International transport of animals: problems relating to disease, welfare and stress

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Summary: The author examines reports received by the Office International des Epizooties (OIE) from OIE Member Countries, and presents details and analysis of some of the regulations which currently govern international transport of animals. An examination follows of two of the more comprehensive reports on the subject, prepared on the initiative of the European Commission.

The conclusions drawn from the above sources highlight the need to ensure the following:

a) only healthy animals are transported
b) precautions are taken to prevent the spread of disease during transport
c) satisfactory environments, feed, watering and rest are provided to animals before, during and after transport
d) only qualified attendants, handlers and drivers are used.


INTRODUCTION

On 13 December 1968, the European Convention for the Protection of Animals during International Transport was opened for signature by Member States of the Council of Europe. The preamble to this Convention declares that Member States are “convinced that the requirements of the international transport of animals are not incompatible with the welfare of the animals”. The present paper is concerned with such transport, although internal journeys in many countries, particularly those situated in the Americas, Africa and Australasia, will be longer than many international journeys. For the purpose of this paper, an international journey is defined as “the movement of animals between two independent nation states or groups of nation states involving the crossing of international frontiers with or without transit of intermediate states”. Although this paper concentrates on such journeys and the problems involved, many of the conclusions and recommendations will be applicable to journeys undertaken within national boundaries (1).

In response to a call by the Office International des Epizooties (OIE) for comments on this subject, reports were received from the following countries: Australia, Austria, Belgium, Bulgaria, Chad, Colombia, Cuba, Cyprus, Egypt, Germany, Ghana, Haiti, * The Corn Store, 14 The Street, Appledore, Ashford, Kent TN26 2BX, United Kingdom.
Republic of Ireland, Japan, Kuwait, Madagascar, Mongolia, Myanmar, The Netherlands, New Caledonia, New Zealand, Norway, Senegal, South Africa, Switzerland, Thailand, Turkey, the United Kingdom and the United States of America.

This report therefore takes into account comments from all five regions of the OIE, complementing the report presented by W.A. Edwards at the 15th Conference of the OIE Regional Commission for Europe (4) held in Istanbul in September 1992, which covered only countries of that region.

PROBLEMS

Related to disease

Disease and animal welfare are inextricably linked; one cannot be considered without the other. Disease may arise as a result of infection with a specific bacterial or viral agent, but disease can also be due to a departure from the normal physiological and/or psychological status of the animal. Such departures from normality can often predispose animals to viral or bacterial infection and vice versa.

Reports received from OIE Member Countries contained only one reference to the transmission of a specific disease (enzootic bovine leukosis) through international transport. However, a number of reports made reference to high death rates in captive wild birds both during transport and in quarantine on arrival in the importing country. Other reports detailed deaths during the transport and lairage of animals being consigned for slaughter. These deaths were not attributed to specific disease entities but, by inference, to adverse environmental conditions during transport. Salmonellosis, transit fever and respiratory disease were also mentioned as problems.

Although this was not stated explicitly, every OIE Member Country is also conscious of the need to prevent the transmission of the major epizootic diseases, such as foot and mouth disease, rinderpest and swine fever. There is also the need to prevent the spread of less spectacular but nevertheless very important diseases, such as bovine tuberculosis, brucellosis and leukosis.

Related to welfare

A prime concern of a number of Member Countries is the need to define the maximum duration of the journey of animals being transported for slaughter. There is also a parallel need to agree on the intervals at which animals and birds should be fed, watered and rested. This latter problem was mentioned in many reports.

Some Member Countries consider that the rights and responsibilities of the various agents involved in the international transport of livestock are ill-defined.

Long-distance transport by sea is the concern of some reports, and the problems involved in the disposal of effluent and carcasses are a particular concern of one report.

The varying types and construction of transport vehicles, ships, aircraft and carrying crates, together with the variations in the training of drivers and attendants, cause considerable concern.

Loading and unloading procedures and delays at frontiers are mentioned in a number of reports as harming the welfare of animals.
One report lists the most frequent faults in animal transport, as follows: overcrowding of the means of transport, unsuitable litter and ventilation, inadequate watering and feeding arrangements, and poorly-qualified attendants. These faults were echoed in many of the reports received.

