

# Using scientific evidence to inform public policy on the long distance transportation of animals in South America

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## Summary

A brief overview of the transportation of livestock in South America is given, with emphasis on scientific reports produced in Chile. Aspects such as journey distances covered, stocking densities used and general handling characteristics, mainly regarding cattle transport, are discussed in relation to their effects on blood variables related to stress as well as on meat quality. A lot of the results are being transferred through talks, training courses and written material to producers, transporters and slaughterhouse personnel; this has produced awareness of changes that need to be made to improve transport and handling conditions. At government level, scientific evidence has shown that existing regulations, usually based on information from more developed countries, need to be complemented by or adapted to local conditions in each country.

## Keywords

Animal, Chile, Livestock, Regulation, Research, South America, Transportation, Welfare.

## Utilizzo dell'evidenza scientifica nell'informazione relativa al trasporto a lunga distanza in Sud America

### Riassunto

*Una rapida rassegna sul trasporto di bestiame in Sud America, con una particolare attenzione alle informazioni provenienti dal Cile. Vengono presi in considerazione, in particolare per quello che riguarda il trasporto di bovini, aspetti come le distanze coperte nei viaggi, il numero di animali trasportati e la qualità del trattamento in relazione agli effetti sulle variabili ematiche e di conseguenza sulla carne in relazione allo stress subito. La maggior parte dei risultati di queste ricerche è stato trasmesso perlopiù oralmente, attraverso corsi di formazione e materiale informativo ai produttori, trasportatori e personale dei macelli; ciò ha portato alla consapevolezza della necessità di un miglioramento delle condizioni dei mezzi e dei sistemi di trasporto. A livello governativo, l'evidenza scientifica ha dimostrato che la normativa vigente, basata perlopiù sui dati provenienti dai paesi più evoluti, va integrata ed adattata alle condizioni locali di ogni singolo paese.*

### Parole chiave

Bestiame, Benessere, Cile, Regolamenti, Ricerca, Sud America, Trasporto.

## Introduction

Animal welfare is being recognised as an increasingly important issue in South America, especially in those countries that trade in meat with Europe or the United States. Livestock producers as well as veterinary services related to ministries of agriculture, are aware that international commercial agreements exert them to meet animal health regulations, but also other requirements of traders and consumers, such as product quality and ethical considerations for product positioning. In most countries in South America general legislation on animal welfare exists, but only in a few cases is this legislation based on standards of the World Organisation for Animal Health (Office International des Épizoties: OIE) or does it refer specifically to transport (14).

Transportation of live animals for export from South American countries deals with many different species, but mainly with individuals for breeding or pets, in which case conditions are carefully monitored. Farm animals destined for slaughter are exported in exceptional cases only, thus transportation occurs mainly within countries (14). Due to country size, climatic and geographic conditions, as well as socio-cultural differences, large variations between countries should be expected within South America, not only in terms of farm size and production characteristics, but also in terms of distances travelled by farm animals and conditions experienced during journeys. There is little information published in scientific journals regarding live animal transportation in South America be it just descriptive accounts or information on the consequences of transportation on animal welfare and meat quality (3, 15, 16, 17, 19, 25, 26). However, information can be found in local technical bulletins and proceedings from scientific meetings. Most of this information deals with cattle and sheep and comes from Uruguay (4, 8, 21), Chile (1, 2, 7, 22) and Brazil (27), but studies have also been conducted on the transport and preslaughter handling of pigs and poultry in Brazil (5, 9, 10, 11, 12), horses for slaughter in Chile (29) and even fish, also in Chile (20).

Generally speaking, transport of animals in countries of South America to auction markets or for slaughter is mainly terrestrial (Figs 1 and 2). Only in a few cases does transportation include ferry crossings or short passages on boats. Journey durations range from 1 h to 12 h, but occasionally can reach up to 60 h (14). In cattle and sheep, it is common that the duration of a journey is increased because of intermediate dealers, or delayed because of unfavourable climatic conditions (heat, rain, storms) or the poor condition of roads. In addition, in most countries, animals are subjected to long lairage times after arrival at the slaughterhouses, either because of regulations stating long minimum lairage times or because of inadequate planning, thereby prolonging fasting. Other problems encountered include overstocking to reduce transport costs and bad practices during loading and unloading, worsened by



Figure 1  
Leading cattle on the farm to transportation vehicles



Figure 2  
Loading cattle onto a livestock transportation vehicle

inadequate design and poor maintenance of handling structures and livestock transport vehicles. In spite of the need for long journeys, provision of water and feed in the vehicle and at resting stops are uncommon. Bruises and dark cutting are among the main meat quality problems encountered in cattle due to excessive transport and poor handling (Fig. 3) (4, 8, 13, 21). In the case of pigs and poultry, the meat chain is shorter, usually farms and slaughter facilities are integrated so that transport distances are short, but observations still indicate that there is a great deal of mistreatment during handling and that welfare and meat quality problems could be significantly reduced through improvements in transport and handling (12).

