Critical points in the transport of cattle to slaughter in Spain that may compromise the animals' welfare

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The welfare of cattle depends greatly on the attitudes and training of stockpersons and on the availability of appropriate facilities. Much has been learned about stress during transport, but less attention has been paid to identifying and correcting critical points, partly because they vary widely both nationally and internationally. A survey of cattle transport in Spain was made in an effort to determine which parts of the process most compromised the animals' welfare. Data were collected on the methods and facilities for loading and unloading, transport times, types of vehicle and slaughterhouse practices. Loading facilities were adequate and loading times generally short but some farms continued to use an electric goad and weather-proofing was generally poor. The average journey time within Spain was three-and-a-half hours, but many trips were made abroad (especially to Italy), few drivers received specific training courses and the types and quality of vehicles varied widely. The average unloading time was very short but the animals were not always inspected for injuries or dirtiness. Lairage times were normally more than eight hours but few slaughterhouses had air-conditioning equipment to prevent excessive heat or dehydration. Almost all stockpersons avoided either regrouping animals or housing or transporting animals at high densities.

ACCORDING to Grandin (2000), the welfare of animals is most often compromised by the attitude and training of stockpersons, followed by inadequate facilities. Their welfare also depends on indirect variables such as the traditions, climate, the demographics of the livestock population and the legislation of different countries.

The welfare of livestock when they are being transported to slaughter has received considerable attention in the past decade but most of the studies have been made in North America, Australia, France and the UK (Albright and Arave 1997, Grandin 2000). Less is known about the pre-slaughter handling of livestock in southern Europe where the warmer climate may also influence handling and transport practices. One main directive (91/628/EC and its amendments [see http://europa.eu.int/comm/food/fs/aw/aw_transport_en.html]) controls the transport of live animals in a wide variety of environments in Europe. In Spain this directive should be enforced by the Ministry of Agriculture (MAPYA), but at the field level its administration is effectively devolved to regional authorities, as in many other countries (Harris 1999). Regional differences in legal interpretations may arise in an attempt to improve transport handling, but they may also be used to exploit loopholes and compromise the welfare of animals being transported.

Spain is the second most mountainous country in the European Community and its geography is very diverse. As a result it has a wide variety of climates, agricultural traditions and livestock, with more than 25 national cattle breeds. Over the years farmers have specialised and there is now a clear separation between breeders and feeders. Beef cattle are either bred in France, Ireland or Portugal and imported, or they come from national breeding or dairy farms and are raised on relatively standardised feedlots, with no mixing of ages or sexes. The recent decrease in the numbers of slaughterhouses throughout Europe (Knowles 1999) has increased average journey times and has had detrimental effects on animal welfare and meat quality (Warriss and others 1995). A national survey was therefore carried out to find out more about the transport of cattle to slaughterhouses in Spain, and to try to pinpoint factors that may have the most adverse effects on the animals.

MATERIALS AND METHODS

The procedures for loading, transporting and unloading the animals, and slaughterhouse practices in Spain were surveyed from February to June 2000, and involved 86 farms, 43 truck drivers and 28 slaughterhouses. Questionnaires were completed either face-to-face, by telephone or by mail in all 17 autonomous communities in Spain (the original questionnaire is available at http://wzar.unizar.es/catra). The same questionnaire was used for each interview and one interviewer was responsible for 69 per cent of them.

Farmers were asked to provide specific information about their loading and handling facilities, in addition to the farm's general housing and husbandry practices. The questionnaire was one page long and took about 10 minutes to complete. Almost half of the farmers (45 per cent) mailed in their questionnaires (previously distributed by ASOVAC, the Spanish Beef Cattle Association), and the rest were interviewed either personally (51 per cent) or by telephone (4 per cent).

Truck drivers answered a two-page questionnaire (taking about 20 minutes) on the specifications of their vehicle and their transport handling practices. Most of the interviews (79 per cent) were completed face-to-face, either before loading or after unloading at several slaughterhouses, and 21 per cent were completed by telephone.

