Preparation of goats for export

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Abstract

This project has sought to review the current practices and performance of the live goat export industry since 2003, with an emphasis on progress since a review of mortality risk factors published by MLA in 2003. The project has been conducted at a time when the great majority of goat exports are by air and long-haul exports by sea are no longer taking place because AQIS is not issuing approvals. Mortality rates of export goats have steadily decreased since 2003 but this can be largely attributed to the shift in export modes as there has been limited uptake of the recommendations of the 2003 report. The key issue for successful export remains the adequate domestication of goats. Exporters have had variable success in the domestication of feral goat species. Due to the loose nature of codes and standards and the lack of outcome-based indicators, it has been difficult to examine reasons for this variability. This report makes several recommendations that may allow the resumption of long-haul exports and the successful continuation of short-haul sea and air exports.

Executive summary

The objectives of this project were to:

- Review current practices and performance of live goat exports over the past five years against the recommendations of the MLA report *Minimising mortality risks during export of live goats by sea from Australia* (More and Brightling, 2003), specifically relating to the preparation of goats prior to export;

- Identify knowledge gaps for prioritised research to address issues identified in the review; and

- Develop a draft 'best practice' guide for the preparation of goats for export, for consideration by industry.

The review has found that there has been little progress in the implementation of evidence-based standards for the export of goats since the publication of the More and Brightling (2003) report. In fact, the report seems to have had minimal impact since its publication despite being the most current and complete review of best practices for goat export. This is no doubt due in no small part to its recommendations that the export of captured feral goats be stopped.

Meanwhile, the performance of the goat export industry has generally been good, with shipboard mortality rates steadily declining. This may be partly due to an increase in the sourcing of semi-managed over captured feral goats and a massive shift from sea to air exports. However, there have been enough reportable mortality incidents to prompt the Australian Quarantine and Inspection Service (AQIS) to stop approving shipments over ten days' duration since early 2008.

Because the recommendations of the More and Brightling (2003) report have not been implemented in any systematic way, it has not been possible to validate or otherwise these recommendations, or the best practices identified in the report. Published investigations of reportable mortality incidents are of very limited value and there appears to have been no new scientific research of relevance since 2003. This review has relied heavily on the collective wisdom of industry players in its conclusions. The evidence is that both the best practices and the gaps identified by More and Brightling (2003) remain current.

The major unresolved issue in goat exports is how to successfully prepare the goats for the conditions experienced on board ship (or to a lesser extent the aircraft) and at the destination. This process has two phases: a domestication period and a period in a pre-embarkation feedlot. The latter phase has an optimum timeframe of 7-10 days that is limited by the build-up of infectious organisms such as Salmonella spp. The domestication phase seems to cause the greatest difficulty for the industry. Some people know how to get the domestication process right, but while there are guidelines, there is no readily codified formula for the optimal length of this phase or the quality of its management.

In addition to the problem of defining strict process standards for pre-feedlot domestication, there is the difficulty of ensuring compliance with any standards that might be developed. Any additional time spent by animals in preparation represents a cost to exporters so there is a powerful incentive to cut corners, especially for air exports where problems with poor preparation rarely have the

opportunity to surface. AQIS does not have control of this part of the chain. An outcome-based standard showing the readiness of a goat for export would be ideal but there are few apparent options in this respect.

This review recommends a number of steps to address the issue of inadequate pre-export domestication of goats. These are:

1. The *Best practice guide to the preparation of goats for live export* that accompanies this report should be widely promoted to the industry. It will be a useful addition to the MLA publication *Going into goats* and the forthcoming *Best practice guide for goat depots* being prepared for MLA by Queensland Primary Industries and Fisheries. The recommendations arising from the *Best practice guide to the preparation of goats for live export* is consistent with both of these publications. However, without the concurrent implementation of the recommendations provided below, best practice guides alone will have limited material effect on the success of the goat export industry.

2. MLA and LiveCorp should develop a quality assurance (QA) program for the export of goats that imposes minimal additional cost to the industry yet is sufficiently credible to all parties. One suggestion is that the system might involve assigning rankings to exporters according to their export performance. Sources of goats (depots or even properties of origin) could also be ranked using the National Livestock Identification System (NLIS) to track performance. Those exporters who are consistently making successful exports should be able to continue doing so under current standards while those who have reportable incidents should be subject to additional conditions, such as the requirement for a veterinarian on all sea voyages and/or a third-party inspection of goats by a recognised expert prior to their entry into the pre-export feedlot.

3. The industry should, in association with the Department of Agriculture and Food Western Australia (DAFWA), and with the agreement of the Australian Quarantine and Inspection Service (AQIS), undertake a series of trial shipments of goats to long-haul destinations. Western Australia is suggested as the basis for these trials because goat exports have declined markedly from that state and there is strong interest in having them resumed. The goats might initially be sourced from managed systems but over time from the pastoral region via agricultural properties as described in this report. These shipments would be closely tracked from property of origin to destination and the QA system developed in recommendation 2 would be tested. If successful, the shipments should provide a ready ‘recipe’ for WA exporters to make low-mortality long haul exports.

4. The industry and AQIS should consider including the application of the food dye test, developed in WA (T. Johnson pers. comm.), as an indicator of which animals are feeding, as a standard to be applied before goats leave the registered premises to be loaded onto ships. Only those goats with dye marks would be permitted to be loaded. This test is attractive as a standard because its interpretation is quite objective and could be done by an AQIS vet. The acceptability of the dye to destination markets would need to be established. The use of the test might be validated during the trial shipments proposed in recommendation 3.

5. The industry and AQIS should note the findings of earlier research that the optimum duration in the pre-export feedlot is between 7 and 10 days and alter the Australian Standards for the Export of Livestock (ASEL) minimum of 5 clear days accordingly.

6. MLA and LiveCorp should consider further research into the optimal dietary fibre requirements for goats. There is no particular evidence that the current recommendation of at least 200g/head/day of hay and/or chaff is satisfactory.

7. MLA and LiveCorp should consider further research into ways to manage dominance behaviour in goats. This is a relatively lower priority but might involve a watching brief on odour neutralisation technologies and anti-gonadotrophin releasing hormone (GnRH) immunisation products.

If these recommendations are implemented, it may be possible to have the long-haul export of goats resumed, re-opening a major market opportunity for producers in Western Australian in particular. Strengthening the goat export standards in the ASEL and promulgating identified best practices, as well as developing a system for monitoring performance, should also reduce risk across the industry.

Contents

1 Background

The success of the live goat export industry has been variable over the last several years. Most shipments of goats are characterised by low mortality rates but there have been a number of high-mortality incidents especially where goats have been exported to long-haul destinations such as the Middle East and North Africa. Such incidents are of great concern to the industry because they reflect poorly on the industry's capacity to deliver a high standard of animal welfare.

It is critical to the success of the industry that goat exporters understand the practices that lead to low-mortality exports. The prevailing knowledge of these practices was reviewed for MLA and LiveCorp by More and Brightling (2003) in project LIVE.215. LIVE.215 identified a range of best practice procedures for goat exports and also highlighted some gaps in current knowledge.

More and Brightling (2003) showed that one critical factor is the adequate preparation of goats before they are shipped. This applies particularly where the goats are sourced from unmanaged herds. More and Brightling (2003) made several recommendations in respect to the backgrounding of goats and even recommended that captured feral goats not be exported by sea at all (after a brief phase-out period in the case of short-haul exports).

In an effort to ensure ongoing progress by the industry, More and Brightling (2003) made a specific recommendation (12) which stated:

> 'A critical and independent re-evaluation of the live goat export industry should be undertaken within three years of this report, to assess progress and the need for further change in a developing industry' (p. 8).

The review presented in this report fulfils recommendation 12 of More and Brightling (2003) by undertaking a re-evaluation of the live goat export industry during the period since the report was published. The review is accompanied by a 'best practice' guide for goat exports developed to supplement current standards.

2 Project objectives

The objectives of this project were to:

1. Review current practices and performance of live goat exports over the past five years against the recommendations of the MLA report *Minimising mortality risks during export of live goats by sea from Australia* (More and Brightling, 2003), specifically relating to the preparation of goats prior to export;

2. Identify knowledge gaps for prioritised research to address issues identified in the review; and

3. Develop a draft 'best practice' guide for the preparation of goats for export, for consideration by industry.

3 Methodology

The methodology for the project was as follows:

1. A desktop review of several key documents was undertaken, notably:

    - *Minimising mortality risks during export of live goats by sea from Australia* (final report of LIVE.215) (More and Brightling, 2003);
    - The unpublished document *Industry proposal for the sea freight of goat species* (Stinson c2008);
    - *Going into goats: profitable producers' best practice guide* (MLA 2006);
    - *National livestock export industry shipboard performance reports 2004-2007* (final reports of LIVE.225, LIVE.235, LIVE.241 and LIVE.246) (Norris and Norman 2005, 2006, 2007, 2008); and
    - Various reports on shipping mortalities and Export Advisory Notices by AQIS.

    Other references are included in the bibliography. The review also involved a search of the recent scientific literature on goat domestication, preparation for export and related disciplines such as feedlotting and statistics on adverse incidents relating to goat exports over the last 5 years.

2. In partial parallel with stage 2, consultations were undertaken with a range of relevant industry representatives to obtain further information on the frequency and types of adverse incidents experienced with goat exports, the usual practices followed in goat pre-export and export, and people's views of current problems and unresolved issues. A major objective was to identify the practices that differentiate 'successful' exporters (i.e. those with few adverse incidents) from those encountering problems.

    The individuals and groups are acknowledged in section 9.1. They included major exporters and export facilitators of goats (by sea and air), LiveCorp staff (Technical Services), MLA staff, key researchers working with goats, export vets and AQIS staff.

    Consultations were conducted by telephone.

3. A draft report was prepared based on the outcomes of stages 1-4, identifying the major developments in the industry and in R&D since the publication of LIVE.215.

4. The draft report was revised and research / consultation undertaken on any additional issues identified from the feedback. A draft best practice guide on the preparation of goats for exports was also prepared.

5. The final report and draft guide were submitted to the MLA / LiveCorp live export R&D program for review.

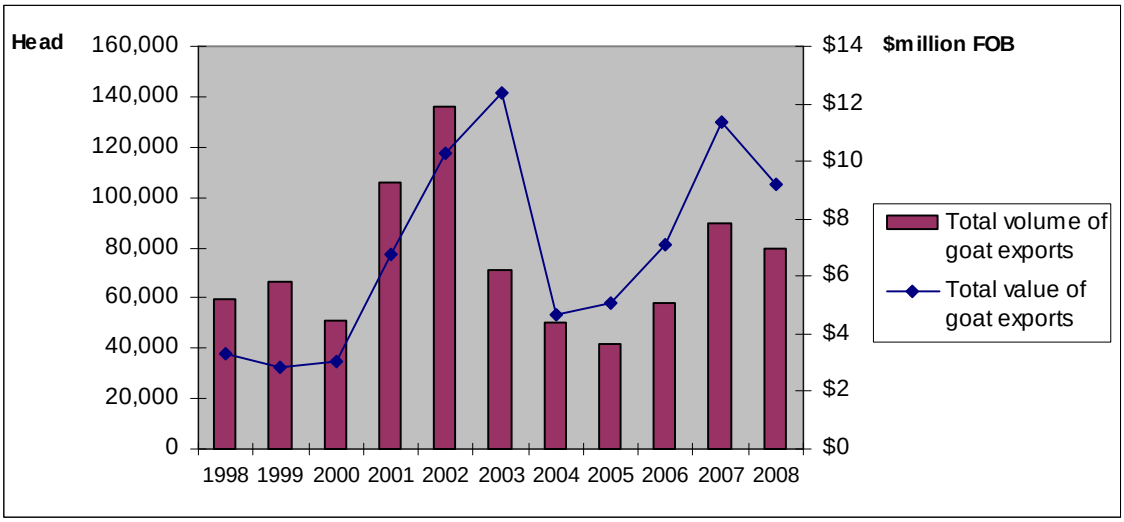
4 Results and discussion

4.1 Goat export industry performance since 2003

4.1.1 General statistics

Figure 1 shows the total volume and value of goat exports in the period from 1998 to 2008. The figure shows that goat exports peaked in volume in 2002 and then declined to 2005 before rising again. The value of goat exports has increased steadily since 2004, reaching $11.4m FOB[1] in 2007 before declining to $9.2m in 2008.

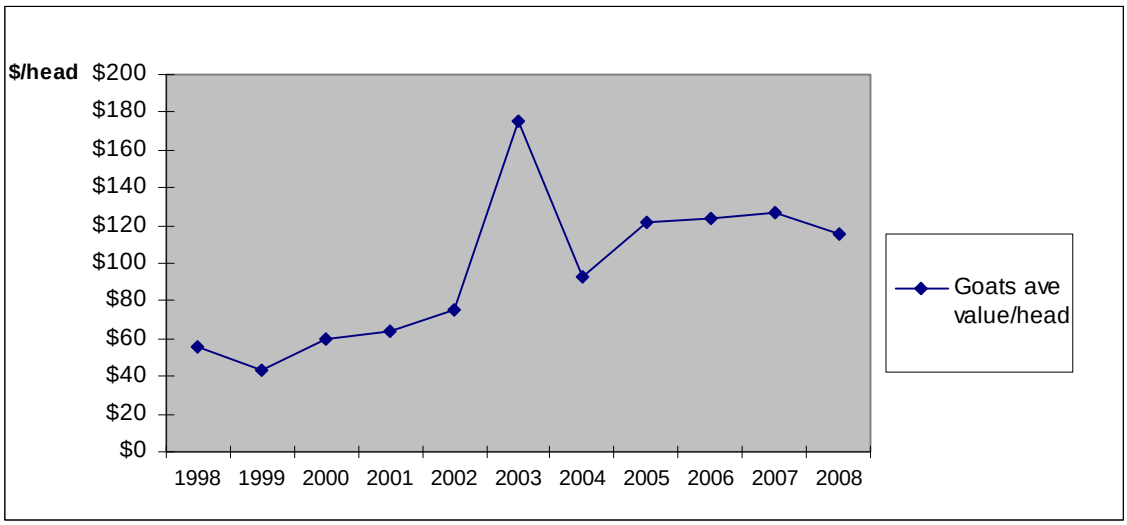
Figure 1 Total volumes and value (FOB) of goat exports 1998-2008 (source: Australia Bureau of Statistics (ABS), courtesy of LiveCorp)



A simple analysis division of total value by number of goats exported shows that the average value of each goat exported rose very sharply from $75 in 2002 to $175 in 2003 then dropped to $93 in 2004. Since then, the per head value of exported goats has averaged between $115 and $126 (Figure 2).