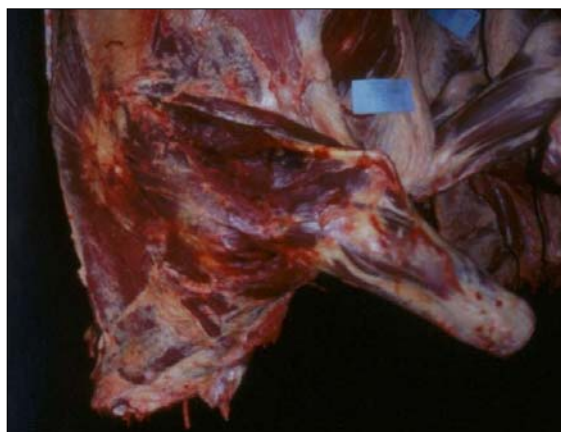


Figure 3  
Bruises due to transport and bad handling

### Case study: Chile

Long transport journeys without water and feed, as well as prolonged lairage times in slaughterhouses are characteristic features of the beef trade in Chile (13). Due to its impact on animal welfare, meat quality and economic losses, the National Commission for Science and Technology (*Comisión Nacional de Investigación en Ciencia y Tecnología*: CONICYT) has funded studies (Research Projects 1980062-1010201-7010201 and 1050492, FONDECYT/CONICYT, Chile) over the past 10 years to quantify the problem and propose appropriate solutions.

Over 400 steers representative of the most common type, weight and conformation

slaughtered in the country were submitted to different transport journeys between the farm and the slaughterhouse (duration was 3 h, 6 h, 12 h, 16 h and 24 h). Blood variables related to stress (cortisol, glucose, packed cell volume, lactate, creatinphosphokinase, etc.) were determined before and after treatment, and measurements of live weight, carcass weight, carcass pH (at 24 h) and colour of muscle (*longissimus thoracis*) were taken to assess the economic and welfare effects of the different treatments.

Compared to 3 h journeys, the longer journeys (12 h, 16 h and 24 h) resulted in greater reductions in live weight, more bruises and a higher proportion of animals that fell (15, 16); 16 h and 24 h journeys increased by 3.6 and 5.4 times, respectively, the probability of high pH carcasses (pH>5.8) compared to 3 h journeys; a lairage time of 24 h increased this by 9.4 times compared to only 3 h (3). After the longer journeys and the longer lairage periods (12 h and 24 h compared to 3 h), the carcass weights tended to be lower, the muscle pH higher and the colour darker, with more carcasses classified as 'dark cutters' (17). Results regarding blood variables related to stress showed that non-stop journeys carrying cattle that lasted 24 h and 36 h were detrimental for animal welfare (25, 26). In addition, due to fatigue, cattle start to fall after 12 h, thereby increasing bruises. Moreover, there was no beneficial effect on the welfare of the animals after a long lairage time after arrival at the slaughterhouse (25). These results have been given to producers and transporters to reduce losses and are being taken into consideration with a view to amending regulations.

A survey of the type and structure of livestock transport vehicles and the stocking densities used commercially for cattle destined for slaughterhouses (Fig. 4), showed that, upon arrival at the slaughterhouses, the mean stocking density was 455 kg live weight/m<sup>2</sup> (19). As there was no indication that space allowance in longer journeys was different from shorter journeys, this means that cattle transported for longer distances are usually initially loaded at much higher densities. In



Figure 4  
Overcrowded cattle being transported to the slaughterhouse

fact, 34.4% of the 413 loads surveyed arrived at estimated stocking densities higher than that permitted by the current legislation ( $500 \text{ kg/m}^2$ ). On the other hand, an experimental comparison of stocking densities of  $400 \text{ kg/m}^2$  and  $500 \text{ kg/m}^2$ , resulted in the latter producing higher bruise scores in the case of 16 h journeys, although no differences were found in 3 h journeys (28). In Chile, carcasses with bruises that affect muscle are downgraded and bruised tissue must be trimmed (Figs 5 and 6), the economic value of the carcass is therefore reduced. Consequently, there might be benefits for both animal welfare and meat quality to reduce stocking densities, at least for long trips. At present, transporters are made responsible for these economic

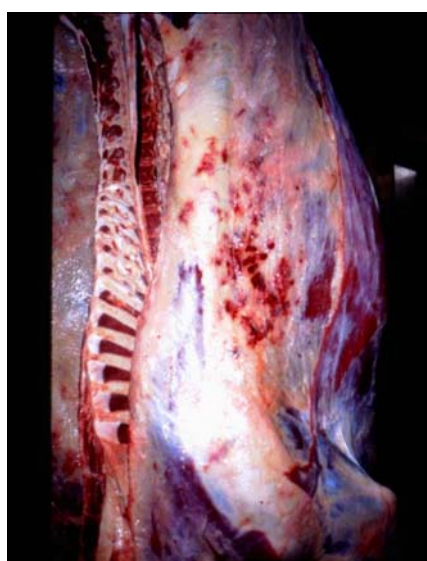


Figure 5  
Carcass showing pointy stick marks due to bad handling



Figure 6  
Carcass showing severe bruising due to lack of care during transportation

losses, hence results are taken into account when calculating transport costs.