Slaughterhouses were asked to complete a three-page questionnaire about their unloading facilities and how animals were handled as they were being unloaded, in lairage and at slaughter, in addition to their postmortem procedures. Nearly half of the interviews were face-to-face (46 per cent), 25 per cent were by mail (distributed with the help of ADITSIC, the Spanish Association of Slaughterhouse and Meat Industry Veterinarians), 18 per cent by fax and 11 per cent by telephone.

Descriptive statistics were calculated and non-parametric analysis was used to compare classes by using Statistix for Windows (Analytical Software 1996).

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TABLE 1: Percentages of farms, trucks and slaughterhouses on which animals were regrouped and driven by different methods during different stages of their journey to slaughter in Spain, and the average duration of each stage

	Loading	Unloading	Slaughter
Regrouped (%)	13·4	4	8·3
Driven (%)			
in groups	91	68	53·8
stick and calls	63	25	7·4
only calls	14·6	39·2	22·2
electric goad	23	35·7	70·4
Average duration (minutes)	16·8	8·4	NA
Morning only	51	17·9	NA

NA Not available

TABLE 2: Number of the 43 livestock drivers questioned who were in different types of employment and the specifications of their vehicles and average road speed

Category of driver or vehicle	Number
Self-employed	31
Contracted	2
Staff	10
Lorries	26
Trailers	7
Road train	10
Double deck	20
Average road speed (km/hr)	71

RESULTS

Loading

The mean (se) size of the feedlots in the survey was 292 (56) animals, and 33 per cent of them had imported animals. Most of the feedlots (>75 per cent) had a loading race and ramp but in most cases neither was protected by a roof. The ramps were nearly all (97 per cent) angled at 20 to 25° and made of cement with anti-slip grooves, 2 to 3 m long, with side railings. Seventeen farms used electric goads to load the animals but they were never used on feedlots with imported (more expensive) animals (Table 1). Regrouping the animals during loading was also uncommon (<15 per cent). Two-thirds (66·3 per cent) of the feedlots had preloading pens where animals were separated from their original pen for a mean of 5 (0·99) hours before they were transported. Many farmers (51 per cent) reported that they tended to load the animals before noon, when the temperature is lower.

The mean loading time was significantly shorter on farms with national breeds, 13·9 (1·2) minutes, than on farms with foreign breeds, 20·2 (1·5) minutes (Kruskall-Wallis statistic 10·8, P=0·0010). In addition, the foreign breeds were more likely to be held in larger and better designed feedlots (Kruskall-Wallis statistic 4·59, P=0·0322) and were more likely to have a race to guide them to the loading site (Kruskall-Wallis statistic 3·51, P=0·0609). The mean number of animals loaded per trip was 16 (1·4).

Farmers were asked their general opinion about their most common loading problems. They underlined difficulties with certain breeds of cattle that are more nervous and difficult to handle.

Transport

To transport livestock in Spain, drivers need a normal truck driver's licence and a permit from the official government veterinarian to certify that the vehicle is equipped to transport livestock. At the moment there are no specific training courses for drivers, although several transport associations and the Spanish Ministry of Agriculture are beginning to control the problem by organising training courses in coordination with local authorities and by enforcing the current European directives.

Most of the drivers interviewed worked at a local level and owned small lorries with two axles and an average floor area of 12 m^2 to carry eight animals. Long-distance journeys (> eight hours) were normally made by truck companies with a staff of drivers. They used lorries with three axles, or lorries with traction units with four to six axles, depending on the model, with room for 20 to 40 animals and with water available on the truck (Table 2). During the survey it appeared that the number of smaller lorries was slowly decreasing, because many of the drivers were older and about to retire, giving way to new large trucking companies with more modern equipment. In both types of vehicle the density of the yearling animals (400 to 500 kg) was consistently around 1·6 m^2/animals. Both drivers and farmers seemed aware of the hazards of overloading, because most of them referred spontaneously to bruising and DFD (dark, firm and dry) meat when questioned about the laws relevant to animal density.

