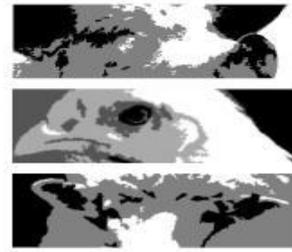


ANIMALS IN TRANSIT

THE JOURNEY AHEAD



RSPCA AUSTRALIA SCIENTIFIC SEMINAR 2008

TUESDAY 26 FEBRUARY CSIRO DISCOVERY CENTRE CANBERRA

Speaker abstracts

Setting the scene – The context and welfare consequences of animal transport

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RSPCA Australia has a long history of interest and involvement in improving the welfare of transported animals. This stems from the formation of the organisation in 1980, when one of its first objectives was to tackle the long-distance transport of livestock and more specifically, the live export trade. From these beginnings, RSPCA Australia developed specific policies on the transport and export of animals, which have formed a significant component of the organisation's work over the subsequent decades.

The main focus of the 2008 RSPCA Scientific Seminar is the transport of livestock within and from Australia. The emphasis on livestock transport reflects the situation that, of all the types of journeys that animals undergo, the numbers of animals involved and the distances travelled mean that the livestock sector raises the most concern for animal welfare.

There are two major scenarios for livestock transport in Australia: the land transport of animals for sale or slaughter; and the export of livestock by sea (and to a much lesser extent, air). It is estimated that over 500 million animals are transported for slaughter or sale every year, with a further 4-6 million exported live. The vast majority of these animals are farmed birds (meat chickens as well as spent layer hens and other poultry) on their relatively short journey to a processing plant, but around 30 million sheep, 9 million cattle, 5 million pigs, and 1 million goats are transported for slaughter every year, many over relatively short distances within their region, but also interstate or to export ports over distances over 1,000 km.

Transporting animals is an inherently stressful process, and one that requires proper consideration of many factors to ensure good outcomes for the animals concerned. The position held by RSPCA Australia is that animals should not, therefore, be transported unnecessarily and must not be assembled, loaded, transported or unloaded in a way which is likely to cause injury, suffering or distress. For the RSPCA, this means that journey times should be as short as possible, and in the case of slaughter animals, that transport should be no further than the location of the nearest available abattoir. But Australia is a vast country with a varied climate and geography, a diverse livestock production industry, and a federal system of animal welfare legislation. This makes the process and policing of animal transportation complex and difficult, and there are many barriers to reducing maximum journey times and avoiding unnecessary journeys.

The 2008 RSPCA Scientific Seminar aims to examine our current knowledge of the impact of these journeys on animal welfare, as well as those measures currently in place or in progress to improve standards and outcomes for the welfare of transported animals. Only by gaining a better understanding of the effect that transport has on the welfare of those animals involved, will we be able to improve practices and develop standards that truly have a scientific basis, and thus a generate real improvements.

Impact of land transport on animal welfare

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Because of the extensive nature of many animal production systems, there has always been a need to move animals to central points such as saleyards, feedlots or abattoirs. Although animals were originally moved on foot, particularly since the late 1920s, there has been an increasing use of mechanised transport by road and rail. Today the vast majority of animals are moved by road. The land transport of animals can have three types of impact on their welfare. Firstly, the handling, loading and novelty of the transport environment and experience can induce a psychological stress response in animals. Secondly, the withdrawal of feed and water, and the need to stand and maintain balance for transport periods, can cause a physiological and fatigue challenge to the animals. Finally, the thermal and physical conditions of the vehicle and journey can present a risk to the physical integrity of the transported animals.

To consider each type of challenge in turn, it is almost inevitable that all animals, unless they have been extensively transported previously, will exhibit some level of stress response during loading and the initial stages of transport. This stress response may be indicated by increases in heart rate, respiration rate, body temperature, and the release of stress-sensitive hormones. This stress response is not usually harmful, and may be minimised by careful handling during loading, good design of loading and vehicle facilities, and by appropriate stocking densities and driving techniques. Studies that have examined animal responses during a journey have typically shown that the animals become adapted to good practice transport within 1 to 2 hours, and that the initial stress response will decline during the transport event.

