Stress may cause reactivation of viruses which are present in animals from a previous infection.

Many infectious diseases may be spread as a result of animal transport. For example outbreaks of classical swine fever and of foot and mouth disease can be made worse because animals were transported and in some cases transmitted the disease at staging points or markets (56). Major disease outbreaks are very important animal welfare problems as well as economic problems and regulations concerning the risks of disease are necessary on animal welfare grounds. If stress is minimised and the mixing of animals and their products is minimised, disease and hence poor welfare can be prevented or made less likely.

4. Guidelines which should minimise poor welfare of animals during handling and transport

4.1 Plan of guidelines

Laws can have a significant effect on the ways in which people manage animals. Codes of practice can also have significant effects on animal welfare during transport. The most effective

of these, sometimes just as effective as laws, are retailer codes of practice since retail companies need to protect their reputation by enforcing adherence to their codes (18).

In order to produce guidelines which can be used to prevent or minimise poor welfare in animals during transport it is necessary to be aware of the biological functioning of the animals concerned and the attitudes and actions of the people involved in the handling and transport procedures. The remainder of this paper is organised, as in the OIE Guidelines, to consider who is responsible, how they should be trained, what is necessary in planning animal transport, the pre-journey period, loading, travel, unloading and actions if a journey cannot be completed.

4.2 Responsibilities

The welfare of animals during their transport is the joint responsibility of all people involved. These people include: owners and managers of animals, business agents or buying/selling agents and animal handlers. Although much of the remainder of this text refers principally to the people who are handling, loading or moving animals or to the drivers of vehicles, it is important that owners, managers and agents appreciate their responsibilities.

4.3 Training and competence

People are less likely to be cruel to other individuals if they consider that these individuals are aware and sentient. Non-human animals are regarded as aware and sentient by some people but as objects valued only according to their use by others. Hence there is a wide range of attitudes to animals and these have major consequences for animal welfare. During handling and transport, these attitudes may result in one person causing high levels of stress in the animals whilst another person doing the same job may cause little or no stress. People may hit animals and cause substantial pain and injury because of selfish financial considerations, or because they do not consider that the animals are subject to pain and stress, or because of lack of knowledge

about animals and their welfare. Training of staff can substantially alter attitudes to, and treatment of, animals. The circumstance where an untrained person is driving a vehicle and in sole charge of tens or hundreds of animals on a transport vehicle can easily result in poor welfare at the time and a potential for much poor welfare in the future because of the risk of transmission of infectious disease.

4.4 Planning the journey

4.4.1. Aspects of planning

Adequate planning is a key factor affecting the welfare of animals during a journey. Before the journey starts, plans should be made in relation to: preparation of animals for the journey, choice of road or rail, nature and duration of the journey, vehicle / container design and maintenance, including roll-on roll-off vessels, required documentation, space allowance, rest, water and feed, observation of animals en route, control of disease, and emergency response procedures.

4.4.2. Genetics of the animals

Some animals are much better able to withstand the range of environmental impacts associated with handling and transport than are other animals. This variation can be because of genetic differences, which may be associated with the breed of the animal or with selection for production characteristics. There may be differences between breeds in how they react to particular management conditions. For example, Hall et al (38) found that introduction of an individual sheep to three others in a pen resulted in a higher heart rate and salivary cortisol

concentration if it was of the Orkney breed than if it was of the Clun Forest breed. The breed of animal should be taken into account when planning transport.

In some farm species there are consequences for welfare of selection directed towards maximising productivity (9,13). Fast growing broiler chickens may have a high prevalence of leg disorders, some beef cattle which have grown fast have joint disorders which result in pain during transport and some strains of high-yielding dairy cows are much more likely to have foot-disorders. Modern strains of dairy cows, in particular, need much better conditions during transport and much shorter journeys if their welfare is not to be poorer than the dairy cows of thirty years ago.

4.4.3. Effects of housing and the animals' experience of humans

Differences amongst individuals in coping ability also depend on housing conditions and with extent and nature of contact with humans and conspecifics during rearing. If animals are kept in such a way that they are very vulnerable to injury when handled and transported, this must be taken into account when transporting them, or the rearing conditions must be changed. An extreme example of such an effect is the osteopenia and vulnerability to broken bones which is twice as high in hens in battery cages as in hens which are able to flap their wings and walk around (47). Calves are much more disturbed by handling and transport if they are reared in individual crates than if they are reared in groups, presumably because of lack of exercise and absence of social stimulation in the rearing conditions (72).

Human contact prior to handling and transport is also important. If young cattle have been handled for a short period just after weaning they are much less disturbed by the procedures associated with handling and transport (54). All animals can be prepared for transport by appropriate previous treatment.

4.4.4 Selection of vehicle

Since physical conditions within vehicles during transport can affect the extent of stress in animals, the selection of an appropriate vehicle for transport is important in relation to animal welfare. Similarly, the design of loading and unloading facilities are of great importance. The person who designs the vehicle and facilities has a substantial influence, as does the person who decides which vehicle or equipment to use.