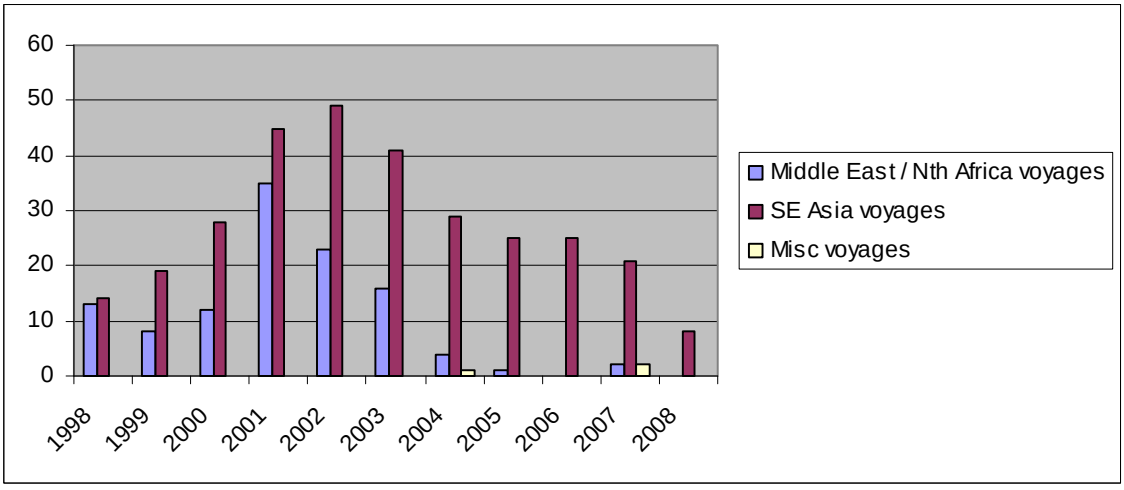
[1] FOB – 'free on board' value – amount earned by the exporter (i.e. excludes transport and insurance costs). FOB is used by the Australian Bureau of Statistics to calculate the value of Australian exports

Figure 2 Average per head value (FOB) of goats exported 1998-2008 (source: ABS, courtesy of LiveCorp)



From 2003 to 2008 there was a steady decrease in the number of voyages to South East Asia and the Middle East / North Africa (Figure 3). Between 2001 and 2003 there were 50 to 70 shipments per year. In following years this dropped to between 20 and 25 and there were only eight in 2008. In contrast, the number of goats exported by air has risen (Figure 4). When the More and Brightling (2003) report was published in 2003, 27.1% of goats (by volume) were exported by air. The corresponding figures were 69.4% in 2007 and 96.0% in 2008.

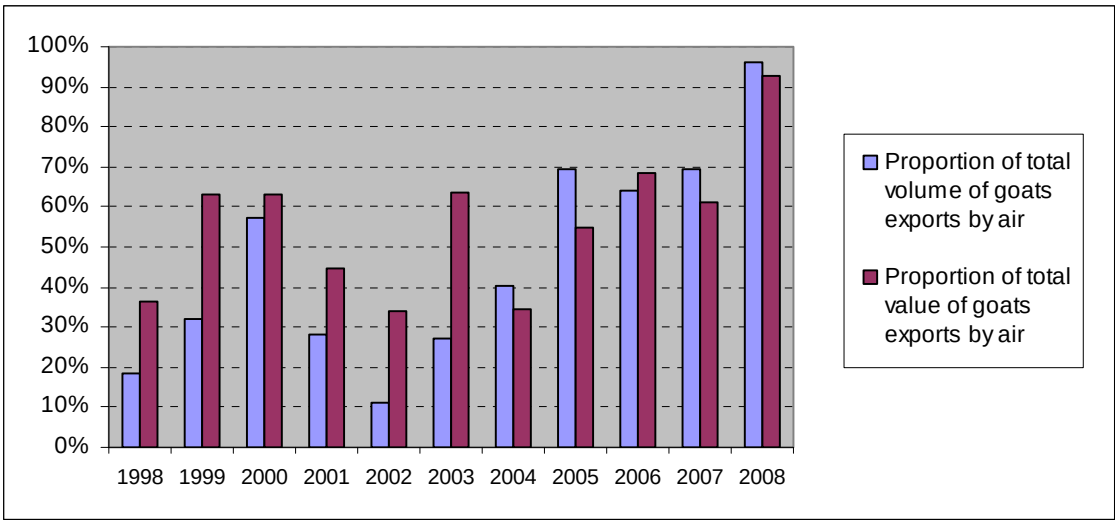
Figure 3 Number of goat export sea voyages 1998-2008 (source: Norris and Norman 2005, 2006, 2007, 2008*)



*Note: the total numbers of voyages as presented here are not always consistent with DAFF data as published on its web site. For the sake of consistency, and because they were the only source from which a breakdown into destination could be obtained, the reports of Norris and Norman published by MLA have been used to derive these data. The

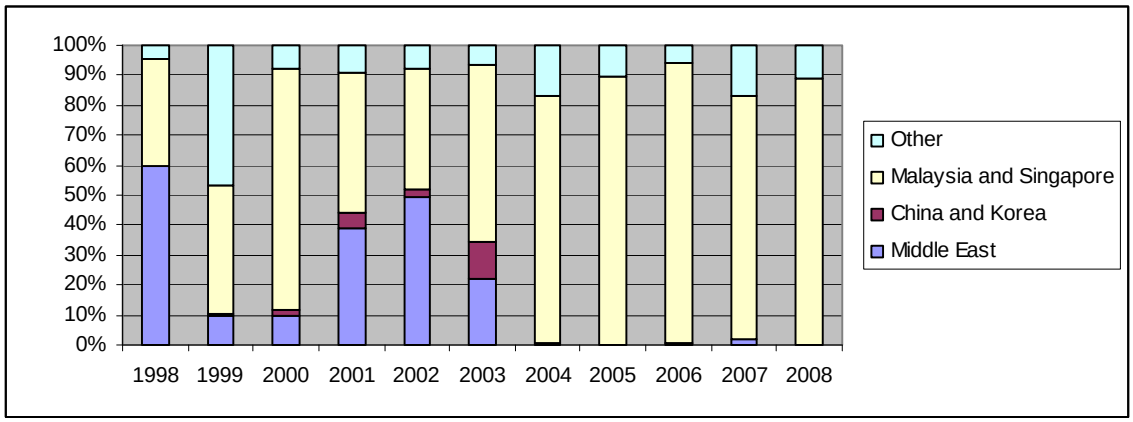
exception is 2008, for which DAFF mortality data were used because the MLA review was not available. The number of voyages to miscellaneous destinations is only available for the years from 2004 to 2008. These are thought to be predominantly long-haul destinations such as Madagascar.

Figure 4 Proportion of goat exports by airfreight, by volume and by value 1998-2008 (source: ABS, courtesy of LiveCorp)



There has also been a shift in the proportion of Australian export goats to various markets. Figure 5 shows that Middle Eastern markets (Bahrain, Jordan, Saudi Arabia and the United Arab Emirates) were significant up until 2003 but have since all but disappeared. Between 2004 and 2008, only 2,293 goats were exported to Middle Eastern destinations. Since 2004 the major markets for Australian goats have been Malaysia and Singapore. These markets predominantly seek breeding animals, in contrast to the slaughter goats that were sent to the Middle East and 'other' destinations such as African countries.

Figure 5 Destination of Australian goats exports by volume 1998-2008 (source: ABS, courtesy of LiveCorp)



The state of origin of export goats has also changed over time (Figure 6 and Figure 7). The number of goats exported from Western Australia decreased markedly from around 30,000 head per annum in 2003 and 2004 to just 4,140 in 2008. In contrast, the number of goats from New South Wales rose from 824 in 2004 to around 30,000 in each of 2007 and 2008. New South Wales, South Australia and Queensland were the major sources of export goats in 2007 and 2008.

Figure 6 Numbers of goats exported from each state and territory 1998-2008 (source: ABS, courtesy of LiveCorp)

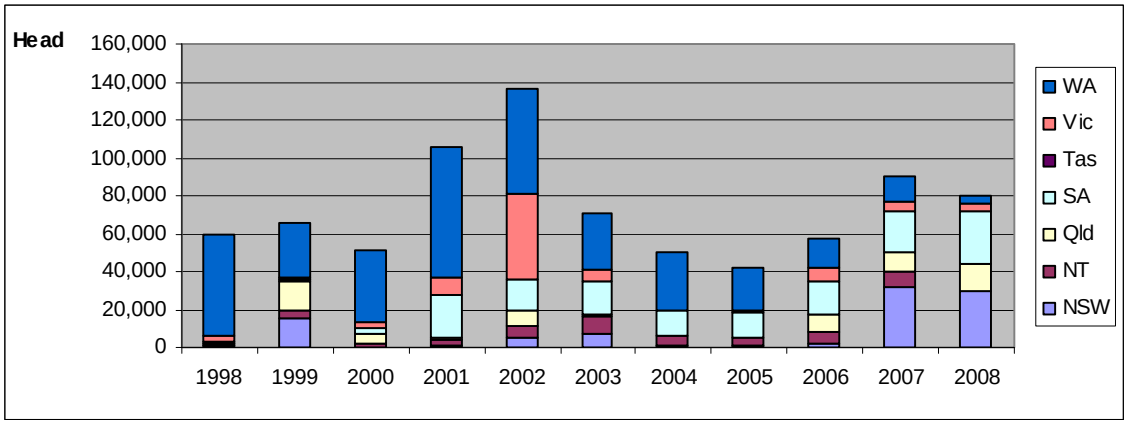
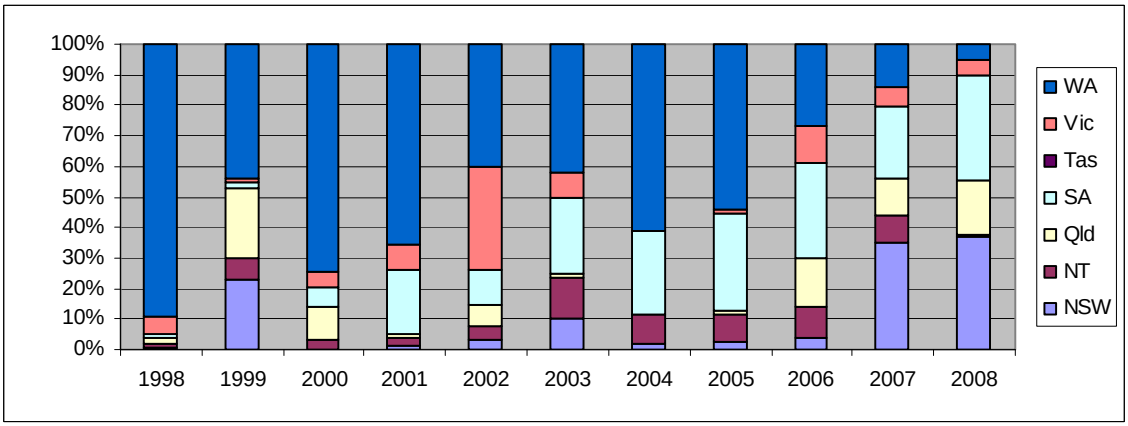


Figure 7 Proportion of all goat exports originating from each state and territory 1998-2008 (source: ABS, courtesy of LiveCorp)



Overall, the picture presented is one of an industry that, over the last decade, has shifted from sea to air exports and from long haul (Middle East and Africa) to short haul (Asia) destinations. There is a very heavy reliance now on the sale of breeding and some slaughter stock to Malaysia and Singapore. Mirroring these changes, export goats are now being sourced mainly from New South Wales, South Australia and Queensland, and are increasingly coming from managed systems rather than extensive pastoral regions. There are very few exports now of captured rangeland goats from Western Australia and the Northern Territory.

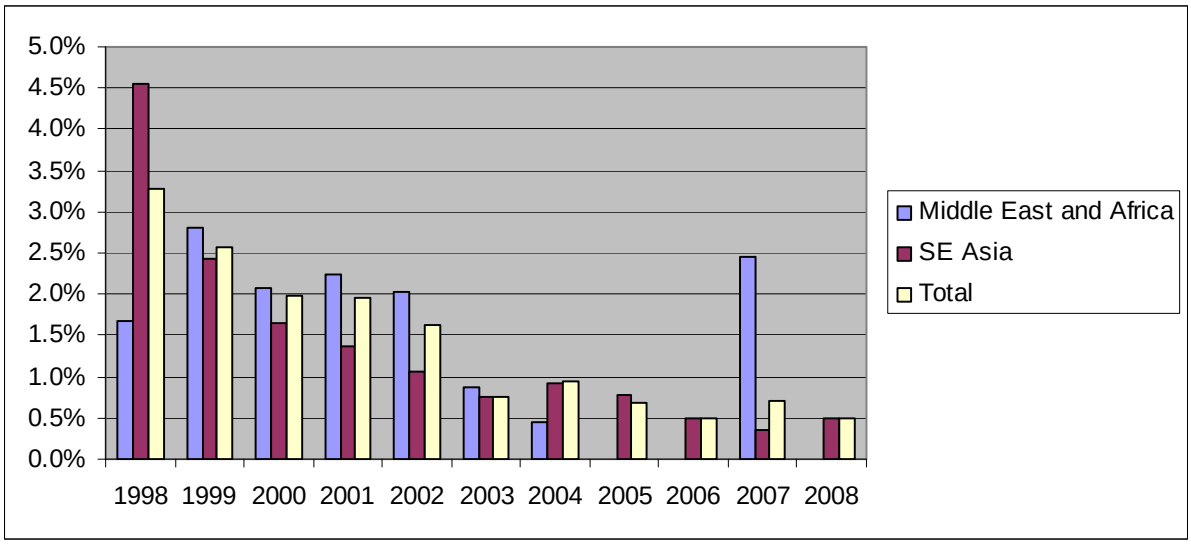
4.1.2 Mortality rates

Mortality rates for sea voyages are published by the Department of Agriculture, Fisheries and Forestry (DAFF) on its web site. The published summaries provide the dates of the voyage, the name of the exporter, loading and destination ports, duration of the journey and numbers of stock loaded and lost. A note is made where action has been taken by AQIS in relation to the voyage. These data were available for the years 2005 to 2008.