Animals are not generally fed and watered during land transport. Where feed and water are made available, animals may not consume very much, due to the novelty of the environment and potential difficulties with access. Therefore, the absence, or at least some restriction, of feed and water are part of the transport experience. Animals vary in their ability to cope with periods of feed and water withdrawal, depending on their species, age, physiological state and pre-transport access to feed and water. Journey conditions can also be an influence, with cold conditions exacerbating the effects of feed withdrawal, and hot conditions increasing the risk of dehydration. Although the basic limits for acceptable durations of feed and water withdrawal are understood for most animal classes, good transport operators adjust journeys to work within and below these limits according to the conditions of the animals and the journey.

The facilities containing the animals on the vehicle should be designed, constructed, maintained and operated in such a way as to minimise the risks of physical injury caused by falls, knocks, bruising and the protrusion of body parts. Risks to animal welfare can further be minimised by careful handling during loading and appropriate stocking densities. Stocking density can also be managed to lessen the impacts on animal welfare caused by hot conditions. In a well-ventilated vehicle, it is the stationary periods rather than periods in motion that present the greatest risk of heat stress. The opposite is true for very cold conditions.

Impact of land transport on animal welfare: Case study (land transport of sheep and cattle)

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Australian livestock road transport practices are different to those in many other countries, due to the extensive nature of our farming conditions and the distances involved. This has prompted differences in welfare codes for transport compared with other countries. Prior to 2005, there was little scientific evidence of the welfare outcomes for cattle and sheep transported under Australian conditions. This combination of uniquely different transport practices and a lack of supporting scientific evidence left Australian livestock industries vulnerable to question on animal welfare grounds. In 2005, a joint Meat and Livestock Australia and CSIRO Livestock Industries project was initiated to scientifically examine the animal welfare outcomes of Australian livestock transport practices. The research focused on two key issues: transport duration (maximum water deprivation times) and the effects of pre-transport curfews (periods of food and/or water deprivation).

Under the current Model Codes of Practice for the Land Transportation of Cattle and Sheep, the maximum allowable duration for mature non-lactating cattle and sheep is 36 h. However, this can be extended to 48 h if the animals are not displaying obvious signs of fatigue, thirst or distress and if the extension allows the journey to be completed within 48 h.

To examine the effects of transport duration, healthy, mature cattle and sheep were transported on commercial livestock vehicles between 6 and 48 h (cattle), or 12 and 48 h (sheep). The changes in bodyweight, lying behaviour, haematology and blood chemistry post-transport and during a 72 h recovery period were determined. The greatest difference between treatments was observed immediately on arrival, although this was not large for some measurements and generally still within normal physiological values. Moreover, the transport-mediated changes had generally resolved by 72 h post-transport. The results of these studies indicate that healthy cattle and sheep that have unrestricted access to food or water prior to transport can be transported with best practice under good weather conditions for 6, 12, 30 or 48 h duration without undue compromise to their welfare.

Pre-transport curfews where cattle and sheep are held off food and/or water for a period are commonly practiced in Australia. There is a view amongst transport operators that curfews are beneficial, enabling animals to cope better with transport. Curfews are also often specified prior to transport for slaughter for food safety reasons. Two experiments were conducted involving yearling beef cattle and 6-mo-old lambs where the animals were exposed to 0, 12 or 24 h curfew (food + water removal), followed by 12 or 24 h of transport. Subjecting healthy, grass-fed cattle or lambs to pre-transport curfews did not enhance the capacity of the animals to cope with transport. On the other hand, the curfew period did not in itself adversely affect animal welfare, but simply added to the overall feed and water deprivation period and its associated effects. The results also support the findings of the transport duration studies in relation to animal response to transport and total time off feed and water. The need for pre-transport curfews should be predicated on consideration of key factors such as the nutritional background and condition of the cattle and sheep, the duration of the transport, and whether the animals are being transported to slaughter.