The truck ramps were normally one-piece ramps with hydraulic adjustment. The truck floor was almost always made of reinforced aluminium with anti-slip grooves, and straw or sawdust litter were used only rarely. The average height of the floor was 1·9 m. The roof and walls were made of a variety of materials, including aluminium covered with tarpaulin, steel, fibreglass or widely spaced metal bars.

The mean journey time within Spain was 3·5 (0·4) hours, and the average international journey time was 24 hours, mainly to Italy. As the average feedlot is quite large, most trucks made only one stop to load. Animals could be loaded at any time during the day and not only during the morning or early evening when the temperature is lower. During the journey, most drivers stated that the animals stood at right angles to the direction of traffic rather than in line with it. Once the truck arrived at the slaughterhouse, the mean time before the animals were unloaded was quite short (10·2 [1·8] minutes), and they were normally unloaded immediately.

Unloading

Sixteen of the slaughterhouses surveyed were private, six were public and six were mixed. The mean number of cattle slaughtered each day at each slaughterhouse was 98·3 (21·8) but there were wide variations.

Unloading at the slaughterhouse was typically short and uneventful. The animals were unloaded in groups and each shipment was placed in a separate pen, with no regrouping. Normally, both the driver and slaughterhouse employees unloaded the truck, but the driver unloaded by himself at 12 of the 28 slaughterhouses. A veterinarian inspected the unloading procedure and lairage pens at 20 of the slaughterhouses.

All the slaughterhouses had an unloading ramp and race. The ramp was usually at the height of the first floor of the truck and sloped down at a mean angle of 25°. In all but one of the slaughterhouses it was cement with anti-slip grooves, and a side railing. On average, the races were 15 m long with an anti-slip floor. The animals were cleaned at only nine of the 28 slaughterhouses and only four slaughterhouses evaluated the cleanliness of the animals.

Lairage

While in lairage the animals were kept in groups. The pens varied in size but averaged 24 m^2 and were adaptable, with ceilings >3 m high. Only two slaughterhouses had antimount devices in the pens; they consisted of hollow metal tubes lying horizontally over the pens to impede mounting physically. The floor of the pens was rough cement, with little or no bedding in 26 of the slaughterhouses. A third of the slaughter-

houses kept other species (normally pigs or sheep) near or within hearing distance of the animals. The animals were not regrouped before slaughter. Water was always available and two slaughterhouses provided food under certain circumstances. Only two slaughterhouses had a temperature control device or air-conditioning. The mean lairage time was 8·6 (1·5) hours, usually overnight.

Slaughter

Animals were driven in groups to the stunning box with an electric goad. Of the 28 slaughterhouses in the survey, 23 said that personnel received training at one point or another. All the slaughterhouses had a race to the stunning box, which ranged in length from 3 to 100 m, and they all stunned the animals with a captive-bolt gun. Only one had a box with head restraint. The average time between stunning and sticking was 53 seconds (range 10 to 240 seconds) after which the cattle were held up vertically by the hindleg to bleed. None of the slaughterhouses used electrical stimulation post-mortem to accelerate meat ageing (Gregory 1998).

The time from slaughtering to chilling was normally around one hour, with a maximum of 90 minutes. Most carcases chilled for at least eight hours in the slaughterhouse, depending on the meat buyers. Only eight slaughterhouses measured carcase temperature, pH and bruising before chilling.

DISCUSSION

Cattle are subject to a variety of stressors on the way to the slaughterhouse. One of the problems with measuring the adverse effects of transport is that most of the animals transported are perfectly healthy, young and resilient. It is not always apparent to what extent their welfare may be compromised nor what level of physiological or behavioural change represents a welfare risk (Barnett and Hemsworth 1990).