In addition, MLA and LiveCorp publish annual 'shipboard performance reports' that summarise mortality data for sea exports of goats, cattle and sheep. The shipboard performance reports break down the mortality rates by Middle East / North Africa and South East Asia destinations. A small number of shipments are classified as 'miscellaneous' (e.g. Madagascar) and reported separately.

Using data from these sources, Figure 8 shows the overall mortality rate of goats exported by sea to different destinations and overall. The figures shown are calculated as the total number of deaths for the year divided by total number of goats shipped. It should be noted that Brightling and More (2003) quote mean and also median mortality rates in voyages with more than 300 goats in their report. This approach probably provides more meaningful results as it treats the voyage, rather than the goat, as the unit of analysis. Analysis of available data on individual voyages from 2005 to 2008, however, shows that there is little difference in results between the 'total' method and mean and median voyage mortality rate methods and raw data were not available for previous years.

Figure 8 Mortality rate in goat export voyages 1998-2008 (source: DAFF 2009, undated; Norris and Norman 2008)



*Note: the 'Middle East and Africa' and 'SE Asia' mortality figures are taken from the MLA shipboard reports (Norris and Norman 2008 summarises all previous years). The 'total' mortality figures are taken from the summary of mortality data published by DAFF on its web site. The 'total' figures of Norris and Norman differ non-significantly from those of DAFF but were only available for 2004-2007, hence the use of DAFF data. The DAFF data, on the other hand, are not broken down by destination. The exceptions are 2008, where the DAFF reports to Parliament containing raw data for Jan-Jun and Jul-Dec 2008 were used, and 1998-1999, where DAFF summary data were not available and an estimate for 'total' mortality was made from the 2007 shipboard reports.

The figure shows that mortalities among export goats steadily declined between 1998 and 2006, and there was a notable stepwise reduction in goat mortalities from 2002 to 2003 from an average of 1.5-2.0% to 1.0-1.5%, a change which has been maintained since that time. The mortality rate on voyages to South East Asia has shown a steady decline to reach 0.35% in 2007 and 0.50% in 2008. In 2007 there were three voyages to the Middle East / Africa, with respective mortality rates of 0.94%, 12.50%, and 2.54%. For these three voyages the total number of goats on board was 744,304 and 2,124 respectively. These three voyages pushed the mortality rate across all voyages in 2007 to 0.71%.

There are limited published mortality data for goats exported by air. Air consignments are not required to be accompanied by stockmen and there is no reporting requirement unless mortality levels exceed 2% (P Stinson pers. comm.). Notwithstanding this, there is a summary of air export performance for 2007 on the DAFF web site. In that year, 61,487 goats were exported in 151 consignments. There were no mortalities in 149 of these. In one of the other two, 20 animals were killed when a crate collapsed (see below), whilst one animal died in the other consignment.

4.1.3 Reportable incidents

Under standard 5.11 of the Australian Standards for the Export of Livestock (ASEL) version 2.2 (DAFF 2008), a level of shipboard mortality in goats of greater than or equal to 2% becomes reportable (if the number of mortalities is at least 3) and a notifiable incident is said to have occurred. AQIS must be informed as soon as practicable and within 12 hours of a notifiable incident taking place.

There have been at least seven reportable mortality incidents in goat exports by sea since 2003 (Table 1). There has also been at least one by air. A summary of the sea and air journeys resulting in reportable mortality rates is provided in Table 2.

Table 1 Reportable mortality incidents in goat exports by sea, as proportion of all voyages, 2003-2008 (source: Norris and Norman 2005, 2006, 2007, 2008; DAFF undated)

Year	SE Asia	Middle East / Africa	Total
2003	>=1/41*	0/16	>=1
2004	2/29	0/5	2
2005	0/25	0/1	0
2006	1/25	0/0	1
2007	0/21	2/4	2
2008	1/8	0/0	1
Total	**>=5/149**	**2/26**	**>=7/175**

*Note: Norris and Norman (2008) provide minimum and maximum voyage mortality rates for previous years but do not list the mortality rates for each voyage in those years. In 2003 the maximum voyage mortality rate was 3.1% implying there was at least one reportable incident (provided there were more than 300 goats on the voyage). However, there may have been more than one. DAFF data were not available for scrutiny.

Table 2 Reportable mortality incidents, goat exports by sea and air 2004-2008 (source: Norris and Norman 2005, 2006, 2007, 2008; DAFF undated)

Date	Exporter	Port of departure	Destination (sea/air)	Duration (days)	Deaths	Mortality investigation report
Dec 2004	International Livestock Export Pty Ltd	Fremantle	Port Klang, Malaysia (S)	11	17/800 (2.13%)	Not found
Dec/Jan 2004/05	South East Asian Livestock Services	Darwin	Muara Port, Brunei (S)	9	16/620 (2.58%)	Not found. Exporter directed to have AQIS accredited vet on next voyage
Jan 2006	Manana Exports Pty Ltd	Geraldton	Port Kelang, Malaysia (S)	17	51/1675 (3.04%)	Not found
Jun/Jul 2007	Halleen Australasian Livestock Traders Pty Ltd	Fremantle	Port Louis, Mauritius (S)	16	38/304 (12.5%)	AQIS c2007a
Oct 2007	*Not detailed*	Melbourne	Kuala Lumpur, Malaysia (A)	1	20/325 (6.15%)	AQIS c2007b
Dec/Jan 2007/08	Central Pacific Livestock Pty Ltd	Port Kembla	Tamatave, Madagascar (S)	24	54/2124 (2.54%)	AQIS c2008
Dec 2008	International Livestock Export Pty Ltd	Fremantle	Pasir Gudang / Singapore	12	10/350 (2.86%)	Not available as at March 2009

A description of these incidents, and any lessons learned from them, is provided in Section 4.3.2.

4.2 The evolution of standards for live goat exports

This section of the report examines the evolution of standards for live goat exports using the report of More and Brightling (2003) as the starting point. Their report was based on reports going back over previous decades (A. Brightling pers. comm.), including one major study in Western Australia by Hawkins (c1995) and a report by Brightling (2001) entitled *Quality assurance for live goat exports to Saudi Arabia,* which reported the findings from four shipments to Saudi Arabia of 12,773 goats.

More and Brightling (2003) is the most recent publication in which risk factors for goat exports, and the recommended practices to manage those risk factors, were comprehensively reviewed.

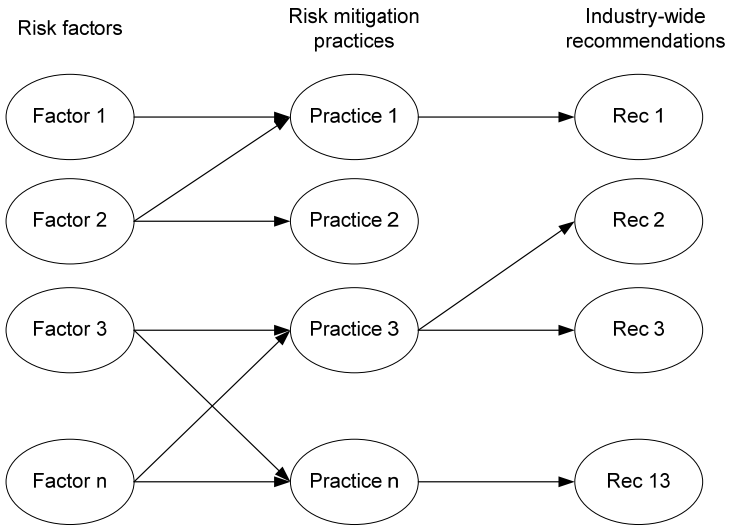
4.2.1 Key studies and reports

In 2003, Meat and Livestock Australia and LiveCorp commissioned a report to 'identify, assess and recommend management of the risks associated with high mortality during live goat exports by sea

from Australia'. The report, titled *Minimising mortality risks during export of live goats by sea from Australia,* was authored by Drs Simon More and Tony Brightling.

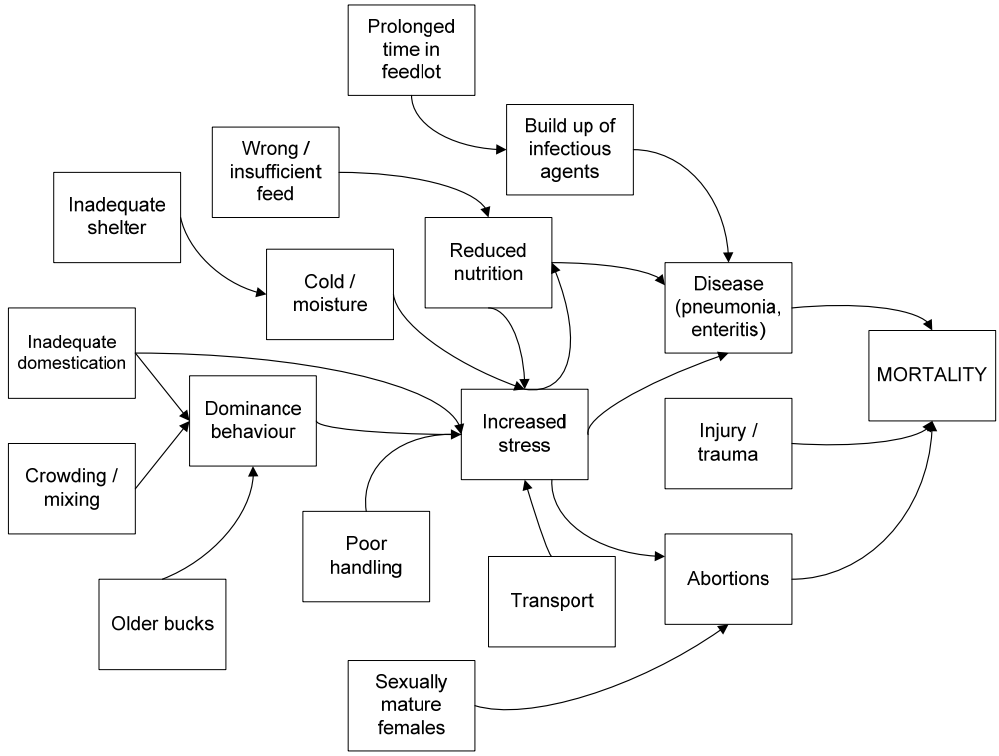
The methodology of the report included the conduct of a scientific literature review, collation of expert opinion and a retrospective analysis of data from shipments of the previous two years. The entire export process from selection of goats to management on-ship was covered by the review. Risk factors and management practices to mitigate them were identified using risk management principles. A series of specific recommendations was made where significant industry-wide changes to current practice were seen to be necessary. A summary of the relationship between risk factors, risk mitigation practices and industry-wide recommendations as presented in More and Brightling (2003) is shown in Figure 9. Not all of the risk mitigation practices identified in the report were embodied in specific recommendations.

Figure 9 Logic of the More and Brightling (2003) report



The risk factors identified by More and Brightling (2003) are shown in Figure 10 as a 'causal web'. The figure does not capture the time element of the export process, and it undoubtedly misses some of the factors or the relationships between them, but it serves as a visual snapshot of the major components of a complex system.

Figure 10 Causal web of mortalities in goat exports (adapted from More and Brightling 2003)



Of the risk factors for voyage mortality shown in Figure 10, More and Brightling (2003) identified eight as being central. These are:

1. Inclusion of unmanaged feral goats;
2. Capture management (for unmanaged goat populations) below best practice;
3. Inadequate pre-feedlot domestication for unmanaged goat populations;
4. Shelter problems during feedlotting;
5. Inclusion of older bucks;
6. Inclusion of sexually mature does;
7. Inadequate management of dominance; and
8. Length of the on-sea voyage.

As shown in Figure 10, six of these key factors relate directly to inadequate domestication of the export goats, including length of voyage. This is a point made in the earlier study by Brightling (2001):

> 'The transition from feral to domestic life was the weakest link in the export chain. Minimum standards for the domestication of feral goats are urgently needed' (p. 13).

Thirteen recommendations were made by More and Brightling (2003), with a further five issues also 'flagged for consideration'. A full listing of the recommendations, and a description of the actions taken against them, is provided in Table 3 in Section 4.2.3 of this report. In short, Table 3

shows that the More and Brightling (2003) report has not been acted upon in any systematic way. Several people consulted for this review commented that the report 'sank below the waves'. This is perhaps not surprising, given the serious commercial implications of several of its recommendations, notably the recommendation to phase out the export of captured feral goats. One interviewee for this review was of the opinion that the report was too quick to call for the banning of exports of captured feral goats and should have placed more emphasis on the practices required to reduce the risks associated with those exports. However, no one seems to dispute the factuality of the report's findings.