Impact of sea transport on animal welfare

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Large numbers of livestock are reared for transport overseas, and the long duration of the journey and the changes in the animals' environments provide special challenges compared to other short distance transport. A description is provided of the most common methods of transporting live animals by sea for slaughter internationally.

The biggest exporter in the world is Australia and the main markets are South-east Asia and the Middle East. The most common livestock transported are cattle and sheep, but goats, camels, buffalo, pigs and horses may also be transported alive.

It is emphasised that multiple factors impacting on animal welfare are involved before, during and after the ship voyage; these include mustering, shearing (in the case of sheep), transport to feedlots and several changes of environment that can cause fear and anxiety. Information on the welfare of exported cattle and sheep on transport ships from Australia comes mainly from a survey of expert opinion completed in 2005. This found that the major stressors on ship were believed to be clinical diseases, especially inappetence and salmonellosis in the case of sheep, heat stress, high stocking density and high ammonia levels. The reported mortality rate is considerably greater for sheep than cattle, particularly due to failure to eat in the sheep, but has tended to decline for both species over the last five years.

Other potential stressors, about which little is known, include noise, motion sickness, changes in lighting patterns and novel environments. It is appropriate to consider whether some of the practices involved in live export are below the standards that the general public require for the keeping of livestock, even though it is recommended that a 'whole of life' approach to animal welfare assessment is most relevant to the animal.

Impact of sea transport on animal welfare: Australian case studies (sea transport of sheep and cattle)

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A number of factors have been identified as impacting on the welfare of animals transported by sea. Heat stress has been identified as a major cause of reduced welfare of cattle and sheep transported by sea during periods of hot, humid conditions. These findings led to research into the physiology of heat stress in cattle and sheep, with a view to finding ways to ameliorate the effects on the animals. In conjunction with this work, a Heat Stress Risk Management model was developed, which used all available data on ships, weather conditions, voyages, and animal factors such as heat stress thresholds for different classes of animals and stocking rate to determine and therefore reduce the risk of a heat stress incident (Stacey, 2003). The heat stress threshold was determined as the prevailing wet bulb temperature at which the animal's core body temperature was 1 °C above what it would normally be. This temperature varies depending on the class of animals, reflecting the situation commonly seen, where for instance *Bos taurus* cattle start to show clinical responses to the heat at lower environmental temperatures than do *Bos indicus* cattle, with Merino sheep and fat tailed sheep also being quite resistant to the heat (Beatty et al. 2006; Stockman et al. 2006).

Methods considered that may improve animal health and welfare in hot conditions included the provision of electrolytes in water or feed. The initial research investigating the physiological responses of cattle and sheep to hot, humid conditions discovered that at the temperatures encountered on hot voyages to the Middle East, cattle lost their appetite but continued to drink, while those sheep that ate continued to do so whether it was hot or not. There were some alterations in blood and urine electrolytes of the cattle, but not of the sheep, leading to testing of electrolytes in cattle. While there were no indications that provision of electrolytes altered the thermal response of the cattle, they did drink more of the electrolyte supplemented water, and there were differences in body weights and electrolyte values (Beatty et al. 2007).

Recent research has investigated on commercial voyages the mixing of sheep or cattle with and without horns, within specification, due to reinterpretation of guidelines for the grouping of animals. This work has been successful in developing a video surveillance system that can record from multiple cameras for the duration of a long haul voyage. On the one sheep and one cattle voyage monitored, there were no negative effects on feed intake, injury, or aggressive interactions of having pens of mixed polled and horned animals (within specification), compared to pens of all polled or all horned animals.

Beatty, D.T., Barnes, A., Taylor, E., Pethick, D., McCarthy, M. and Maloney, S. (2006). Physiological responses of *Bos taurus* and *Bos indicus* cattle to prolonged, continuous heat and humidity. *J Anim. Sc.* 84: 972-85.

