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GLOBAL STANDARDS FOR ANIMAL WELFARE DURING TRANSPORT

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Summary

There is much public concern in many countries about the welfare of animals during transport. As a result there are now codes of practice for welfare produced by food retail companies, producer groups and animal protection societies. Such codes, the standards of the World Organisation for Animal Health (OIE) and laws such as those in Europe are based on scientific information about animal welfare during transport. Poor carcass quality is a welfare indicator since it is associated with poor welfare during transport and during pre- and post-slaughter handling. Bruising, bone breakage, pale soft exudative (PSE) meat and dark firm dry (DFD) meat cost much money. Factors which can affect welfare include: attitudes to animals, knowledge about animal functioning and welfare, laws, codes of practice, training, vehicle design, planning of journeys, genetic selection of animals, previous experience of animals, space allowances on vehicles, handling methods and equipment, quality of driving, physical conditions and journey duration. In order to improve animal welfare, education is a key factor. The standards of the OIE provide a useful start in encouraging this and framing legislation.

Keywords: animal welfare, stress, transport, handling, space allowance, driving, meat quality, journey duration.

Introduction

There has been a substantial amount of scientific research in recent years on the welfare of farm animals during transport. This research has been used in legislation in the European Union and many countries. Codes of practice have been developed by many transport organizations. Why has this occurred? What should be the key aspects of the laws and codes? These issues will be addressed in this paper.

Evidence for increased public concern about animal welfare includes: letters to politicians, media coverage, references in parliament, government requests for scientific evidence, scientific advisory committees, funding of research, more conferences and more legislation. Members of the European Parliament have reported that they receive more letters on animal welfare than on any other subject. These concerns and actions in Europe are echoed in many other countries. Animal welfare research, national committees and laws are developing around the world. The OIE is now playing a part in this. Multinational food companies are also having important effects.

Transport refers to the procedures associated with the carrying of animals from one location to another by road, rail, ship or air. An animal transport journey should be regarded as commencing when the first animal is loaded onto a vehicle and as ending when the last animal is unloaded, and includes any stationary resting or holding periods. The same animals should not be regarded as commencing a new journey until a period of over 48 hours, sufficient for rest and recuperation of the animals with adequate food and water provided, has passed since the end of the previous journey. Factors that affect the welfare of animals during handling and transport are described below.

Attitudes to animals

People may be cruel to one another but generally believe that other people are aware and sentient so are likely to feel some guilt if they have been cruel. 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.

In the long term, education has a great effect on human attitudes. People with more knowledge of animal welfare science, and on the physiology, behaviour, and cognitive ability of animals are more likely to treat them in a way that ensures that their welfare is good. 20 years ago there were about six people in the world teaching animal welfare in veterinary, agriculture, biology and psychology courses. Now there are hundreds. For example, there are 32 in Brazil. If people regard animals as non-sentient automata, they may treat them badly. Greater knowledge usually means less cruel behaviour and better welfare. Better education is the key. All staff should have training concerning biological functioning and welfare.

Laws

Laws can have a significant effect on the ways in which people manage animals. Within the European Union (EU), the Council Regulation (EC) No 1/2005 "On the protection of animals during transport and related operations" takes up some of the recommendations of two separate reports: (i) the EU Scientific Committee on Animal Health and Animal Welfare Report *"The welfare of animals during transport (Details for Horses, Pigs, Sheep and Cattle)" (March 2002)* and (ii) the European Food Safety Authority "Report on the welfare of animals during transport" (2004) which deals with the other species. Laws have effects on animal welfare provided that they are enforced and the mechanisms for enforcement within EU Member States are the subject of current discussion.

Codes of practice

Codes of practice can also have significant effects on animal welfare during transport. The most effective of these, sometimes just as effective as legislation, are retailer codes of practice, since retail companies need to protect their reputation by enforcing adherence to their codes (6).

Breed of animal and selection for production characteristics

Farm animals have been selected for particular breed characteristics for hundreds of years. As a consequence, there may be differences between breeds in how they react to particular management conditions. For example, Hall *et al* (14, 15) 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.

Farm animal selection for breeding has been directed especially towards maximising productivity. In some farm species there are consequences for welfare of such selection (4, 5). Fast growing broiler chickens may have a high prevalence of leg disorders and Belgian Blue cattle may be unable to calve unaided or without the necessity for caesarean section. Some of these effects may affect welfare during handling and transport.

Certain rapidly growing beef cattle 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 30 years ago.

Experience that the transported animal has had of: housing conditions, human contact, and social contact

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 osteopenia and vulnerability to broken bones, which is twice as high in hens in battery cages than in hens which are able to flap their wings and walk around (18). 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 (26).

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 (19). All animals can be prepared for transport by appropriate previous treatment.

Design of vehicle, loading and unloading facilities

Poor designs of vehicles, floors and loading facilities can lead to poor welfare in transported animals.