The above-mentioned studies, undertaken in commercial conditions but on experimental groups of animals, raised the need for more knowledge on the situation of transport and handling of animals prior to slaughter and on meat quality. Led by the association of Chilean slaughterhouses, an evaluation was undertaken of the transport and slaughter conditions for cattle and sheep in the main large slaughterhouses. Results showed that overcrowding was a common problem and that transporters and animal handlers have no training (Figs 7, 8 and 9) (24). An evaluation of animal welfare during handling in crowded pens, single-file chutes and during stunning in the same slaughterhouses showed that handling of cattle before slaughter is deficient when compared to international standards. A high proportion of animals are prodded, slip or vocalise. Stunning is inefficient as a high proportion of animals show signs of recovery after stunning (6). At an experimental level, it



Figure 7  
Crowding of mules in transport



Figure 8  
Transportation of livestock, leaving little space  
for movement

has been demonstrated that simple changes to infrastructure, replacement of equipment and employee training can significantly increase the efficiency of the pneumatic captive bolt stunning process in cattle (18). In collaboration with the association of slaughterhouses and with the support of the *Fundación para la Innovación Agraria* (FIA, Chile), the Universidad Austral de Chile, created a centre

for the training and research in animal welfare in 2007 ([www.bienestaranimal.cl](http://www.bienestaranimal.cl)).



Figure 9  
Transportation of lambs in a triple-deck vehicle  
to the slaughterhouse

Lately, attention has been given to a journey that includes a maritime ferry crossing lasting 24 h, with a total mean duration of 39 h (1, 2); it concerns the transport of around 25 000 head of cattle and 15 000 sheep annually. Results have shown that stocking densities used for adult cattle are the same as for shorter inland road journeys, although density is reduced for the transport of weaned calves for fattening. There is no water availability and ventilation can be a problem when vehicles transporting livestock are loaded in closed compartments instead of open decks on ferries (Figs 10 and 11). Live and carcass weight losses are significantly higher in lambs that undergo these prolonged journeys compared to lambs slaughtered locally (7). In steers, the main risks are dark cutting and bruises (22). Studies are being conducted at present to see if welfare and meat quality can be improved by reducing stocking densities and by providing animals with water during these journeys. Research into the effects on other species, such as horses (29) and farmed salmon (20) was launched recently.

The above studies have provided support for the amendment of Chilean regulations for the slaughterhouse structures and there has been a reduction in the compulsory minimum lairage times for large farm animals (from 12 h to 6 h).



Figure 10  
Cattle transported on an open-deck ferry



Figure 11  
Cattle transported on the closed deck of a ferry

Furthermore, the associations of both meat producers and of slaughterhouses, are requesting that the existence of a compulsory minimum lairage time be eliminated, so that livestock can be slaughtered as soon as possible after arrival. On the other hand, the Ministry of Agriculture has produced written and graphic guidelines for the handling of cattle on farms, at livestock markets (Fig. 12), during transport and slaughter (23) and slaughterhouse regulations state that the training of slaughterhouse personnel is compulsory. An animal welfare committee has been created by the Ministry of Agriculture, and its first duty is to review the current regulations on cattle transport, taking into consideration national research results and OIE standards.



Figure 12  
Loading cattle at a livestock market

## Conclusions

Due to the socio-economic and cultural situation in many South American countries, it is obvious that there are more urgent needs to solve than animal welfare, and that the interest in this issue is based on economic rather than on ethical reasons. Therefore, research into the consequences of animal transportation on meat quality becomes relevant. South America boasts some of the main meat exporting countries of the world (Brazil, Argentina, Uruguay) and there is an increasing awareness among consumers on the ethical aspects within the broad term of 'meat quality' that provides a good opportunity to improve quality assurance schemes and set good livestock practices that take into consideration animal welfare on the farm, during transport and at slaughterhouse as a component in the production chain. There is need for more local research to endorse transport and slaughter regulations locally and also to ensure that animal handlers and transporters along the meat chain are trained appropriately and informed sufficiently to ensure that significant improvements will be seen in both animal welfare and meat quality.

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