The types of stress that affect animal welfare adversely may differ between countries or even between farms. A short list of the stressors experienced during transport includes heat, inanition, dehydration, pain and trauma, cold, motion sickness and fear (Gregory 1998). Two specifically European problems are the long journey times due to the recent reduction in the number of slaughterhouses and the continued use of live auction markets (Knowles 1999, Murray and others 2000). According to this survey, neither of these problems is especially important within Spain, where slaughterhouses are relatively abundant and the animals are transported directly to slaughterhouses in journeys usually lasting less than three hours. Internationally, however, there has been a progressive increase in the trade in live animals for slaughter, mainly to southern Italy, and many of these animals were bred in France and transported to Spain for fattening.

The critical points during the transport chain included the lack of weather-proofing and the occasional use of electric goads, which can produce unnecessary stress. Although the Spanish climate is generally mild, occasional rain can seriously reduce the speed of loading. The use of electric goads is most probably the result of poor loading facilities, or the farmer's ignorance, and farmers should be actively dissuaded from using them. Veterinary inspections should also concentrate on smaller feedlots where the loading facilities are often worse than on larger farms.

The journey itself involves a continuous change in environment over a short period of time and an increased possibility of physical damage or injury. Apart from these unavoidable stresses, social stress should be minimal because different groups are not normally mixed (Phillips 1993).

Drivers generally obeyed the rules concerning the space allowed per animal, if not for the welfare of their animals, to avoid economic losses from high bruising scores. However, there is no official training for livestock drivers in Spain, and there are no strict vehicle standards, which leaves a loophole for reckless drivers, to the detriment of the animals.

The time of day for the journey was generally poorly organised, because it is often difficult to coordinate communication between farmer, driver and slaughterhouse, and there is no infrastructure to support it. Heat stress and dehydration could be minimised by an increased effort to transport animals during the cooler early morning and late afternoon.

The animals were usually unloaded quickly and they often walked off the truck voluntarily. An increased effort to clean and inspect the animals after they have been unloaded would increase their comfort before slaughter. The lairage pens were quite spacious, and overnight lairage also helped to let the animals rest, drink water and settle down. Although drinking water containing electrolytes has been shown to prevent excessive weight loss (Schaefer and others 1997), it is not widely used in Spain. This is unfortunate because the high summer temperatures (40 to 45°C) may dehydrate animals in a few hours and decrease the quality of the meat.

The transport chain in Spain seems to work well, which is partly demonstrated by the low incidence of DFD meat in Spain, an average only 5 to 8 per cent (MAPYA). The probable reasons are that many feedlots are relatively new and have a standard design and management, that animals are not regrouped, that the regulations concerning animal densities are respected, that slaughterhouses are generally well equipped, and lastly that the consumers demand high quality products and penalise products from stressed animals. Although the situation is quite good, efforts are needed to implement and improve training courses for the people involved in all aspects of animal handling. Although local authorities play an important role, annual evaluations by an independent group would help to ensure the effective and uniform application of the law in all European countries.

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Evaluation of the potential causes of epistaxis in dogs with natural visceral leishmaniasis

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Haemostasis was evaluated in 19 dogs with natural *Leishmania* infection, six of them with a history of epistaxis, and the results were compared with the results from 24 healthy dogs. In addition, the dogs' blood pressure was measured and biopsies were taken from the nasal mucosa. Buccal mucosa bleeding time was prolonged in the dogs with leishmaniasis (P<0-002) and most significantly in those with epistaxis (P<0-05). None of the *Leishmania*-infected dogs had thrombocytopenia, low levels of plasma von Willebrand factor antigen, a prolonged prothrombin time or activated partial thromboplastin time, a low plasma fibrinogen concentration or high serum fibrin degradation products. These results rule out defects of secondary haemostasis or disseminated intravascular coagulation as significant causes of epistaxis in non-complicated leishmaniasis. Histopathology of the nasal mucosa of 10 of the affected dogs, three of them with epistaxis, revealed ulcerative and inflammatory lesions in all of them.