4.4.5 Social mixing

For cattle, pigs and some other species, any mixing of animals with those not previously housed with them can cause very poor welfare. If pigs or adult cattle are taken from different social groups, whether from the same farm or not, and are mixed with strangers just before transport, during transport, or in lairage there is a significant risk of threatening or fighting behaviour (33,55,67). The glycogen depletion associated with threat, fighting or mounting often results in dark firm dry meat, injuries such as bruising and associated poor welfare. The problem is sometimes very severe, in welfare and economic terms, but is solved by keeping animals in groups with familiar individuals rather than mixing strangers. Cattle might be tethered during

loading but should never be tethered when vehicles are moving because long tethers cause a high risk of entanglement and short tethers cause a high risk of cattle being hung by the neck.

4.4.6 Space allowance

Before a journey starts, there must be decisions about the space allowance for the animals on the vehicle and the grouping and distribution of animals on the vehicle. For all species, being tied by the neck, body, or leg on a moving vehicle can lead to major problems.

Tarrant et al (68) studied cattle at a rather high, an average and a low commercial stocking density and found that falls, bruising, cortisol and creatine kinase levels all increased with stocking density. A stocking density which is not too high is crucial for good welfare.

4.4.7 Payment of handlers and drivers

The behaviour of handlers towards animals whilst loading and unloading, and the way in which people drive vehicles, are affected by the method of payment. When people are paid more if they load or drive fast, welfare will be worse. Payment of bonuses to handling and transport staff if the incidences of injury and poor meat quality are low improves welfare. Insurance against bad practice can result in injury or poor meat quality.

4.4.8 Other aspects of planning

All of the factors mentioned so far should be taken into account in the procedure of planning for transport. Planning should also take account of temperature, humidity and the risks of disease transmission. Disease is a major cause of poor welfare in transported animals. Planning of

routes should take account of the needs of the animals for rest, food and water. Drivers or other persons responsible should have plans for emergencies including a series of emergency numbers to telephone to receive veterinary assistance in the event of injury, disease or other welfare problems during a journey.

4.5 The pre-journey period

Once the planning is completed, there are certain actions which should occur before the first animals are loaded, including selection of compatible animals in order to avoid the problems described above. Pre-journey rest is necessary if the welfare of animals has become poor during the collection period because of major physical or social problems. Feed and water should be provided pre-journey if the journey duration is greater than the normal inter-feeding and drinking interval for the animal. When animals will be provided with a novel diet or method of water provision during or after transport, an adequate period of pre-exposure is necessary. Before each journey, vehicles and containers should be thoroughly cleaned and, if necessary, treated for animal health and public health purposes.

Inspection of animals to be transported is important in order that animals not fit for transport or likely to transmit disease are not transported. Where an animal handler believes that there is a significant risk of disease among the animals to be loaded, the animals should be inspected by a veterinarian.

4.6 Handling, loading and unloading of animals

The methods used during handling, loading and unloading can have a great effect on animal welfare. Since loading has been shown to be the procedure most likely to be the cause of poor welfare in transported animals, the methods to be used should be carefully planned.

Large animals can be readily moved from place to place by experienced stock-people who move so as to take advantage of the animal's flight zone (32,46). Cattle will move forward when a person enters the flight zone at the point of balance and can be calmly driven up a race by a person entering the flight zone and moving in the opposite direction to that in which the animals are desired to go.

Handling animals without the use of sticks or electric goads results in better welfare and less risk of poor carcass quality. Good knowledge of animal behaviour and good facilities are important for good welfare during handling and loading.

4.7 Travel

The quality of driving of vehicles transporting animals can have great effects on the welfare of those animals. When humans are driven in a vehicle, they can usually sit on a seat or hold on to some fixture. Animals standing on four legs are much less well able to deal with accelerations such as those caused by swinging around corners or sudden braking. Cattle, sheep and horses always endeavour to stand in a vehicle in such a way that they brace themselves to minimise the chance of being thrown around and avoid making contact with other individuals. They do not lean on other individuals and are substantially disturbed by too much movement or too high a stocking density. In a study of sheep during driving on winding or straight roads, Hall et al (40) found that plasma cortisol concentrations were substantially higher on winding than on straight roads.

During journeys animals can become sick or injured. Such animals can be detected and appropriate action taken if adequate inspections are carried out with sufficient frequency. Hence on all but the shortest journeys, it is important that there is adequate opportunity for inspection. There are problems to inspect animals in multi-deck vehicles.

The actual physical conditions, such as temperature and humidity may change during a journey and require action on the part of the person responsible for the animals. A journey of long duration will have a much greater risk of poor welfare and some durations inevitably lead to problems. Hence good monitoring of the animals with inspections of adequate frequency, and in conditions which allow thorough inspection, are important.

4.8 Post-journey treatment of animals

The unloading procedures are mentioned above. In general, more care is needed at unloading because the animals are more likely to be fatigued, injured or diseased.

An animal that has become sick, injured or disabled during a journey should be appropriately treated or humanely killed. When necessary, veterinary advice should be sought in the care and treatment of these animals. At the destination, there should be appropriate facilities and equipment for the humane unloading of animals that are non-ambulatory due to fatigue, injury or sickness. These animals should be unloaded in a manner that causes the least amount of suffering. After unloading, separate pens and other appropriate facilities should be available for

sick or injured animals. Feed, if appropriate, and water should be available for each sick or injured animal.

After vehicles and facilities have been used for animal transport they may harbour infectious agents which would lead to spread of major diseases. Hence proper disinfection and disinfestations are needed.

On occasion there may be reasons why a journey cannot be completed. Hence drivers and owners should be aware of actions which are necessary in these circumstances.

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