**Related to stress**

A number of reports mention stress and stressors, and in one paper these terms are defined. At present, there is considerable difficulty in measuring stress and relating this to the welfare status of animals. Stress is difficult to define, but is probably best considered as the non-specific response of the body to any demand made upon it.

The agent of stress may be pleasant or unpleasant, but both types of agent produce the same biological response. There are two main physiological systems involved in this response: the hypothalamic-pituitary-adrenocortical system and the sympathetic adrenomedullary system. These two systems are inter-related.

Changes in the behaviour and physiology of an animal are the two parameters which are most easily monitored. Behavioural responses to an arousal stimulus are the first attempts of an animal to adjust to changed circumstances. Such behavioural changes do not necessarily induce a stress reaction. However, if the changes are sudden or if the initial behavioural adjustment does not solve the problem, physiological alterations can come into play.

When there are major changes in feed, water and housing, the sympathetic adrenomedullary response is activated. The neurohumoral response concerns the extent to which the physiological system of the animal is able to adapt to such changes.

When a stimulus exceeds a basic level – in either intensity or duration – this becomes a stressor. The response, an attempt by the animal to cope with stressors, is known as the general adaptation syndrome.

These physiological changes may result in subclinical disease developing into overt disease, as a result of a weakening of the natural defence mechanisms. General immunocompetence may also be affected, leading to changed susceptibility to infectious organisms.

**PROPOSED SOLUTIONS**

Not all countries have specific legislation dealing with international transport. One OIE Member Country reported that on the arrival in the country of 110 non-human primates, all of which were dead, no action could legally be taken as the national Animal Welfare Act in that country did not provide for animals arriving under such circumstances.

However, many countries report quite extensive and detailed legislation covering the following:

- the health of the animals to be exported
- inspection prior to the journey and accompaniment during the journey by a veterinary surgeon
- construction of the means of transport
- approval of attendants.
One report stated that in order to deal with problems relating to disease, welfare and stress during transport, the various stages and procedures during travel need to be defined. The report set out the objectives of international transport, as follows:

- to minimise the risk of the spread of disease
- to deliver healthy animals
- to move animals in the least stressful way in the shortest possible time
- to ensure the welfare of the animals involved.

The same report also suggested that the rights and responsibilities of the following parties must be clearly defined:

- consignor
- conveyor
- consignee
- recipient country
- others.

One report detailed "the set of needs for the safe carriage of sheep by sea", as follows:

- sufficient palatable, nutritionally-balanced feed for physiological requirements
- sufficient drinkable water
- an air supply which is free of noxious gases
- an environment which provides the opportunity for behavioural expression without undue physical restriction
- natural or artificial protection from adverse weather
- protection from parasites, disease, predators and injury
- access to suitable treatment in the case of disease or injury.

This catalogue of needs could easily be adapted for other means of transport (Appendix).

EXISTING LEGISLATION

European Convention for the Protection of Animals during International Transport

This Council of Europe Convention (1) forms the model from which the Transport Directives of the European Community (Union) have been drafted, and was mentioned in a number of the reports received from OIE Member Countries. The provisions contained in the eight chapters (fifty-two articles) of the Convention are designed to achieve "the desire to safeguard, as far as possible, animals in transport from suffering".

The Convention can be broadly divided into three parts, as follows:

- transport of livestock in general
- specific methods of transport (by water, air, road and rail)
- special provisions relating to particular species (domestic birds and rabbits, cold-blooded animals, and "other mammals and birds").

The general provisions in Chapter II (Articles 3 to 16) of the Convention are not presented in the chronological order of activities which make up an international journey. However, these articles cover the following:

- pre-transport preparation of the livestock to be carried, including veterinary inspection, etc.
- loading arrangements
- form and construction of the transport to be used
- the actual journey and the care and attention which the animals should receive during the journey
- unloading and the care and treatment of the animals during at least the first 24-48 hours following the journey.

The following key recommendations within the Convention are absolutely essential to the satisfactory carriage of animals between countries:

- Article 3 (paragraph 1) requires that, before being loaded, the animals “shall be inspected by an authorised veterinary officer of the exporting country who shall satisfy himself that they are fit for transportation”.