Beatty, D.T., Barnes, A., Taplin, R., McCarthy, M. and Maloney, S. (2007). Electrolyte supplementation of live export cattle to the Middle East. *Aust. J. Exp. Agric.* 47: 119-24.

Stacey, C. (2003) Development of a heat stress management model. Published by Meat and Livestock Australia.

Stockman, C., Barnes, A., Pethick, D & Maloney, S. 2006. 'Physiology of heat stress in Merino wethers during conditions similar to live export', *Proceedings of the British Society of Animal Science*, University of York, pp. 58

Long distance transport of livestock: lessons learnt from the European Union

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Animal welfare during transport has been a high profile issue in the European Union for many years. The first EU-wide Directive governing welfare in transit was passed in 1977. Subsequent amendments followed, and a more binding Regulation, implemented in 2007, strengthens areas such as fitness to travel and haulier competency. However, continuing EU expansion (membership now 27), makes securing agreement on new legislation, and ensuring consistent implementation/enforcement, increasingly challenging. During negotiations on the Regulation, failure of countries to agree on revising key welfare issues, including space and journey duration, means these have remained unchanged since 1995 despite scientific evidence and practical experience indicating their inadequacies.

Enforcement of EU law is the responsibility of the European Commission and individual countries. The Commission's enforcement agency, the Food and Veterinary Office (FVO), undertakes 'missions' to audit implementation and enforcement. Enforcement in member states is undertaken by various bodies including police and local authorities. FVO missions and other evidence indicate enforcement is variable and under resourced. However, imposition of EU sanctions for failures can be slow and inadequate. Provisions to improve enforcement are included in the new Regulation, including use of satellite navigation systems to track journeys.

Annual EU-wide transport of livestock is over 350 million farm animals and thousands of millions of poultry. Although many journeys are short (a few hours), some are much longer. Long distance transport to slaughter is driven by several factors including discrepancies between production and consumption of meat in different areas, market value of 'home killed' versus 'imported' meat, and reduction in numbers/centralisation of slaughterhouses. Significant long distance live animal trade routes in Europe include:

- Slaughter horses from central/eastern Europe to Italy
- Slaughter and fattening pigs from the Netherlands to Spain and Italy
- Slaughter sheep from various member states (including Romania) to Greece

Reports of serious breaches of law on these routes, and serious welfare problems even when law is implemented, indicate both failures in implementation/enforcement of rules, and the inadequacy of the rules themselves to protect welfare.

Differences clearly exist between areas of the world (e.g. EU and Australia) regarding welfare during transport, such as temperature/humidity and animals' familiarity with handling and confinement. However, many aspects of welfare in transit are common to all, including animals' propensity to suffer hunger, thirst, fear, distress, discomfort, disease and injury, and their inherent species-specific natural behaviours. Experience gleaned on one Continent can, therefore, be useful to others. Also of potential value to others are approaches developed in EU countries aimed at reducing welfare problems in transit, and developing potential alternatives to long distance live transport. Recent initiatives involving collaboration between industry, Government and welfare groups in the EU to develop alternative home markets for animals normally transported to other countries, as well as market/industry-driven improvements above law in common live transport practices, have shown what can be achieved despite failures at a legislative level. Nevertheless, achieving a meaningful baseline standard – provided by effective, properly enforced legislation – remains an important goal.

Fish transport in the aquaculture sector: Case study (Atlantic salmon)

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Although species-specific aquaculture production systems typically operate over reduced geographical ranges relative to many other terrestrial animal production systems, it is nonetheless often necessary to transport live fish between facilities by road in order to permit on-growing or finishing. Road transport is therefore common in Australian salmonid (trout and salmon) production and is a particularly significant feature of Atlantic salmon culture in Tasmania where it is necessary to transport juvenile fish (smolts) from inland freshwater hatchery facilities to coastal marine farms for grow-out to slaughter.