CANINE leishmaniasis is a disease caused by a protozoan of the genus *Leishmania*. It is an important zoonosis in Central and South America, North Africa, Portugal and the Mediterranean area, where dogs are considered to be the chief reservoir of the parasite (Slappendel and Ferrer 1998). Dogs with leishmaniasis often suffer epistaxis (Longstaffe and Guy 1985, Slappendel and Ferrer 1998), but its cause is uncertain. Many authors have suggested that it is caused by a combination of inflammatory and ulcerative lesions of the nasal mucosa (Ferrer 1992, Mahony and Cotter 1995, Taboada and Merchant 1995) and a haemorrhagic diathesis related to hyperglobulinaemia, paraproteinaemia, azotaemia and/or thrombocytopenia (Slappendel and Ferrer 1998).

Epistaxis may be a sign of defective primary haemostasis, which may result from an abnormal vascular wall, thrombocytopenia and/or defective platelet function. Thrombocytopenia (Ferrer 1992, Bravo and others 1993, Kontos and Kountinas 1993, Slappendel and Ferrer 1998) and vasculitis associated with the deposition of immune complexes have been reported in canine leishmaniasis (Slappendel 1988, Pumarola and others 1991). Defective platelet function might contribute to epistaxis (Valladares and others 1998). Potential causes of platelet malfunction include azotaemia (Wardrop and others 1989, Harris and Krawiec 1990, Brassard and Meyers 1994) and liver disease (Bowen and others 1988, Willis and others 1989), which may develop in dogs with visceral leishmaniasis (Poli and others 1991, Nieto and others 1992, Ferrer 1992, Kontos and Kountinas 1993). The epistaxis in animals with leishmaniasis may thus sometimes be related to platelet dysfunction associated with renal and/or hepatic insufficiency, but epistaxis may also occur in dogs without renal and hepatic disease.

The purpose of this study was to investigate the causes of epistaxis in dogs with visceral leishmaniasis but without either renal or hepatic disease.

MATERIALS AND METHODS

Animals

Nineteen naturally infected German shepherd dogs, of both sexes and between one and 11 years of age, were investigated. They had all lost weight and had excessive scaling of the epidermis as the main clinical signs. Their superficial lymph nodes were enlarged. Six of them had had one or more episodes of epistaxis. Leishmaniasis was diagnosed by an indirect immunofluorescence assay (IFA) (Tesouro 1984) of serum samples, and antibody titres over 100 were considered positive. In order to establish whether there was a relationship between IFA titre and epistaxis the dogs were divided into a group with a low IFA titre (100 to 400) and a group with a high IFA titre (>400).

The control group consisted of 24 healthy German shepherd dogs not suspected of having leishmaniasis and with a negative IFA. *Leishmania*-infected dogs of other breeds were also included for the determination of the plasma concentrations of von Willebrand factor antigen (vWF:Ag), and for biopsy studies of the nasal mucosa.

All the dogs were examined physically, and a complete blood cell count and biochemical tests were carried out. Dogs with renal dysfunction (increased plasma urea and/or creatinine concentrations and proteinuria) or hepatic damage increased plasma activities of alanine aminotransferase (ALT) and/or gamma-glutamyl transferase (GGT) were excluded.

A specific IFA for *Ehrlichia canis* (Sainz and others 1995) was applied to each *Leishmania*-infected dog, and any *Ehrlichia*-positive dogs were excluded from the study.

Clinicopathological measurements

Blood samples collected from a jugular vein were anticoagulated with EDTA or heparin. The blood cells were counted with an automated cell counter (Microcellcounter F-800; Sysmex). Plasma glucose, urea, creatinine, ALT and GGT were assayed

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Notes