A later report (Entwistle and Jephcott 2005) reviewed the problem for live export of aggressive behaviour of entire male species (goats as well as sheep and cattle). The authors of this report concluded that aggression is a leading cause of mortality in goats and cite 'considerable anecdotal information' that this aggression is most pronounced in feral animals. Boer-cross goats show less aggression than feral goats and purebred Boers are better again. The authors discuss the difficulty of separating breed from background influences, noting that increasing levels of Boer genetics are highly correlated with a more intensive management background.

Because of the problem with aggression in feral goats, Entwistle and Jephcott (2005) endorsed the recommendation of More and Brightling (2003) that 'only those goats of feral origin that have been managed (domesticated) for a period after capture, or throughout their lives, should be exported'. A phase-out period of 1-2 years was recommended. Other recommendations of Entwistle and Jephcott (2005) included:

- Market survey and consumer education activities in importing countries to encourage a shift from imports of entire males to wether goats;
- A review of available information on the performance of feral and domesticated breeds under pastoral and intensive situations to inform breeders interested in supplying the live export market;
- Implementation of breeding plans by producers for domesticated feral goats;
- Application of low-stress behaviour management strategies, as outlined in the report, both pre-export and on board the export vessel; and
- Investigation of the use and market implications of anti-GnRH immunisation to reduce aggression in males, including the specific evaluation of new products.

As with the More and Brightling (2003) report, it appears that the recommendations of Entwistle and Jephcott (2005) have generally not been implemented.

4.2.2 Development of formal standards and conditions of export

The ASEL are published by DAFF. As at February 2009, the current edition of the ASEL is version 2.2, published in December 2008. The first edition of the ASEL was published in December 2004 when it replaced the Australian Livestock Export Standards (ALES) which were operative at the time of More and Brightling (2003). The ASEL are implemented through the Operations and Governance Manuals of livestock exporters, which must demonstrate to AQIS how the standards are to be complied with (DAFF 2007).

DAFF receives advice on the 'revision, further development and implementation of' the ASEL from the Livestock Export Standards Advisory Group (LESAG; formerly Livestock Export Standards Advisory Committee or LESAC), a group comprising industry, Government and research personnel (DAFF 2007, M. Hibbert pers. comm.).

As noted above, there was no formal adoption of the recommendations of More and Brightling (2003) following its publication.

In fact, it seems that the report was not made available to LESAC. This comment was made by at least two interviewees for this project. This would appear to be the main reason why a number of the practices identified by More and Brightling (2003) as important in mitigating the risks of goat exports were not captured in the new ASEL as the authors recommended they should be.

An example of such a recommendation is the inclusion in the shipboard diet of 200g/head/day of chaff and/or hay. As described below, meeting this standard has subsequently become a condition of the approval of exports by AQIS but it remains outside the ASEL.

In June 2006, AQIS issued Export Advisory Notice (EAN) 2006-02 in response to a mortality incident in which 'almost 6 per cent of goats from one registered premises died whilst aboard the vessel' (AQIS 2006). The EAN gave notice of three new conditions on the approval of Notices of Intention (NOI) and Consignment Risk Management Plans (CRMP) for goat exports:

> 'a) Goats to be exported by sea are held at one premises for 5 clear days (excluding the day of arrival and departure) before export and
> b) Goats are fed *ad libitum* during that period and only on pelletised feed equivalent to that normally used during the export journey.
> In addition to the two conditions above, AQIS may require the following:
> c) An AQIS accredited veterinarian must accompany the consignment on the export voyage' (AQIS 2006, p. 3).

These conditions extended the provisions of version 2 of the ASEL which only required the 5 clear days for paddock-based premises south of latitude 26 degrees and during the months May-October, with 3 days allowed during November-April or in any shedded premises. Feeding of pelleted rations was required only for 3 days in each instance. Premises north of 26 degrees latitude were exempted from these restrictions. Under EAN 2006-02 these premises apparently became included in the requirement for 5 clear days and 5 days' shipboard ration.

EAN 2006-02 was replaced by EAN 2007-19 in September 2007 (AQIS 2007a). This notice added to the provisions of EAN 2006-02 that:

> 'The shipboard ration must include a minimum of 200 grams of chaff or hay per day per goat' (AQIS 2007a, p.2).

The rationale for this condition does not appear in the EAN but it appears to follow the Fremantle-Port Louis mortality incident of July. As described above, the feeding of chaff or hay with the ration at 200g/head/day is one of the recommendations of More and Brightling (2003).

The most recent EAN in relation to goat exports is 2007-27, which was released in draft form for comment in November 2007 (AQIS 2007b). The EAN remains a draft as at February 2009 (M. Hibbert pers. comm.) and is therefore not in force. This notice proposed two further conditions on the export of goats:

> 'a) Applications for export licences for goats by sea will be issued with a licence condition that short haul voyages for goat exports will only be permitted until a successful history (5 voyages) of goat exports is demonstrated
> b) Note that NOIs and CRMPs for the export of goats by sea on long haul (>10 days) voyages will not be approved unless there is a history of successful export of goats on short haul (<10 days) voyages' (AQIS 2007b, p. 2).

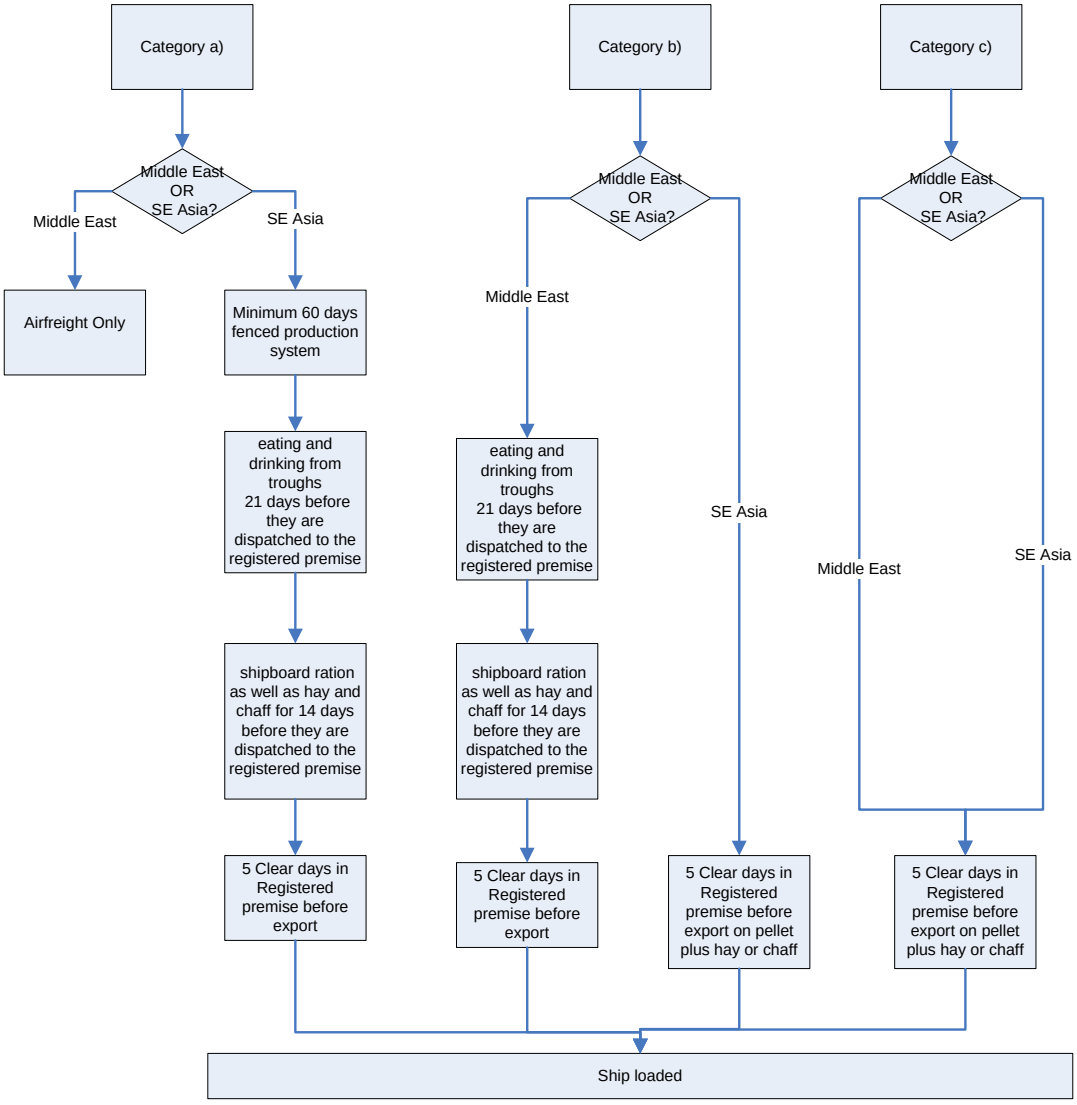
EAN 2007-27 effectively represented a softening of the AQIS stance of issuing no approvals at all for long-haul goat exports. However, its issue evoked a negative response from the industry which saw that inadequate preparation of goats, rather than inexperience of exporters, was the key issue. The observation has also been made that this approach will not work because different exporters work in the short-haul and long-haul markets.

During December 2007 and January 2008 a group of members of the Australian Livestock Exporters' Council (ALEC) in conjunction with LiveCorp began to develop a set of standards for goat exports. A draft *Industry proposal for the sea freight of goat species* (Stinson c2008) was circulated for comment by industry and AQIS / DAFF. The document proposes a series of standards that are based upon the destination of the goats (Middle East or South East Asia) and their origin:

- Category (a): goats sourced from unmanaged, unfenced rangeland production systems;
- Category (b): rangeland goats born in fenced production systems; and
- Category (c): goats from intensive production systems.

Figure 11 reproduces a decision tree from the draft proposal, which summarises the standards put forward by industry.

Figure 11 Proposed goat export preparation standards (reproduced from Stinson 2008)



In summary, the industry proposal accepts the 5 clear days in the registered premises, and feeding of shipboard rations during that time, put forward in EAN 2006-02. It also accepts the inclusion of chaff and/or hay in the shipboard diet and requires goats to be on single tier decks. It goes further by anticipating the potential problems posed by shipment of feral and rangeland goats by strengthening the provisions for nutritional backgrounding, requiring the feeding of the shipboard ration for 14 days before transfer to the registered premises for feral goats on any journey and for fenced rangeland goats prior to long-haul export.

The industry proposal appears to attempt a middle ground between the ASEL and the recommendations of More and Brightling (2003). Category (a) of the proposal is the group of

animals (captured feral goats) for which More and Brightling recommended a complete cessation of live export (immediately in the case of long haul, after two years for short haul).

More and Brightling (2003) did not make recommendations specific to category (b), although they noted the growing significance of managed and genetically upgraded feral goat production systems. There are some problems with the definition of category (b) stock, as More and Brightling (2003) discussed in some detail in their report, noting that the definition of a farmed goat as one 'born behind wire and reared since birth' is 'open to wilful misinterpretation'.

The industry proposal has not been progressed since January 2008. According to industry interviewees this is because AQIS has not responded to it. AQIS argues that the proposal is very brief, is not supported by evidence and does not explain how compliance with the standards is to be verified.

Since early 2008, AQIS has not been approving notices of intent for shipments of goats over 10 days' duration (M. Hibbert, pers. comm.). There seems little prospect of this ban being lifted as long as there is no acceptable counter-proposal from industry.

4.2.3 Summary: Status of More and Brightling (2003) recommendations

The recommendations of More and Brightling (2003) and their progression since the publication of the report are summarised in Table 3. In summary, the table shows that there has been no systematic adoption of the recommendations although several of the major ones have been picked up by AQIS as conditions of the approval of notices of intention.

Table 3 Summary of recommendations of More and Brightling (2003) and their status

	Recommendation
1	*On voyages of 10 days or more duration (long-haul voyages), captured feral goats are not selected for export. Only goats that have been in a managed production system since birth are exported on long-haul voyages.*
	Status This recommendation was not adopted, but it has been put forward in the proposed industry standards of January 2008. Specifically, industry has proposed to exclude captured feral goats from export to the Middle East (as distinct from voyages >10 days) except by air freight (Stinson c2008). AQIS has not been approving any voyages >10 days since early 2008.
2	*On voyages of less than 10 days duration (short-haul voyages), captured feral goats are not selected for live export from 1 January 2005. During the phase-out period to 1 January 2005, captured feral goats are only eligible for export on short-haul voyages if they are accustomed to people, and relatively stress-free in their presence, and are used to eating and drinking from troughs at the time of arrival at the pre-export assembly depot…the system of selection and management at both the domestication site and export assembly depot must be both documented and auditable.*
	Status This recommendation was not adopted. However, S1.20 of ASEL ver 2.2 requires that 'Goats must not be sourced for export unless they have become conditioned to being handled and to eating and drinking from troughs for a minimum of twenty-one (21) days before transfer to registered premises' (DAFF 2008). This on-farm adaptation period was lengthened from 14 days in ver 1 of the ASEL. EAN 2006-02 gave notice of an AQIS condition for 5 clear days in the registered premises and exclusive feeding of the shipboard ration for at least 5 days prior to leaving the registered premises (AQIS 2006). S3.8 of ASEL ver 2.2 requires 5 days and 3 days respectively for goats in paddocks between May and October, or 3+3 for November-April or goats in sheds at any time of year. This applies only to preparation of goats south of 26 degrees latitude (DAFF 2008) The industry proposal of January 2008 argues that captured feral goats should be permitted for export by sea to south-east Asia (as distinct from 'short-haul'). The proposal is based on strict process requirements for a minimum of 60 days in a 'fenced production system'; eating and drinking from troughs for 21 days before dispatch to the registered premises; the feeding of a shipboard ration as well as hay or chaff for 14 days before dispatch to the registered premises; and for the goats to spend 5 clear days in the registered premises before export. The system of selection and management prior to entering the registered premises is not 'documented and auditable' and there is no current proposal for such a system.
3	*Goat bucks of feral origin are not selected for export if they have a full mouth of permanent incisor teeth.*