The most obvious respect in which road transport of live fish differs from that of terrestrial livestock is the requirement to provide a "life support system" for the duration of the process. Aside from an inherent requirement for water it is essential to provide oxygenation in order to support basic respiration. Thereafter, water quality must be managed to limit the accumulation of potentially toxic metabolites. Among these, carbon dioxide (CO₂) is of particular concern. Without appropriate management, CO₂ can rapidly accumulate to levels as high as 80 mg/L and result in hypercapnia, respiratory dysfunction due to the Bohr and Root effects, narcosis and ultimately death. Current life support systems typically function to maintain CO₂ at acceptable levels of 20-30 mg/L. Water temperature changes during and at the end of the transport process may also be an issue but are typically only a relatively minor consideration.

Fortunately, the question of withdrawal of water does not arise during live fish transport. However, in common with other livestock transport systems, the loading process and associated handling can evoke a physiological stress response which, though intended to be adaptive, may interact synergistically with aspects of the life support system. Increased rates of oxygen consumption and CO₂ excretion place additional demands on the life support system while, from the fish's perspective, the changes in gill perfusion and circulation which facilitate such alterations in gas exchange can also operate to increase osmotic influx and result in diuresis and iono-regulatory dysfunction.

As a consequence, once a suitable life support system has been provided, the efforts of salmon farmers are focussed on the need to minimise handling stress. The majority operate sophisticated pumping and counting systems that are intended to minimise aerial exposure of fish and, in a manner consistent with the natural behaviour of the animal, mimic as far as is practicable the process of being "washed downstream".

Development of animal welfare standards – A balancing act

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The 'National Animal Welfare Standards for the Livestock Transport Industry' were developed and integrated with the industry quality assurance (QA) program, TruckCare, to help fulfil both industry's and the community's expectations of the high levels of quality assurance associated with livestock transport. The need for QA programs that include animal welfare standards indicates a heightened awareness in the transport industry that animal welfare is an issue that engages the broader community, a recognition that contentious welfare standards are discussed in the public domain and the fact that public attitudes have the potential to influence animal welfare standards. Another driver that may contribute to wider uptake of these QA standards is the new Australian Animal Welfare Strategy (AAWS) initiative involving the revision of current Codes of Practice into Australian Standards, to be regulated in all jurisdictions. Three booklets were produced for the standards and QA (TruckCare) that cover animal welfare issues in transport: a Standards Manual, a Working Manual and Background Information and Rationale. A management group comprising representatives from government, welfare organisations, industry, customer organisations and other technical experts contributed towards a consensus approach, and the project also targets from the Codes of Practice, scientific information where available and industry practice. These standards will provide mechanisms for monitoring animal welfare, stimulating ongoing improvement, assuring the quality of animal care practices and minimising risks to the sustainability of the transport industry and associated livestock industries. These standards draw on previous work undertaken with other livestock industries, including chicken meat, pork, dairy and meat processing, contributing to a whole of chain approach.

Animal Welfare QA programs such as the one described above need to be acceptable to the community, be able to meet all customers' requirements and demonstrate to government authorities that they provide appropriate confidence that animal welfare standards have been met. Increasingly, governments, retailers, processors, customers and other stakeholders are showing an interest in ensuring the successful implementation of QA programs. For instance, discussions are underway regarding the options for implementation of the new legislated standards for transport (the AAWS initiative), where it is recognised that QA programs may have a role in demonstrating the legislative requirements.

In determining appropriate standards for animal welfare, for use in either policy or QA programs, there are several considerations, including the practicality of the action in question, the available science to underpin an appropriate target or measure and information on the welfare outcome, as well as the ethical considerations. Current uncertainties about the validity of standards, defining animal welfare and assessment or interpretation of animal welfare measures may have impact on the success of animal welfare standards or QA in terms of industry, government, and consumer confidence in the system and verification activities. Although legislation may be able to be limited to the minimum requirements and be fairly prescriptive, animal welfare standards in QA programs need to enable continual improvement, alternative practices and be able to apply to several systems or sectors. Therefore, the approach taken for these industry animal welfare standards for livestock transport contain both 'resource-based' measures (or inputs to the system), in combination with 'animal based measures' that focus on specific animal and consignment related parameters, such as prodder use, water deprivation and mortalities. QA programs for animal welfare can provide a key role in providing the framework for some of the more 'non-specific' measures and activities such as stockpersonship and key resource, facility and management inputs that contribute towards animal welfare and industry practice change, and also underpin the outcomes required in welfare legislation.