- Article 6 (paragraphs 1 and 2) provides that animals shall have adequate space and (except under special circumstances) room to lie down. Paragraph 2 also requires that the means of transport and containers “shall be constructed so as to protect animals against inclement weather conditions and marked differences in climatic conditions”. Even more essentially, paragraph 2 also requires that “ventilation and air space shall be adapted to the conditions of transport and be appropriate for the species of animals carried”.

- General provisions with regard to feeding and watering are to be found in Article 6 (paragraph 4). More specific provisions for domestic birds and rabbits, domestic dogs and cats, and other mammals and birds, are contained in Articles 39, 41 and 42, respectively.

- A general principle in Article 6 (paragraph 4) states that: “Animals shall not be left more than 24 hours without being fed and watered. This period may, however, be extended if the journey to the destination where the animals are unloaded can be completed within a reasonable period.” This requirement has been the subject of much discussion and debate.

**European Community Directive**


The Directive is divided into four chapters and an Annex. The details regarding the treatment of animals during transport are contained in the Annex, which is divided into five chapters, as follows:

**Chapter I** covers the transport of domestic solipeds and domestic animals of the bovine, ovine, caprine and porcine species.

This chapter is divided into five sections as follows:

- **Section A** covers general provisions, including the following important and (in some quarters) disputed provision at Section A 2(a): “During transport the animals must receive water and appropriate feed at suitable intervals. These intervals shall not exceed 24 hours unless an extension of this period by not more than two hours is required in specific cases in the animals’ interest in view, in particular, of the species being transported, the means of transport used, and the proximity of the place of unloading.”

- **Section B** provides special provisions for rail transport.

- **Section C** provides special provisions for transport by road.

- **Section D** provides special provisions for transport by water including transport of animals by road vehicles on board ships.
Section E covers transport by air and states that containers, pens or stalls are required, to comply with the most recent live animal regulations issued by the International Air Transport Association (IATA).

Chapter II relates to the transport of poultry, and domestic birds and rabbits. This chapter requires that, in addition to the general provisions, feed and water shall be available in adequate quantities, except for a journey lasting less than 12 hours (provided that the journey is completed within 72 hours of hatching in the case of “day-old” chicks).

Chapter III relates to the transport of domestic dogs and cats, and requires that these animals be fed at intervals of not more than 24 hours, with water to be provided every 12 hours.

Chapters IV and V cover the transport of other mammals and birds, other vertebrate animals and cold-blooded animals. Both chapters require compliance with the most recent IATA regulations.

No mention is made in the Directive of the movement of animals “on the hoof”. Indeed, this is excluded by the definition of “transport” as “any movement of animals effected by a means of transport which involves loading and unloading”.

Most countries have very similar legislation.

Many reports from OIE Member Countries endorse the IATA regulations covering the transport of livestock by air. Certain parts of these regulations were established in cooperation with the OIE and are included in the OIE International Animal Health Code.

It could be argued that with healthy animals, correct preparation, a suitable means of transport with adequate room and ventilation, and with watering and feeding facilities either on board or provided at resting places at suitable intervals, a journey of almost infinite length is possible without causing distress to the livestock concerned. On the other hand, for susceptible animals (such as fat pigs), poor preparation, poor loading facilities and a poorly-constructed transport vehicle, even a relatively short journey on a very hot and humid day could easily prove disastrous for the animals involved.

PUBLISHED REPORTS

Numerous papers have been published on the subject of the transport of livestock, including two publications from the Commission of the European Communities which contain references to most of the other papers.


The report of this seminar, held in Brussels in July 1981, was published in book form in 1982 (5).

A number of conclusions were drawn from the proceedings, the most significant of which are as follows:

- Much knowledge is available from both scientific observations and practical experience which could be used to improve the transport of livestock. Methods of loading and the construction of vehicles, ships, crates and aircraft could benefit from the application of existing knowledge. It is less clear whether it would be better to disseminate such knowledge by education and advice or to contemplate further regulations.
There would appear to be considerable scope for further direct observation of livestock during transport, particularly since conclusive evidence is lacking on the ways in which animals prefer to align themselves, and whether they prefer to stand or lie during a journey by road.

There is still a need for basic research in some areas, e.g. the effect of transport on reproductive performance, the preparation of animals for transport, the onset of fatigue and its recognition and prevention, and the short- and long-term effect of transportation on the immune system of animals.