	Recommendation
	Status This recommendation has not been formally adopted and is not referred to in the ASEL, the various EANs or the 2008 industry proposal.
4	*There have been significant problems, mainly relating to spontaneous abortion, with the export of does from Australia. This problem can be reduced, but not eliminated, through pregnancy testing. Although this risk is removed in animals prior to sexual maturity, detailed information linking sexual maturity and bodyweight in Australian feral does is currently lacking. For these reasons, it is recommended that goat does should not be selected for export as slaughter animals.*
	Status This recommendation has not been formally adopted. However, S1.11 of ASEL ver 2.2 requires that goat does 35kg or heavier may only be selected for export as slaughter or feeder animals if demonstrated not pregnant by ultrasound and thus certified within 30 days before export (DAFF 2008).
5	*The overall voyage mortality rate (covering the period from loading on-ship to subsequent unloading) should not exceed 2.0%...an expert investigation will be conducted on each occasion where the voyage mortality rate exceeds this level.*
	Status S5.11 of ASEL ver 2.2 requires that AQIS be advised as soon as possible and within 12 hours of a level of 2% mortality being reached. AQIS conducts an investigation of voyages where mortality exceeds the 2% level (DAFF 2008).
6	*Goats exported by sea should be penned on the ship in lines, with the liveweight range in each line of goats not exceeding 10kg.*
	Status This recommendation has not been formally adopted and is not referred to in the ASEL, the various EANs or the 2008 industry proposal.
7	*The following 'Best Practice' box is added to the Australian Livestock Export Standards: 'Best practice: Where possible, does and entire bucks should not be held on the same deck during export'. This 'best practice' may be difficult to achieve on ships carrying both cattle and goats. In these situations, it is critical that goats are loaded in areas of the ship that will remain dry during cattle wash-downs, and other strategies may be needed to ensure that does and entire bucks cannot mix during the voyage.*
	Status This recommendation has not been formally adopted and is not referred to in the ASEL, the various EANs or the 2008 industry proposal.
8	*The following 'Best Practice' box is added to the Australian Livestock Export Standards: 'Best practice: Where possible, goats should be penned on the vessel in single tier pens'.*

	Recommendation
	Status This recommendation has not been formally adopted, but it has been put forward in the proposed industry standards of January 2008.
9	*The shipboard fodder provided for goats exported by sea includes at least 200g/head/day of chaff and/or hay.*
	Status This requirement for 200g/head/day of chaff and/or hay was notified as a condition of approval of NOI by AQIS by EAN 2007-19 in September 2007. It has also been put forward in the proposed industry standard of January 2008 (in the latter case without specifying a minimum quantity).
10	*Oral antimicrobial agents must not be used prophylactically (as a preventive measure to apparently-healthy animals) unless prescribed by a veterinarian.*
	Status This recommendation has not been formally adopted and is not referred to in the ASEL, the various EANs or the 2008 industry proposal.
11	*All mortality incidents (consignments with a voyage mortality rate of more than 2%) are expertly investigated, to identify the cause and enable a continuous improvement in the health and welfare of goats during live export. There may be an additional requirement regarding pre-voyage mortality, depending on the results of the current ALES review.*
	Status See (5). The usefulness of the data from such investigations as publicly reported, however, is questionable (see below). Mortality rates prior to arrival at the registered premises are not monitored.
12	*A critical and independent re-evaluation of the live goat export industry is undertaken within three years of this report, to assess progress and the need for further change in a developing industry.*
	Status The current project fulfils the recommendation, although conducted over 5 years after the publication of More and Brightling (2003).
13	*To enhance compliance with the recommendations listed above, we strongly recommend that they are embedded in the Australian Livestock Export Standards, and therefore in the quality assurance program for each live goat exporter.*
	Status As discussed elsewhere in the table, several of the recommendations made do not appear in ASEL ver 2.2 (DAFF 2008).

	Recommendation
Other issues	*The Australian Livestock Export Standards (ALES) are currently being changed from a practice-based to an outcome-based standard. As a consequence, there may be a requirement to monitor mortality rates prior to shipping (covering the period from time of departure from the farm / station / property-of-capture to loading on-ship) as well as during the shipping period.*
	Status The ALES were not changed to an outcome-based standard. Mortality rates prior to arrival at the registered premises are not monitored.
	Goats are very susceptible to cold stress. Because the peak demand for goats will move forward by about ten days each year, to coincide with Ramadan and the hajj, as the years progress, increasing efforts will need to be paid to the prevention of hypothermia in goats exported from southern Australia.
	Status This issue does not appear to have been specifically addressed, but AQIS has not been approving any voyages of >10 days' duration since early 2008.
	Entire bucks are much more difficult to manage than wethers during live export. Because standards in risk management vary throughout the industry, the industry should consider a progressive reduction in the proportion of goats exported as entire males. The authors recognise current constraints to change, given the current preference for entire bucks in most of Australia's live goat export markets.
	Status This issue does not appear to have been formally addressed and is not referred to in the ASEL, the various EANs or the 2008 industry proposal.
	There is very limited information concerning fibre requirements and optimal pen heights and animal densities during live goat export. Further research in these areas would be warranted.
	Status As far as can be ascertained, this recommendation has not been addressed.
	Veterinary reports of voyage mortalities during live export have been of variable quality. In order to improve the value of these reports, it is recommended that industry require a detailed report, following the guidelines outlined in an accompanying document (More, 2002c), from all veterinarians accompanying live animal export voyages from Australia.
	Status As far as can be ascertained, this recommendation has not been addressed.

4.3 Clarification of risk factors and best practices

This section of the review considers what should now be regarded as best practices in live goat exports. Initially, it was anticipated that this knowledge would largely be gained by examining the success or otherwise of the implementation of the recommendations of More and Brightling (2003). The foregoing discussion has shown, however, that these recommendations have never been systematically adopted and have therefore not been validated.

Thus, the premise of this section is that the findings of More and Brightling (2003) are essentially correct but to ask whether any subsequent developments should modify or add to those findings. There are three potential sources of new information:

- New scientific research;
- Analyses of reportable incidents; and
- The expert opinion of industry participants.

This section also examines the particular issues applying to air exports, which were not explicitly examined by More and Brightling (2003) and which are ostensibly less risky than sea exports.

4.3.1 New scientific research

A search of the literature did not reveal any new knowledge of safe goat export practices or associated fields such as domestication or feedlot management. This is perhaps not surprising, as many research questions concerning the adequate preparation of goats for export are unique to Australia.

Entwistle and Jephcott (2005) did not cite any scientific literature on the topic of male aggression that would alter the findings of More and Brightling (2003).

4.3.2 Analyses of reportable incidents

As described above (Table 1 and Table 2), there have been at least seven reportable mortality incidents among goat exports since 2003. Investigation reports on only three of these were able to be accessed for this review. These are described in detail below.

Fremantle-Port Louis July 2007

This incident involved a very high mortality rate (12.5%) among a relatively small shipment of 304 goats. According to the mortality investigation report (AQIS c2007a), the goats were resident in the registered premises for a minimum of 14 days before export, during which time there were 3 mortalities (details are not provided).

The AQIS report concludes that mortalities were likely to have been caused by inanition and enteritis (consistent with salmonellosis). The weather record for the voyage shows that seas were rough for most of the trip. No link is drawn between the weather conditions and the mortalities, although there is reference to efforts to keep the goats from being saturated by sea spray. The

report also notes that 'by day 4 the chaff was mixed with the pellets because the goats were not consuming the pellets', and that chaff and hay were fed for the remainder of the voyage. The amount of chaff or hay that was being fed prior to day 4 and the role this may have played in the pathogenesis of the inanition / enteritis was not elaborated.

The report was forwarded to the LESAC and the exporter was suspended from exporting goats during the investigation (July-December). An Export Advisory Notice (EAN 2007-19 – see below) was issued requiring the feeding of chaff or hay at a minimum of 200g/head/day. The report also notes that AQIS was not permitting the export of goats on voyages longer than 10 days' duration and that any subsequent consignments by the exporter would require the presence of an accredited veterinarian.

An undated discussion paper supplied to this review notes that the exporter disputed the AQIS findings, pointing out that no post mortems were performed and arguing that the mortalities were 'more related to the wetting of the goats in the rough seas' (McIvor undated). However, as noted by one interviewee of this review, goats with full bellies are far less likely to die from cold stress.

Melbourne-Kuala Lumpur October 2007

This has been the only reportable incident among air consignments within the review period. Thirteen goats were killed, and further 7 required euthanasia, in a load of 325 (6.2%) when the middle tier of a 3-tier wooden crate collapsed. The AQIS investigation report (AQIS c2007b) recommended that:

- AQIS inspect crates before export, with the option to stop the shipment or require repairs before proceeding;
- 'Ensure that accurate goat weights are obtained to ensure that crates are not over loaded beyond their structural design capacity' (responsible party not specified); and
- Standards for the construction of air transport crates be formulated based on the specifications of the International Air Transport Authority (IATA) Unit Load Devices (ULD) Technical Manual and included in the Australian Standards for the Export of Livestock (ASEL).

The report was forwarded to the LESAC. The exporter's licence was suspended for the duration of the investigation and subjected to additional conditions for subsequent shipments, namely:

- The exporter must supply a report from a structural engineer on the capacity of the proposed crate;
- The crate must be constructed in accordance with the engineer's report; and
- An AQIS officer must supervise the weighing of all animals in the consignment.

Two subsequent mortality-free shipments by the exporter under the additional conditions were noted.

Port Kembla-Tamatave January 2008

This incident involved the loss of 2.54% of a shipment of 2,124 goats. The mortality investigation report for the shipment (AQIS c2008) notes that:

- The consignment originally comprised 2,750 goats, but 545 were rejected at the registered premises for not meeting the importing country's requirements for property of origin; 14 were rejected for positive tests to caprine arthritis encephalitis, caprine Johne's disease or Q fever; 43 were rejected by the exporter as not meeting the ASEL; and 24 died.
- The goats were held at the registered premises between 16 and 54 days and were inspected three times prior to loading by AQIS and once by the AQIS-accredited veterinarian.
- The goats were loaded in accordance with the ASEL.
- The animals as shipped comprised 463 Angora bucks and does and 1661 Boer bucks and does.
- There were rough conditions for the first 5 days of the voyage.
- Based on clinical signs and post mortem findings, 36 goats died from enteritis and 18 from pneumonia. The report notes that, 'in general terms, the angora goats died of pneumonia and the boers [sic] goats mainly died of enteritis (consistent with salmonellosis)'.

The report notes that there were no factors associated with the property of origin that could be linked to the mortalities. However, the report does not say which specific factors (e.g. degree of domestication) were investigated or were not investigated. The report concludes that the goats died from enteritis and pneumonia with the duration of the voyage and the early rough conditions contributing to the mortality level.

The actions taken were:

- Consideration by AQIS of additional conditions on the approval of NOIs and CRMPs for export of goats on voyages of less than 10 days for all exporters, namely a minimum period of 5 clear days in the registered premises, exclusive feeding of the shipboard ration for 5 clear days prior to leaving the registered premises for loading and inclusion of a minimum of 200g/head/day per day per goat in the shipboard ration.
- Consideration by AQIS of additional conditions on the approval of future consignments of goats on voyages of less than 10 days for this exporter, namely the requirements for an AQIS veterinarian or AQIS-accredited veterinarian on board, 10% additional space allocation above the ASEL, weighing of individual animals in the registered premises and a minimum of 10 days in the registered premises.
- New or renewed export licences for goats by sea to be issued with a condition that only short haul voyages will be permitted.
- NOIs and CRMPs submitted for export of goats by sea on long haul voyages (>10 days) not currently being approved.

The very long period in the registered premises in this case is interesting. Hawkins (c1995) found that if the time spent in the pre-export feedlot exceeded 10 days there was a amplification of exposure to infectious diseases, notably salmonellosis and coccidiosis, and recommended that this period not be exceeded. More and Brightling (2003) cite this finding and state that 'the feedlotting of goats prior to live export should not continue for greater than 7-10 days'. It is possible that this was a contributing factor to the high mortality rate.

Given the finding of Hawkins (c1995), and the fact that these goats were in the registered premises for such a long period, it is strange that AQIS has suggested requiring a minimum of 10 days in the registered premises for future shipments, when in fact a 10-day *maximum* might have been more appropriate.

It must be noted here that the mortality investigation reports are not very informative. Whilst it is recognised that they may be deliberately brief for public consumption, and that much valuable information may simply not have been available to AQIS at the time of the investigation, the reports contain little analysis of real value and omit background information that may be highly relevant. For example, neither of the reports on the long haul shipments mention the background (notably the domestication status) of the goats.

Thus, it is difficult to draw any lessons on the risk factors for goat exports from the reports of recent adverse incidents, with the obvious exception of that involving the collapsed crate.

Significant issues for the Port Louis shipment appear to have been the weather and wetting of the goats, associated with an inanition problem that may or may not have been partially preventable by better backgrounding of the goats and the inclusion of chaff or hay in the diet. It is not known whether the goats were from managed production systems. In the case of the Port Kembla voyage, the long period of time spent in the registered premises may have been an important factor. Rough weather and the duration of voyage (almost by definition – cumulative mortality was 1.13% by day 10) may also have been contributing factors, but no further conclusions can be reached.

It will be difficult for AQIS and the industry to make progress in reducing the number of high mortality incidents – short of simply not issuing approvals to export – without a more comprehensive system of investigation. Such a system was recommended by More and Brightling (2003) but has not been implemented.

4.3.3 Expert opinion

A wide range of exporters, vets, researchers, AQIS staff and other industry participants were asked what practices were effective at reducing the risk of mortalities in goat exports to acceptable levels.