While the animal welfare standards for livestock transport were developed in such as way as to ensure broad stakeholder consensus and some evaluation of their impact is underway, wider assessment of animal welfare benefit, economic or efficiency gain to industry and general acceptability by customers and the community remains undetermined. It is acknowledged that the full impact of QA programs will be fully appreciated when their ability to deliver comprehensive benefits has been evaluated. Most importantly, however, these standards will provide a means to reassure customers and Governments that animal welfare standards are being met.

National standards for animal welfare: Case study (land transport of livestock)

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The development of the Australian Animal Welfare Standards and Guidelines for the Land Transport of Livestock ('Land Transport Standards' – LTS) is the inaugural project in an Australian Animal Welfare Strategy (AAWS) sponsored program of conversion of the existing Model Codes of Practice for the welfare of animals (MCOP). At the request of AAWS, Animal Health Australia consulted with company stakeholders in 2005 to develop a business plan for the reformatting and revision of existing MCOP to Animal Welfare Standards and Guidelines. This plan was endorsed in early 2006 and used for the commencement of the LTS project in October 2006. Key elements of the plan are the inclusive nature of consultations, transparent process and the development of complementary, animal welfare guidelines for the livestock industries.

The AAWS vision is for national animal welfare standards that will reflect contemporary scientific knowledge, competent livestock husbandry and mainstream community expectations, and are maintained and enforced in a consistent, cost-effective manner.

The LTS comprises 6 general and 11 species chapters and will replace 6 MCOP for transport of a species, one draft MCOP and create provisions for the other species. Standards are the acceptable animal welfare requirements that must be met under law for livestock welfare purposes. The standards are intended to be clear, essential and verifiable statements; however, not all issues are able to be well defined by scientific research or are able to be quantified. Guidelines are the recommended practices to achieve desirable animal welfare outcomes. The LTS has been the inaugural standards development project and much has been learnt for the benefit of subsequent development projects.

After 6 reference group meetings the LTS will go to public consultation in mid March 2008 for a 60 day period. It is recognised that there is not complete consensus for the standards and those unresolved issues will be identified for consultation and further addressed by the Reference Group on the basis of submissions. It is expected that government endorsement will be achieved in the latter half of 2008. This will feed into the concurrent AAWS project examining key aspects of harmonisation of the jurisdictional animal welfare regulatory systems.

Building community confidence – The role of QA in stock transport and current initiatives

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The Australian Livestock Transporters Association (ALTA) recognises that the future of its industry relies on retaining community confidence that its work is being carried out in a demonstrably humane manner. While codes of practice for animal welfare in livestock transport already exist across all jurisdictions - and are soon to become national legislation - the ALTA Council saw value in developing an audited quality assurance scheme that would create confidence that these standards were being met by the industry on a day-to-day basis. Over the past three years, a set of industry standards were developed by the ALTA working cooperatively with commercial stock transport operators, State and Federal agriculture agencies, the wider meat and livestock sector and animal welfare community groups like the RSPCA and Animals Australia. These Standards were agreed in 2006 and a year later, a practical, audited quality-assurance system – TruckCare – was co-launched in 2007 by the then Federal Agriculture Minister Peter McGauran and Immediate past President of WSPA International and RSPCA Australia Dr Hugh Wirth.

The TruckCare program is the industry's badge of quality. It is a program that has already found the formal support of groups like the Australian Meat Industry Council (representing the processing sector) and corporates like Elders Group, Woolworths and Coles. Ultimately like similar programs overseas, the future of the program lies in the community of Australian consumers creating a demand for audited quality assurance schemes in the livestock production chain.