Report on the International Transport of Farm Animals Intended for Slaughter

The above report (2) sought to answer the question of "whether there are good physiological, ethological and economic reasons for limiting the final journey to the abattoir of animals intended for immediate slaughter and, if so, for recommending a maximum duration for such journeys". Although this report deals primarily with slaughter animals, the conclusions are applicable to all forms of transport and all species. Some of the more important conclusions are set out below.

Attention to the preparation of livestock prior to transport, improved loading and unloading facilities at the beginning and end of transport, and improved handling and physical transport conditions would result in improved animal health and welfare during transport.

Animals obviously become tired during transport and may be seen to rest in preference to eating after a long journey. However, other stresses can still occur on short journeys, and conclusions cannot be drawn with any certainty on the respective merits and demerits of long and short journeys.

A great deal of knowledge is available which, if implemented, would enable animals to be transported (according to their species, age and condition) with little stress. However, many areas remain where it is impossible to make specific recommendations on transport conditions because vital information is lacking. The appropriate times (according to species, age and physiological condition) at which feed and water should be provided prior to, during, and after a journey are not precisely known. There are great differences between monogastric species and ruminants, and considerable differences in the requirements of both at different times of the year. Optimum stocking densities (by species, age, physiological condition and method of transport) are based to a large extent on practical observations. However, much information is still required - which could be obtained by observational studies - before advice on stocking densities for all animal species and methods of transport can be promulgated. In addition, the ventilation requirements of the various methods of transport are not precisely known for all species, ages and physiological conditions of animals. The effect of lack of rest for all livestock is another area in which little research work, if any, has been performed.

Limiting factors for journey time will depend on the following factors:

- type of species (ruminant or monogastric)
- age and physiological condition (pregnant or not, shorn or unshorn [in the case of sheep], etc.)
- climatic conditions during the journey
- the construction and ventilation of the means of transport
- methods of loading and unloading
The report concluded that further research was required into the following:

- the frequency and means of providing feed and water to animals, prior to and during transport (by age, species and physiological condition)
- the importance of rest during transport and the means by which animals can be provided with environments in which they can rest during transport, or whether there is a need for journeys to be broken for the provision of rest
- stocking densities (by species, age, sex and physiological condition)
- ventilation requirements of the different modes of transport for the different species
- the economic effects of the various methods of transportation (in the case of this report, specifically with regard to meat quality)
- information on morbidity and mortality during transport (by species, age and physiological condition)
- investigation of the design of lairages at slaughterhouses and the provision of water and feed (or not) prior to slaughter
- further investigation of the various physiological measurements which can be used to assess changes in the physiological and psychological status of livestock.

The report suggests two main methods for conducting this further research: observational studies of livestock before, during and most importantly after transport; and co-ordinated basic research.

**CONCLUSIONS**

The following important points arise from consideration of the reports from OIE Member Countries and close examination of the relevant Council of Europe and European Community publications, Convention and Directives:

*a)* The primary and essential need to ensure that animals which are to be transported must not only be seen to be healthy but must not be transmitters of disease.

*b)* The complementary need to ensure that the animals in transit, and animals in the countries through which journeys are undertaken, are not exposed to infection. This requires attention to satisfactory and efficient cleaning and disinfection of transport vehicles and equipment, prevention of entry of potential insect or small animal vectors of disease into transports, and the provision of uncontaminated feed and water.

*c)* Handlers, attendants and drivers must be competent.

*d)* The means of transport must be adequately constructed and maintained in satisfactory condition, and must be suitable for the species of animal to be transported.

*e)* The provision of a suitable environment for the journey, together with feed, water and rest when required, is an essential requirement for satisfactory transport.

*f)* Rules and regulations, if imposed, must be satisfactorily monitored.