Only a small number of people consulted considered themselves to be sufficiently involved in goat exports, particularly by sea, to offer a valuable opinion. In fact most of the people contacted for information referred the enquiry to only two individuals, in the case of sea export, and another three or four specialising only in air.

Major findings from the consultations were that:

- Sea and air exports are quite different propositions in the requirements for successful backgrounding. Goats travelling by air do not need to become accustomed to the pellets that comprise a shipboard diet and they are not exposed to ambient weather conditions during travel. Goats exported by air need to be adaptable to conditions encountered in the destination country but this does not appear to be a major challenge provided the goats are eating well before they depart Australia.

- The key to successful exports, particularly by ship, is sourcing the right goats. This was repeatedly stated. Goats from more closely managed systems (Queensland, NSW), usually Boer crosses, are far safer than captured feral goats from unmanaged systems.

- Having said that, any group of goats can be domesticated to the point where they can be successfully exported and many such goats are sent by air. Skill and patience (as well as time and money) are required in the domestication process. Estimates of the time required varied between two weeks and more than 60 days. However, a specific length of time is not as important as the adoption of suitable processes and the willingness to draft off non-performing animals. It was difficult to define precisely what these processes are – they are presented more as 'art' than 'science'.

- An outcome-based indicator or series of indicators of readiness for export would be more meaningful than observing a fixed period of time in the domestication process. The ASEL requires that goats be eating and drinking from troughs. A further indicator might be that the goats do not take fright in the presence of humans. However, the inherent subjectivity of evaluating such behaviours is acknowledged.

- Managing dominance behaviour is also an important part of preparing and exporting goats. Segregation by weight, age and sex in the pre-export feedlot and maintaining the same groups on board the ship or aircraft is important, as each disruption to a group (including the introduction of new members) triggers a renewed period of dominance behaviours until an equilibrium is re-established.

- The provisions of the ASEL are necessary but not sufficient for successful exports. There was no objection to any particular standards. Continually tightening up the ASEL, however, has the effect of making it more difficult for responsible exporters without stopping the 'cowboys' because compliance with the ASEL cannot be adequately ensured anyway.

- Many exporters, including those using air freight, do not understand what is needed to export goats successfully.

Sea freight

There is a view that any class of goats can be exported, even long-haul, if they are prepared properly. Boer-cross goats and those from managed systems pose a much lower risk than captured ferals, but these too can be exported safely with the appropriate investment in preparation. Those exporters who believe they know how to export goats within acceptable mortality limits say that AQIS unfairly 'tars them with the same brush' as others who do not know how to export goats. The fact that there is no formal recognition of exporters with a strong record is a palpable frustration.

A goat industry expert from WA, who participated in an extensive study of management strategies to improve goat exports for the Meat Research Corporation in the mid-1990s (Hawkins c1995), believes there is an opportunity in WA for captured feral goats to undergo a period of domestication on agricultural land, for example where there are crop stubbles not otherwise being grazed. The Department of Agriculture and Food WA (DAFWA) is encouraging the development of this value chain because there is insufficient infrastructure in the pastoral zone to allow goats to be held, as the stocking rate typically ranges between 1 dry sheep equivalent (DSE) per 8 Ha and 1 DSE per 20 Ha. Moving goats to agricultural land from which sheep have largely disappeared provides an economic value-add in both regions. There are also environmental benefits on the pastoral country from reducing the stocking pressure exerted by the goats.

Under the DAFWA program, goats would spend a minimum of two weeks on the agricultural property before being moved to the pre-export feedlot. The critical step is to identify non-feeders by the inclusion of food dye in the ration at the pre-export feedlot. The goats without dye around their mouths are drafted off. The use of the dye would need to be approved by the country of destination but this should not pose a problem as the dye is a food-grade product (T. Johnson pers. comm.).

Air freight

AQIS appears to have a strong preference for air rather than sea export of goats. This is not surprising; while mortality rates associated with air exports are not made public by AQIS, they are said to be nil or virtually nil, although more than one exporter spoken to for this review argued that mortalities do occur during air shipments.

The DAFF web site carries details of only one reportable incident in recent years (the crate collapse of October 2007). Two specific research issues concerning air export of goats have been identified, namely ventilation systems and crate construction, and projects to address these are almost complete (P. Stinson pers. comm.).

There is no indication from government of any problems with air exports of goats. Yet discussions with key industry players reveal considerable concern about the practices of a few 'rogue operators' who are threatening the reputation of the industry. Because of the inherently low risk of air transport itself, deficiencies in goat export processes are rarely manifested as on-board mortalities but are instead 'hidden' in mortalities occurring after arrival at the pre-export premises and prior to AQIS inspection, and after arrival at the export destination.

In particular, problems arise when exporters become 'facilitators' rather than 'principals' in the transaction, effectively 'renting' their licence to other parties who organise the goats and manage the export process. These arrangements are usually associated with a range of sub-standard export practices from selection of unsuitable goats to insufficient backgrounding and the use of inferior crates.

Interviewees described these problems as being infrequent and caused by a very small number of exporters, but with the potential to cause great harm to the industry. It is understood that a current industry initiative is seeking to address this problem. Details were not available to this review.

A particular issue highlighted to this review was that goats to be exported by air are not required to spend a period of time in a 'registered premises' (as defined in the ASEL) prior to export. Rather, they are assembled at 'approved premises' which are subject to less stringent requirements for record-keeping and are not audited. Interviewees indicated that the groups of animals presented for AQIS inspection at approved premises are, in some cases, only the acceptable remainder of a larger original group. AQIS has no way of tracing the history of the group.

All of the responsible air exporters interviewed placed great emphasis on the sourcing and preparation of goats even where additional costs were involved (for example, the use of registered premises pre-export). There are depots in New South Wales with a good reputation for supplying goats which have been through a solid backgrounding process. In one case the exporter has a strong incentive to achieve a low mortality rate because he has an interest in the overseas abattoir

and retail outlets. He also has an interest in a local abattoir, allowing him to cull the export group quite heavily and sending the culls direct to slaughter.

Some exporters believe that the ASEL is capable of delivering high quality air export outcomes, but with a lack of effective mechanisms to ensure compliance; others disagreed that the ASEL are sufficient.

4.4 Results: Best practice guidelines

This section of the report is suggested for publication as a *Best practice guide to the preparation of goats for live export.* Because it is designed as a stand-alone document, it repeats some material previously presented in this report.

Introduction

The live goat export industry provides a valuable source of income to many farms. The great majority of goat exports from Australia in recent years have been by air to countries such as Malaysia, although a significant number still travel by sea, especially to short-haul destinations in south-east Asia.

Unfortunately, there have been occasional cases of high-mortality shipments of goats, mainly where goats of rangeland origin have been taken on long sea voyages to the Middle East or Africa. These incidents have led to restrictions on goat exports by sea and the loss of market opportunities.

However goats can be exported successfully even when they have been sourced from unmanaged herds and some exporters consistently demonstrate the ability to do so. While there is relatively less information on the science of preparing goats for export than preparing sheep or cattle, best practices have been identified that maximise the chances of successful goat exports.

The key clearly lies in the careful preparation of goats prior to the voyage. No amount of careful onboard management will compensate for an inadequate preparation regime.

These guidelines have been developed to assist goat exporters to deliver healthy consignments of goats with a minimum of onboard mortalities. They are based primarily on recommendations from a review for Meat & Livestock Australia and LiveCorp by Drs Simon More and Tony Brightling in 2003 entitled *Minimising mortality risks during export of live goats by sea from Australi*a. Advice during the preparation of this document was also received from Australia's leading goat exporters.

Relevant sections from the Australian Standards for the Export of Livestock (ASEL) version 2.2 are also included in this guide. They are shown in boxed sections of text. Sections in *italics* are reproduced precisely, while sections in normal text are paraphrased. The ASEL standards must be complied with. Note that some of the best practice guidelines do not have an accompanying ASEL standard.

Selection of goats for export

Exporting country requirements

1. Ensure the goats sourced for export meet the requirements of the importing country. This is an ASEL standard.

ASEL S1.2: *Livestock sourced for export must meet importing country requirements.*

Property of origin

2. As far as possible, source goats from herds that that have been raised behind wire since birth and are regularly handled by people. Goats from extensive systems (especially captured feral goats) are more prone to disease and death during export than those from intensive production systems. Less domesticated goats can be exported without high mortality rates but they require very careful preparation before they are suitable to export.

3. You must obtain a National Vendor Declaration (NVD) identifying the property of origin of the goats and providing assurance that the goats are not within a treatment or grazing withholding period or export slaughter interval and have not been fed animal-derived products during their lives.

ASEL S1.3 (sea), ASEL 6.2 (air): *Livestock sourced for export must be:* *(a) identified to the property of source;* *(b) accompanied by a correctly completed and signed declaration as to the identification of the livestock and property of source; and* *(c) individually identified where testing is required during preparation.* ASEL S1.4 (sea), ASEL 6.3 (air): *Livestock sourced for export and intended for human consumption must comply with Australian food safety requirements, including standards for chemical residues or environmental contaminants.*

Genetics

4. As far as possible, source Boer-cross goats for export because they pose a lower risk of mortality during shipment. It is difficult to know whether this is due to breed characteristics or simply that infusions of Boer blood are associated with more intensive management. Regardless of the reason, Boer-cross goats should be preferred over feral bloodlines for export.

Age/period since weaning

5. Goat bucks of feral origin should not be exported by sea if they have a full mouth of incisor teeth (i.e. 8 teeth). Six-tooth bucks should also be avoided. These older bucks show a higher risk of mortality onboard export vessels.

6. Goat kids must have been weaned at least 14 days before sourcing for export and must have a bodyweight of more than 22kg. This is an ASEL standard.

ASEL S1.12 (sea), ASEL 6.9 (air): *Unless approved by the relevant Australian Government agency…goat kids must only be sourced for export if…*
(a) they have been weaned at least fourteen (14) days before sourcing for export;…and
(c) goat kids have a liveweight of more than 22 kg.

Sex and pregnancy status

7. Does should not be selected for export as slaughter animals as spontaneous abortions can occur. Although the ASEL standard requires only that does over 35kg destined for slaughter or feeding be pregnancy tested not-in-kid, this may reduce but not eliminate abortion problems, unless does of all sizes are pregnancy tested. There is insufficient information on sexual maturity and bodyweight in feral does to be sure that does will not be pregnant below a specified bodyweight.

8. Lactating does must not be exported unless they have young at foot, in which case they may be exported by air only. This is an ASEL standard.

ASEL S1.7 (sea): Lactating animals are not suitable to be exported unless they have young at foot, in which case they may be exported by air only.

ASEL S6.7 (air): *Livestock that are declared to be pregnant or that have given birth in the last forty-eight (48) hours must not be tendered for transport unless accompanied by a veterinary certificate certifying that the animal is fit to travel and there is no evidence of imminent parturition.*

ASEL S1.11 (sea), S6.8 (air): *Ewes with a weight of 40 kg or more and does (goats) with a weight of 35 kg or more must only be* ***sourced for export as slaughter and feeder animals*** *if they have been pregnancy tested by ultrasound within thirty (30) days of export and certified not to be pregnant, by written declaration, by a person able to demonstrate a suitable level of experience and skill.*

ASEL S1.13 (sea): *Sheep and goats* ***sourced for breeding*** *must only be sourced for export if they have been pregnancy tested using ultrasound foetal measurement within thirty (30) days of export and certified, by written declaration, by a person able to demonstrate a suitable level of experience and skill, to be not more than a maximum of one-hundred (100) days pregnant at the scheduled date of departure.*

ASEL S6.6 (air): Female goats must only be sourced for export for breeding if they have been pregnancy tested by ultrasound foetal measurement within thirty (30) days of export and certified, by written declaration, by a person able to demonstrate a suitable level of experience and skill, to be not more than 115 days pregnant at the scheduled date of departure.

Horns

9. Horned goats must comply with the ASEL standard.

ASEL S1.17 (sea), ASEL 6.12 (air): *Horned goats must only be sourced for export as slaughter and feeder animals if the horns:*

(a) are not turned in so as to cause damage to the head or eyes;
(b) would not endanger other animals during transport;
(c) would not restrict access to feed or water during transport; and
(d) Are no more than 15cms long and blunt or are no more than 22cm long with tips no more than 20cm apart.
Otherwise, horned goats must only be sourced for export with the approval of the relevant Australian Government agency.

General condition

10. Goats must comply with the ASEL standard for general animal health and welfare (see box below). This includes compliance with the relevant animal welfare code of practice. There is a national *Model Code of Practice for the Welfare of Animals – the Goat*, and this is the document you should directly refer to for Queensland, South Australia, Western Australia and the Northern Territory. Other states and the Australian Capital Territory have their own slightly different versions of this code.

    State and territory codes of practice for the welfare of goats can be obtained from the sources listed in Appendix 1. If in doubt, check with your state animal welfare authority.

ASEL S1.1 (sea), ASEL 6.1 (air): *Livestock sourced for export must meet any relevant animal health and welfare requirements under state and territory legislation and relevant requirements under national Model Codes of Practice for the Welfare of Animals.*

11. Goats must not be exported unless they are in condition score 2-4 (scale 1-5) and free from signs of disease. The signs specifically listed in the ASEL standard as rejection criteria are:
    - Emaciated or over fat
    - Anorexia (inappetence)
    - Uncoordinated, collapsed, weak
    - Unwell, lethargic, dehydrated
    - Ill-thrift
    - Lameness or abnormal gait
    - Abnormal soft tissue or bony swellings
    - Dysentery or profuse diarrhoea
    - Bloat
    - Nervous symptoms (head tilt, circling, incoordination)
    - Abnormal or aggressive behaviour/intractable or violent
    - Generalised papillomatosis or generalised ringworm, dermatophilosis
    - Generalised and extensive buffalo fly lesions
    - Generalised skin disease
    - Visible external parasites
    - Significant lacerations
    - Discharging wounds or abscesses
    - Cutaneous myiasis (flystrike)
    - Balanitis (pizzle rot in sheep)
    - Blood/discharge from reproductive tract (vulva/prepuce)
    - Blindness in one or both eyes

- Cancer eye
- Keratoconjunctivitis (pink eye)
- Excessive salivation
- Nasal discharge
- Coughing
- Respiratory distress — difficulty breathing
- Untipped sharp horns
- Horns causing damage to head or eyes
- Bleeding horn/antler stumps
- Scabby mouth
- Mobs with unusual mortalities over the whole period of pre-export isolation
- Large disparities in size or age (redraft animals in this case).