Poor handling, loading, unloading

Well-trained and experienced stock-people know that cattle can be readily moved from place to place by human movements that take advantage of the animal's flight zone (12, 17). 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 animal intends to go.

Handling animals without the use of sticks or electric goads results in better welfare and less risk of poor carcass quality (see Fig. 1). Sound knowledge of animal behaviour and good facilities are important for good welfare during handling and loading.

Fig. 2 shows the cortisol concentration in pigs that were either loaded in a normal manner into a vehicle and transported on good roads, or loaded and then left standing in a well-ventilated vehicle at a comfortable temperature. The high cortisol concentration caused by the loading is apparent and indicates poor welfare at this time.

Bruising, scratches and other superficial blemishes can be scored in a precise way and when carcasses are downgraded for these reasons, those in charge of the animals can reasonably be criticized for not

making sufficient efforts to prevent poor welfare. There is a cost of such blemishes to the industry, as well as to the animals. The cost, in monetary and animal welfare terms, of DFD and PSE meat is huge. When animals are subjected to violent handling and they respond by energetic struggling, a possible consequence is capture myopathy. This muscle damage that occurs will impair muscular action in the future, at least in the short-term, and is an indicator of poor welfare because it reduces coping ability and may be associated with pain (10).

Insert Fig. 1

Insert Fig. 2

Mixing of social groups

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 (13, 20, 24). The glycogen depletion associated with threat, fighting or mounting often results in DFD 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 by 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.

Insufficient space allowed

Some animals stand during all transport, e.g. horses. Others stand on short journeys but lie after a few hours, e.g. sheep. Others lie on all journeys if possible, e.g. pigs, chickens. Animals which stand need space to stand with legs braced so that they can maintain balance on a moving vehicle. They make great efforts not to touch one another. For comfortable standing and lying, sufficient area and headroom are needed. Tarrant *et al* (25) investigated welfare during transport of Friesian steers at stocking densities at the higher and lower ends of the range used in commercial transport in Ireland (Table I).

Insert Table I

Ambient Temperature and other physical conditions

Extremes of temperature can cause very poor welfare standards in transported animals. Exposure to temperatures below freezing has severe effects on small animals including domestic fowl. However, temperatures that are too high are a commoner cause of poor welfare, with poultry, rabbits and pigs being especially vulnerable. For example, de la Fuente *et al* (11) found that plasma cortisol, lactate, glucose, creatine kinase, lactate dehydrogenase and osmolarity were all higher in warmer summer conditions than in cooler winter conditions in transported rabbits. In each of these species, and particularly in chickens reared for meat production, stocking density must be reduced in temperatures of 20°C or higher or there is a substantial risk of high mortality and poor welfare.

Vehicle-driving methods

When humans are driven in a vehicle, they can usually sit on a seat or hold on to some fixture. Cattle 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 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* (16) found that plasma cortisol concentrations were substantially higher on winding than on straight roads. Careful driving and a moderate stocking density are crucial for good standards of welfare.

Disease, welfare and transport

The transport of animals can lead to increased disease - and hence poorer welfare - in a variety of ways: (i) tissue damage and malfunction; (ii) pathological effects which would not otherwise have

occurred resulting from pathogens already present; (iii) disease from pathogens transmitted from one transported animal to another; and (iv) disease in non-transported animals because of pathogen transmission from transported animals. Exposure to pathogens does not necessarily result in infection or disease in an animal. Factors influencing this process include the virulence and the dose of pathogens transmitted, route of infection and the immune status of the animals exposed (21). Enhanced susceptibility to infection and disease as a result of transport has been the subject of much research (3, 7, 8, 9, 22).

The shedding of pathogens by the transported animals results in contamination of vehicles and other transport-related equipment and areas, e.g. in collecting stations and markets. This may result in indirect and secondary transmission. The more resistant an agent is to adverse environmental conditions, the greater the risk that it will be transmitted by indirect mechanisms.

Many infectious diseases may be spread as a result of animal transport. Outbreaks of classical swine fever in the Netherlands and of foot and mouth disease in the UK were much worse than they might have been because animals were transported and, in some cases, transmitted the disease at staging points or markets. Schlüter and Kramer (23) summarised the outbreaks in the E.U. of foot and mouth disease and classical swine fever and found that, once this latter disease was in the farm stock, 9% of further spread was a result of transport. In a recent epidemic of Highly Pathogenic Avian Influenza virus in Italy it was found that the movement of birds by contaminated vehicles and equipment created a significant problem in the control of the epizootic**.**

Major disease outbreaks constitute very important animal welfare as well as economic problems, and regulations concerning the risks of disease are necessary on animal welfare grounds. If stress and the mixing of animals and their products are minimised, disease, and hence poor welfare, can be prevented or made less likely.