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Appendix

OVERVIEW OF CONSIDERATIONS: ANIMAL TRANSPORT

<table>
<thead>
<tr>
<th>Stage of the journey</th>
<th>Problems/requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td></td>
</tr>
<tr>
<td>Veterinary inspection and tests:</td>
<td>Collection of animals from different sources</td>
</tr>
<tr>
<td>- on the farm</td>
<td>Agreement on veterinary certificate by importing, transiting and exporting country</td>
</tr>
<tr>
<td>- in quarantine</td>
<td></td>
</tr>
<tr>
<td>Provision of quarantine/holding premises</td>
<td>Suitable buildings and location; cleansing and disinfection</td>
</tr>
<tr>
<td>Provision of feed and bedding</td>
<td>Suitability of animals and freedom from disease</td>
</tr>
<tr>
<td>Attendants/drivers</td>
<td>Number and competence; potential source of disease?</td>
</tr>
<tr>
<td>Form of transport</td>
<td>Suitable construction; compliance with legislation of exporting, transiting and importing country</td>
</tr>
<tr>
<td></td>
<td>Construction of crates and/or containers</td>
</tr>
<tr>
<td></td>
<td>Cleansing, disinfection and disinfestation</td>
</tr>
<tr>
<td>Approval of route</td>
<td>Approval of relevant authorities</td>
</tr>
<tr>
<td>Provision of suitable staging posts and</td>
<td>Agreement of relevant authorities; provision of ground power units for aircraft</td>
</tr>
<tr>
<td>refuelling stops</td>
<td></td>
</tr>
<tr>
<td>Transit of frontiers</td>
<td>Notification to relevant authorities</td>
</tr>
<tr>
<td><strong>Loading</strong></td>
<td></td>
</tr>
<tr>
<td>Methods:</td>
<td>Type of transport:</td>
</tr>
<tr>
<td>- ramps</td>
<td>- road vehicles</td>
</tr>
<tr>
<td>- tail lift</td>
<td>- sea transport</td>
</tr>
<tr>
<td>- crates</td>
<td>- roll on/roll off transport</td>
</tr>
<tr>
<td>- slings</td>
<td>- air transport; ventilation</td>
</tr>
<tr>
<td></td>
<td>Degree of coercion and/or tranquilisation</td>
</tr>
<tr>
<td><strong>Transit</strong></td>
<td></td>
</tr>
<tr>
<td>Road transport</td>
<td>Provision of feed and water:</td>
</tr>
<tr>
<td></td>
<td>- on board</td>
</tr>
<tr>
<td></td>
<td>- at staging posts</td>
</tr>
<tr>
<td></td>
<td>- ventilation</td>
</tr>
<tr>
<td></td>
<td>At what intervals?</td>
</tr>
<tr>
<td>Air transport</td>
<td>Provision of feed and water; at what intervals?</td>
</tr>
<tr>
<td></td>
<td>Suitable travelling accommodation/crates</td>
</tr>
<tr>
<td></td>
<td>Ventilation at loading, refuelling stops and destination</td>
</tr>
<tr>
<td>Sea transport</td>
<td>Construction of livestock accommodation</td>
</tr>
<tr>
<td></td>
<td>Feeding and watering regimes</td>
</tr>
<tr>
<td></td>
<td>Ventilation</td>
</tr>
<tr>
<td></td>
<td>Protection against the weather</td>
</tr>
<tr>
<td></td>
<td>Route and possible ports of call</td>
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</tbody>
</table>
Roll on/roll off transport

Rail transport

Each transport method will also involve:
- consideration of loading density
- methods of constraint/tethering where considered necessary
- cleansing and disinfection of all structures and equipment prior to use
- disinfection prior to and during transport
- cleansing, disinfection and disinfestation of any staging posts
- satisfactory sources of feed, water and litter on route

**Frontiers**
Veterinary inspections and examination of documentation

**Destination**
Unloading, veterinary inspection, examination of documents
Quarantine and tests

**General problems**

Fatigue and travel sickness and their recognition
Veterinary accompaniment or not?
Limitation on length of journey?
Ban on particular journeys/species?
  - wild birds
  - movement on the hoof
Loading densities; need to consider:
  - length of journey
  - species
  - physiological status (pregnant? unshorn?)
  - climatic conditions

**Solutions**

Basic legislation dealing with principles for all forms of transport and species
Codes of practice dealing with specific methods of transport and species
Training of all staff, with the issue of certificates of competence
Monitoring of journeys by means of:
  - use of instruments (e.g. video recorder)
  - accompaniment.

* * *
REFERENCES