Goats for export should also have a sound mouth.

ASEL S1.7 (sea), ASEL 6.4 (air): Livestock for export must not exhibit any of a range of rejection criteria including signs of anorexia, abnormal or aggressive behaviour, disease, parasites or sharp horns / horns causing damage to the head or eyes (see above). Mobs with unusual mortalities over the whole period of pre-export isolation should be rejected and those with large disparities in size or age should be redrafted.

ASEL S1.8: *Livestock must not be sourced for export if they are in an emaciated or overfat body condition. That is:…(c) sheep, goats and deer must be from condition scores 2 to 4 (inclusive) on a scale of 1 to 5.*

ASEL S1.27 (sea), S6.19 (air): *Livestock sourced for export that become sick or injured during on-farm preparation must be excluded from export, and arrangements must be made for their prompt and humane handling and care.*

Pre-feedlot preparation

It is critical that goats are accustomed to a human presence and fully adapted to eating and drinking from troughs before they enter the pre-export feedlot. If they are not, onboard mortalities can be very high because the goats stop eating (‘inanition’) and are very susceptible to stresses such as cold. Stress rapidly leads to infections such as salmonellosis or pneumonia and death.

The guidelines below apply largely to goats sourced from unmanaged populations. For intensive and semi-intensive systems, many of the recommended practices will be built into the preparation protocol.

The evidence shows that pre-feedlot preparation is the most important part of the process of preparing goats for export.

Capture of unmanaged goats

12. Unmanaged goats should be captured in a manner that is as stress-free as possible because they are particularly susceptible to sudden death, lameness, bruising, injuries,

chronic ill-thrift and/or infection resulting from acute stress and/or careless handling. Good capture management includes:

- Mustering during periods of mild weather;
- Droving slowly, at the speed set by the tail of the mob;
- Allowing 24 hours' rest, with feed and water, before journeys of 8 hours or more (or otherwise as specified by land transport regulations – see below);
- Holding the goats in yards large enough to avoid crowding and with shade; and
- Minimising the use of dogs.

Refer to 'Module 6 – Husbandry' in the MLA *Going into goats* guide for good advice on goat handling.

Location of pre-feedlot premises

13. As far as possible, the pre-feedlot domestication process should take place in premises in a similar region to the property of origin.

Duration and general management of the pre-feedlot period

14. The ASEL require that goats are accustomed to being handled and to eating and drinking from troughs for at least 21 days before transfer to the pre-export feedlot.

    However, this step in the export process should be dictated by the required outcome rather than a specific time period. Some experts say that the backgrounding process can take 2 months or more depending on the origin of the goats and the quality of the backgrounding process.

    High-quality backgrounding is described as an *active* rather than *passive* process: in other words, the goats should not simply be confined but should be handled as regularly as possible through activities such as drafting, weighing and drenching. Patience is a virtue. Check the goats daily by walking amongst them. Interactions with the goats should follow principles of low stress stock handling – refer to 'Module 6 – Husbandry' in the MLA *Going into goats* guide for good advice.

    When goats are adequately domesticated they should not take undue fright when people walk amongst them. They should also be eating drinking from troughs.

ASEL S1.20 (sea), S6.13 (air): *Goats must not be sourced for export unless they have become conditioned to being handled and to eating and drinking from troughs for a minimum of twenty-one (21) days before transfer to registered premises* [or approved premises, in the case of air export only].

15. Goats that do not adapt to confinement should be humanely put down. This includes goats that do not eat for 3-4 days. Recommended methods for humane destruction of goats are outlined in the *Model Code of Practice for the Welfare of Animals – the Goat* and equivalent state / territory codes (see Appendix 1).

Nutrition

16. Provide ready access to water at all times.

17. Where goats have been captured from unmanaged systems, provide feed of a type that is readily accepted – especially natural scrub and other roughage. Access to browsable material is desirable because it permits normal behaviour. The goats will need to adapt to a feedlot ration but this must be a gradual and planned process.

Treatments

18. All goats should be vaccinated against enterotoxaemia (pulpy kidney) and tetanus and treated for internal and external parasites at the start of the pre-feedlot period. If goats have not previously been vaccinated they should receive two doses 4-6 weeks apart. If they have previously been vaccinated, a booster dose is advised.

    Refer to 'Toolkit 6 – Husbandry' in the MLA *Going into goats* guide for further information about vaccination.

19. You must keep records of any treatments applied to goats prior to export, including vaccines, for at last two years after the date of export. This is an ASEL requirement.

ASEL S1.25 (sea), S6.18 (air): *A record of all vaccines, veterinary medicines and agricultural chemicals used to vaccinate or treat livestock sourced for export must be kept for at least two (2) years after the date of export.*

20. Female goats must not be treated with a prostaglandin drug within the time periods prescribed by the ASEL standards.

ASEL S1.26 (sea), S6.18a (air): *Female livestock must not be treated with a prostaglandin drug within fourteen (14) days of export, and not during the sixty (60)-day period before export unless they have been pregnancy tested immediately before prostaglandin treatment and declared to be in the first trimester of pregnancy or not detectably pregnant.*

Land transport to feedlot

General standards

21. Ensure the land transport of export goats meets the requirements of the importing country. This is an ASEL standard.

ASEL S2.2: *The land transport must meet any importing country requirements for the land transport phase in the export chain.*

22. As a minimum, you must observe the livestock transport requirements of your state/territory or the ASEL (Standard 2) – whichever is the more stringent. Note that state/territory codes of practice for the land transport of livestock are being replaced by more formal Land Transport Standards. As at June 2009 these standards were undergoing public

consultation process. After finalisation, they will gradually become adopted into state and territory legislation.

Ensure that the transporter observes the standards of ASEL S2 and the relevant state / territory regulations. These include the requirement for a travel plan, maximum water deprivation and minimum rest times, curfews, loading densities and ensuring fitness for travel.

Protection from cold stress

23. Goats are particularly susceptible to cold stress. Goats should not be moved during cold or wet weather except in a covered crate. Endeavour to transport goats, especially feral goats, from pastoral areas to southern export points during warmer months only.

Pre-export feedlotting

General standards

24. The location, construction and management of the registered premises must conform with the ASEL. Refer to ASEL S3, *Management of livestock in registered premises,* for full details. Those standards and best practices with specific relevance to the preparation of goats are discussed below.

Duration

25. For goats to be exported by sea, the period of time goats spend in the pre-export feedlot should be between 5 and 10 days. Periods longer than this are associated with outbreaks of salmonellosis and coccidiosis because the organisms build up in the environment. Shorter periods (less than 5 days) are insufficient to accustom the goats to the pelleted ration.

    The ASEL require goats to spend 3 days or 5 days clear (i.e. not including the day of arrival and day of departure) in the registered premises, depending on where in Australia the goats are held, whether the goats are held in sheds or paddocks and the time of the year. However, under Export Advisory Notice (EAN) 2006-02, AQIS requires goats to spend a minimum of 5 days clear in the feedlot regardless of circumstances. This is therefore the minimum requirement.

    No *maximum* period is stipulated by ASEL or any current EAN but, as noted above, the period should not exceed 10 days because of the risk of infectious disease.

AQIS EAN 2006-02 (sea): *AQIS is placing the following conditions on the approval of the NOI / CRMPs for goat exports by sea…a 5 clear day minimum period in the registered premises.*

26. Goats travelling by air are only required to be assembled at an approved premises (as distinct from a registered premises) prior to despatch. There is an unofficial requirement for goats to spend at least 24 hours in the approved premises. However, experts advise that a

minimum period of 3-5 days is preferable to allow animals from different farms to be accustomed to each other. This should be regarded as best practice.

Segregation

27. Goats should be penned in the feedlot by size and weight to minimise dominance behaviour. Aggressive, dominant bucks should be penned separately or excluded from export. The different lines should be maintained onboard the ship to minimise the risk of fighting while the social structure is re-established.

Nutrition

28. Goats held in premises south of latitude 26 degrees south must be fed *ad libitum* whilst in the registered premises. This is an ASEL requirement.

ASEL S3.8: For preparation of sheep and goats in premises south of latitude 26 degrees south, feeding must be *ad libitum* throughout the period in the registered premises.

29. Goats held in any other premises must be fed at least the minimum feed requirement specified in the ASEL standards, and access to drinking water at all times.

ASEL S3.7: *To ensure adequate supply of feed and water…(e) the quantity of feed available should meet at least minimum feed requirements, which are…(ii) sheep and goats – three (3) per cent of their bodyweight per day for sheep younger than four (4) tooth and two (2) per cent of their bodyweight per day for four (4) tooth or older, of a quality feed able to meet daily maintenance requirements…(f) all livestock must have access to drinking water at all times (unless under curfew)*

30. It is important that goats become accustomed to the shipboard diet whilst in the pre-export feedlot. The ASEL require goats to have a minimum of 3-5 days on the shipboard ration prior to export depending on where in Australia the goats are held, whether the goats are held in sheds or paddocks and the time of the year. However, under Export Advisory Notice (EAN) 2006-02, AQIS requires goats to spend a minimum of 5 clear days exclusively on the shipboard ration regardless of circumstances. This is therefore a minimum requirement.

AQIS EAN 2006-02 (sea): *AQIS is placing the following conditions on the approval of the NOI / CRMPs for goat exports by sea…the exclusive feeding of the shipboard ration for 5 clear days prior to leaving the registered premises for loading.*

31. The shipboard ration must include at least 200g per head per day of chaff or hay. This requirement does not appear in the ASEL but was advised by AQIS in Export Advisory Notice (EAN) 2007-19 and is therefore a requirement.

AQIS EAN 2007-19 (sea): *AQIS is placing the following conditions on the approval of the NOI / CRMPs for goat exports by sea…the shipboard ration must include a minimum of 200 grams of chaff or hay per day per goat.*

32. Non-feeders should be identified and removed for particular attention or removal from the export consignment.

Hygiene

33. Feedlot hygiene is important to prevent the transmission of diseases between goats. A number of the ASEL standards are concerned with this aspect of feedlot design and management.

    Feed and water troughs and self-feeders must be designed and constructed in a way that protects the feed and water from weather and contamination by urine and faeces. This is an ASEL requirement.

ASEL S3.7: *To ensure adequate supply of feed and water…(a) where feeders, self-feeders and water troughs are used, they must be of a design that allows for complete cleaning of all surfaces, prevents spoilage of feed during inclement weather, and minimizes faecal contamination and injuries...(g) water troughs must be: (i) positioned apart from hay and feed sources to prevent fouling; and (ii) kept clean.*

Use of prophylactic antibiotics

34. Antibiotics should not be given to goats prior to export unless they are prescribed by a veterinarian to treat a specific infection. The use of prophylactic antibiotics – given to healthy animals to prevent Salmonella or other infections – can actually trigger outbreaks of salmonellosis when they are stopped.

Use of Vitamin B1

35. Some leading goat exporters recommend that goats be given an injection of vitamin B1 (thiamine) on arrival at the feedlot and/or on departure from it. There is no science to support this practice but vitamin B1 is a safe substance to administer as a single dose in this manner.

Monitoring

36. The health of goats in the feedlot should be monitored and, where appropriate, actions taken as required by the ASEL.

ASEL S3.16: *Daily monitoring of health, welfare and mortality must include the following:*
(a) All livestock must be inspected daily by a competent stock person
(b) All sick or injured livestock must be given immediate treatment, and veterinary advice must be sought if the cause of a sickness or injury is not obvious, or if action taken to prevent or treat the problem is ineffective
(c) Investigation by a registered veterinarian must be conducted if mortalities in any one paddock or shed exceed zero point one (0.1) per cent or 3 deaths, whichever is the greater, on any one day for cattle and buffalo, or zero point two five (0.25) per cent or 3 deaths, whichever is the greater, on any one day for any other species of livestock. Dead livestock must be collected and disposed of on a daily basis. Animals must not be able to access the area for disposal of carcases

(d) Records of each consignment must be kept for at least two (2) years after the date of export.

References and further reading

More S & Brightling A 2003, *Minimising mortality risks during export of live goats by sea from Australia,* final report of project LIVE.215, Meat & Livestock Australia, North Sydney, 52 pp.

DAFF (Department of Agriculture, Fisheries and Forestry) 2008, *Australian standards for the export of livestock*, version 2.2, www.daff.gov.au/animal-plant-health/welfare/export-trade/v2-1, accessed 21 January 2009, December.