Journey duration

If the journey duration is too long, the animals become fatigued and then exhausted. They may be extremely affected by lack of water and lack of food and adverse conditions cause them more problems. (1, 6, 8)

Conclusion

As trade in farm products becomes more and more international, and consumers in increasing numbers of countries demand good welfare standards during animal transport, the necessity for international standards for animal welfare during transport becomes more important. The OIE standards are likely to be a minimum that most countries will follow. However, the standards enforced by food retail companies in some countries will be higher. Hence most countries will choose to use the higher standards.

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Table I - Indicators of welfare at high and low stocking density in transported steers (from Tarrant *et al* (25))

	Low stocking density	**High stocking density**
Falls	1	8
Cortisol ng/ml	0.1	1.1
Creatine kinase	132	687
Bruise score	3.7	8.5

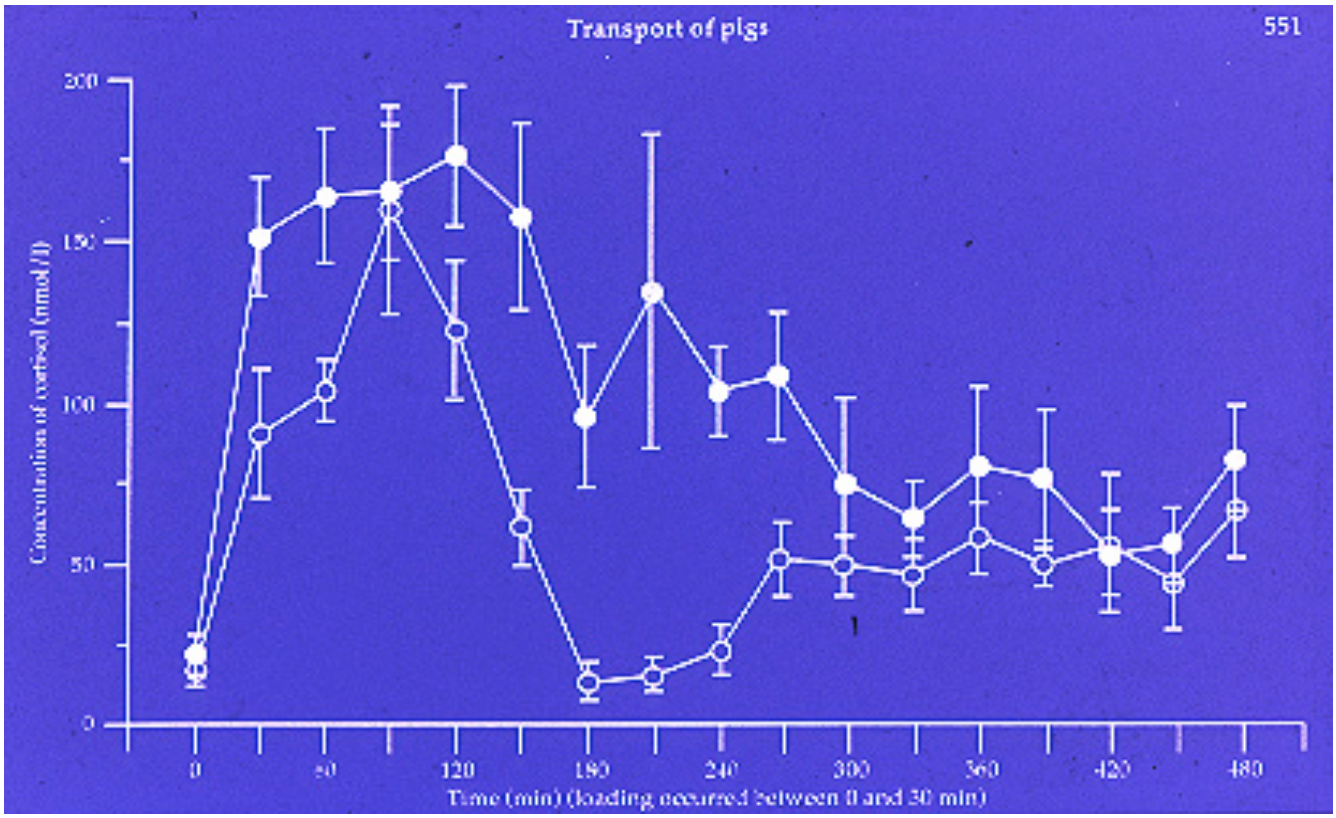
Figure legends:

Fig. 1. Carcasses of calves after transport, some showing extreme bruising and scratching and others showing little (photograph D. M. Broom).

Fig. 2. Concentration of cortisol in plasma in pigs that were loaded onto a vehicle and transported for eight hours (solid circles) or loaded and left in the stationary vehicle (open circles) in good conditions (data from Bradshaw *et al* (2))

Fig. 1

Fig. 2


Transport of pigs
551
200
150
100
50
0
0
60
120
180
240
300
360
420
480
Time (min) (loading occurred between 0 and 30 min)