These guidelines should be read in conjunction with the MLA guide *Going into goats: profitable producers' best practice guide* (2006), in particular:

- Module 6 Husbandry
- Module 7 Nutrition

Appendix 1: Animal welfare codes of practice

State/territory	Internet	Phone
National (note: applies to Qld, NSW, SA, WA and NT)	www.daff.gov.au/animal-plant-health/welfare/model_code_of_practice_for_the_welfare_of_animals	Department of Agriculture, Fisheries and Forestry 02 6272 5076
Queensland	www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/4790_6047_ENA_HTML.htm	Queensland Primary Industries and Fisheries 132523
NSW	www.agric.nsw.gov.au/reader/welfare	Department of Primary Industries 02 6391 3682
ACT	www.tams.act.gov.au/live/pets/animalwelfare	Department of Territory and Municipal Services 132281
Victoria	www.dpi.vic.gov.au/dpi/nrenfa.nsf/LinkView/C2FA9410CF1FD6B4CA2572AD001F4BAA6166E48F26CF64DACA256EDD0082EDF1	Bureau of Animal Welfare 03 9217 4200 or Animal Health Operations 03 5430 4509
Tasmania	www.dpiw.tas.gov.au/inter.nsf/WebPages/EGIL-535VVF?open	Department of Primary Industries and Water 1300 368 550
SA	www.environment.sa.gov.au/animalwelfare/index.html	Department of Environment and Heritage 08 8124 4200

WA	www.dlgrd.wa.gov.au/Legislation/AnimalWelfare/Default.asp	Department of Local Government and Regional Development, Animal Welfare Branch 08 9217 1500 or Department of Agriculture and Food 08 9368 3627
NT	www.nt.gov.au/d/Primary_Industry/index.cfm?header=Animal%20Welfare&newscat1=Animal%20Biosecurity&newscat2	Regional Development, Primary Industry Fisheries and Resources Animal Welfare Branch 1300 720 386

4.5 Conclusions

4.5.1 Overview

Statistics indicate that the live goat export trade has performed very well since 2003. There have been only a small number of reportable incidents, the average mortality rate of goats exported by sea has steadily decreased and the mortality rate associated with air exports seems to be negligible. Whilst not calculated because the air export data are not available, the overall mortality rate across all modes of live goat export has undoubtedly dropped significantly since 2003.

However, this optimistic picture masks two facts. First, long-haul sea exports have effectively been banned and the number of short haul shipments has decreased dramatically. Doing nothing is a very effective risk management strategy but it represents a lost commercial opportunity. Second, while air exports are apparently very safe, they may not be as benign as they appear and may be associated with adverse consequences prior to or following export that are not observed in the onboard mortality figures.

The overall mortality rate in short-haul voyages has come down by about one percentage point and this is a positive result. However, whether this is due to improved pre-export and export practices *per se* or a change in the type of goat being sourced for export is debatable. The reason does not matter unless the source population of goats in the future changes back to one with a higher-risk profile and the safeguards are not in place to prevent a rise in mortalities. The Department of Agriculture and Food WA in particular is promoting a return to the shipping of captured feral animals because of the potential economic and environmental benefits.

There is currently a stand-off in the live goat export industry between three groups: those who might be described as making up the ‘responsible majority’ of industry players; shorter-term, opportunistic exporters, who may take short cuts in their preparation of livestock; and AQIS. There is mistrust within the industry and mutual mistrust between industry and AQIS. This mistrust is highly problematic if the industry is to have a successful future and there is a clearly a need for measures to break the current stalemate.

4.5.2 Gaps in science and practice

A central objective of the present study was to 'review current practices and performance of live goat exports over the past five years against the Standards and recommendations of LIVE.215, specifically relating to the preparation of goats prior to export'. It has proven difficult to achieve that objective. The recommendations of the 2003 report have not been systematically adopted and have therefore not been tested. There are relatively few high-mortality incidents from which to draw lessons about 'what not to do' and, where there have been adverse results, the data available from which to draw judgments about contributory factors are weakened by the passage of time and commercial interests.

With those caveats in mind, it seems clear that the major risk factor for high mortality levels during shipment is the degree to which the goats have become accustomed to the conditions they will encounter on board before they are shipped – that is, the quality of the domestication and nutritional backgrounding process. This was recognised by Brightling (2001) and More and Brightling (2003) and it is recognised by industry and by AQIS.

The 'gap', however, seems to lie not in an absence of knowledge of what to do – which some people clearly already possess – but in establishing and demonstrating minimum standards in a way that is unambiguous and appropriate to all situations.

For example, it is clear that semi-managed, usually Boer-cross goats are much safer to export than true feral 'Australian' goats – but how much 'Boer blood' is needed and how is it recognised? What is the dividing line between unmanaged and managed farming systems? And how long do the goats have to be in a managed system? These important parameters are currently not able to be defined and, until they are, AQIS feels compelled to apply the same principles across all goats destined for export.

None of the interviewees for this project were able to specify, in a way that could be codified, how long the pre-feedlot domestication should be, what defines high-quality management during this period or how successful outcomes can be objectively demonstrated.

The ASEL contain several key provisions such as the requirement for 21 days' eating and drinking from troughs before dispatch to the registered premises and 5 days' feeding of the shipboard ration prior to shipping. Industry has proposed that captured feral goats not be exported on long-haul voyages and that they be subject to 60 days' management in a 'fenced production system' prior to short-haul sea export. Ultimately, though, while they are based on a reasonable consensus, there is no objective evidence to support any of these current standards or proposals. Individuals contacted during this project expressed the view that 60 days in a 'fenced production system' is probably a sufficient period of domestication in most cases but not all. However, there is no good definition of a 'fenced production system'.

It seems that setting a strict figure on the time goats should spend in a pre-feedlot domestication phase is the wrong approach. In addition to the diversity of genetic and environmental backgrounds *between* different mobs, it is to be expected that *within* any mob a law of diminishing returns will apply – that is, a majority of animals will adapt to feedlot conditions relatively quickly while the remainder will only gradually adapt, if ever, such that the average cost per goat steadily rises as the domestication phase continues.

Guidelines for pre-feedlot domestication, combined with an outcome-based indicator of readiness for export, would seem to be preferable to a strict process standard. Such indicators are not easy to find because they generally concern the expression of certain behaviours. The ASEL requirement that goats are eating and drinking from troughs is not objectively measured and looks only at the average performance of the group. However, the approach taken in WA to identify non-feeders using a dye marker in the ration does seem to provide an opportunity for the non-adapting tail of the group to be identified and removed. This test has not been validated in an export situation. Such a validation should be attempted, because the dye marker test seems to offer a reasonably objective and cost-effective technique to at least partially define domestication for export purposes.

There is a general view that the standards of ASEL are not of themselves sufficient to consistently ensure successful goat exports, particularly by ship, whether this is due to weakness in the standards themselves or to non-observance. The industry proposal for a goat export standard (Stinson c2008) has attempted to augment the ASEL with an industry-managed QA program based on considered best practices. However, AQIS does not accept that the proposed provisions are adequately grounded in objective evidence.

The best practice guide to preparation of goats for export has been constituted primarily from the findings of More and Brightling (2003) because that was the last time 'best practice' was comprehensively reviewed and little appears to have changed since that time. The guide has been validated through consultation with the small number of exporters recognised as leaders in this area. It will be a useful product for those goat producers and exporters who genuinely wish to improve their performance.

As described above, however, the greatest gaps are not so much in the science of low-risk exporting but in the QA along the supply chain. There is no way of ensuring that standards applying prior to arrival at the registered premises are being complied with. There is a substantial incentive to take short cuts (reasonable profit in a low-margin environment, almost nil risk of getting caught) and little incentive to fully comply (significant cost, no recognition as a 'quality' exporter). Until this is rectified, there is little point developing rigorous standards that cannot be enforced. Standards for adequate domestication are the most obvious example.

There are several possibilities to address the lack of adequate quality assurance (QA). Compliance could be monitored by industry, AQIS or a third party. Industry self-governance may be unsatisfactory to AQIS; monitoring by AQIS would require an extension of the AQIS reach up the supply chain to include the domestication phase; third party monitoring may be the most satisfactory but also most expensive. The challenge for any of these options is that the properties of origin and depots are often remote. First-hand inspection would be expensive, yet there seems no acceptable alternative for an effective QA system.

One recent development that offers considerable promise in the management of export QA is the National Livestock Identification Scheme (NLIS). NLIS is becoming mandatory for goats across Australia. From 1 January 2009 sheep and farmed goats of any age must be identified with an approved NLIS tag prior to movement in all states (MLA 2007).

There are slightly differing provisions with respect to NLIS and feral goats in each state. For example, feral goats in New South Wales are exempt from NLIS if they are moved directly to a

depot, which by definition must be accredited under MLA's Livestock Production Assurance (LPA) program. If they move to any other property they must be tagged with a post-breeder tag for the property of capture. NSW defines feral goats as those 'that have been captured from a wild state, have not been born as a result of a managed breeding program, and have not been subjected to any animal husbandry procedure or treatment' (NSW DPI 2009). In Western Australia, 'captured unmanaged' goats in the Pastoral Zone are exempt from NLIS if moved from the place of capture to an approved pastoral goat depot within 200km for the purpose of movement direct to a WA port for live export.

Notwithstanding these exemptions, this review understands that AQIS requires all export goats to carry an NLIS tag (P. Eliseo, pers. comm.).

NLIS offers a significant opportunity to improve the tracking of goats through the value chain. For example, the property or depot of origin of each animal dying during shipment could be recorded and added to a database showing the performance of each source. It could be part of the CRMP process to demonstrate that goats have been sourced from low-risk properties or depots. It would be in the interests of industry to establish and manage such a database.

There is a question about whether the economic incentives are sufficient for the industry to commit to additional QA measures such as these. This is particularly true given the impending removal of the Commonwealth's 40% subsidisation of AQIS services following the Beale review of the equine influenza affair (Beale et al 2008).

Two other 'gaps' are recorded here. They have been raised by previous authors but apparently not acted upon. The first relates to the optimal type and amount of fibre that should be included in the feedlot and shipboard diet of export goats. More and Brightling (2003) recommend that at least 200g/head/day of hay and/or chaff be provided in the diet but note that 'further work is needed to confirm the optimum type and roughage to be included in the diet '.

The other gap opportunity for further research is on dominance behaviour. Both the More and Brightling (2003) and Entwistle and Jephcott (2005) reports note that there is scope for better management of dominance behaviour, including the avoidance of exporting feral goats and entire bucks. Segregation will reduce but not eliminate dominance behaviour. New technologies such as anti-GnRH products or possibly odour neutralisers may eventually offer complementary solutions to management practices and should be monitored.

4.5.3 Recommendations

The following recommendations are made:

1. The *Best practice guide to the preparation of goats for live export* that accompanies this report should be widely promoted to the industry. It will be a useful addition to the MLA publication *Going into goats* and the forthcoming *Best practice guide for goat depots* being prepared for MLA by Queensland Primary Industries and Fisheries. The recommendations arising from the *Best practice guide to the preparation of goats for live export* is consistent with both of these publications. However, without the concurrent implementation of the recommendations provided below, best practice guides alone will have limited material effect on the success of the goat export industry.

2. MLA and LiveCorp should develop a quality assurance (QA) program for the export of goats that imposes minimal additional cost to the industry yet is sufficiently credible to all parties. One suggestion is that the system might involve assigning rankings to exporters according to their export performance. Sources of goats (depots or even properties of origin) could also be ranked using the National Livestock Identification System (NLIS) to track performance. Those exporters who are consistently making successful exports should be able to continue doing so under current standards while those who have reportable incidents should be subject to additional conditions, such as the requirement for a veterinarian on all sea voyages and/or a third-party inspection of goats by a recognised expert prior to their entry into the pre-export feedlot.

3. The industry should, in association with the Department of Agriculture and Food Western Australia (DAFWA), and with the agreement of the Australian Quarantine and Inspection Service (AQIS), undertake a series of trial shipments of goats to long-haul destinations. Western Australia is suggested as the basis for these trials because goat exports have declined markedly from that state and there is strong interest in having them resumed. The goats might initially be sourced from managed systems but over time from the pastoral region via agricultural properties as described in this report. These shipments would be closely tracked from property of origin to destination and the QA system developed in recommendation 2 would be tested. If successful, the shipments should provide a ready 'recipe' for WA exporters to make low-mortality long haul exports.

4. The industry and AQIS should consider including the application of the food dye test, developed in WA (T. Johnson pers. comm.), as an indicator of which animals are feeding, as a standard to be applied before goats leave the registered premises to be loaded onto ships. Only those goats with dye marks would be permitted to be loaded. This test is attractive as a standard because its interpretation is quite objective and could be done by an AQIS vet. The acceptability of the dye to destination markets would need to be established. The use of the test might be validated during the trial shipments proposed in recommendation 3.

5. The industry and AQIS should note the findings of earlier research that the optimum duration in the pre-export feedlot is between 7 and 10 days and alter the Australian Standards for the Export of Livestock (ASEL) minimum of 5 clear days accordingly.

6. MLA and LiveCorp should consider further research into the optimal dietary fibre requirements for goats. There is no particular evidence that the current recommendation of at least 200g/head/day of hay and/or chaff is satisfactory.

7. MLA and LiveCorp should consider further research into ways to manage dominance behaviour in goats. This is a relatively lower priority but might involve a watching brief on odour neutralisation technologies and anti-gonadotrophin releasing hormone (GnRH) immunisation products.

5 Success in achieving objectives

This report has met all of the project objectives:

1. Review current practices and performance of live goat exports over the past five years against the recommendations of the MLA report *Minimising mortality risks during export of live goats by sea from Australia* (More and Brightling, 2003), specifically relating to the preparation of goats prior to export;

2. Identify knowledge gaps for prioritised research to address issues identified in the review; and

3. Develop a draft 'best practice' guide for the preparation of goats for export, for consideration by industry.

6 Impact on meat and livestock industry

The uptake of recommendations of this report, and the best practice guide that will arise from it, will provide one contribution to the defence of an industry with a free-on-board value of around $10m per annum. If a way can be found to resume the export of goats to long-haul destinations such as the Middle East and Africa, there is the potential for this figure to increase substantially.

7 Conclusions and recommendations

There has been little progress in the implementation of evidence-based standards for the export of goats since the report of More and Brightling (2003). In fact, the report seems to have had minimal impact since its publication despite being the most current and complete review of best practices for goat export. This is no doubt due in no small part to its recommendations that the export of captured feral goats be stopped.

Meanwhile, the performance of the goat export industry has generally been good, with shipboard mortality rates steadily declining. This may be partly due to an increase in the sourcing of semi-managed over captured feral goats. There has also been a massive shift from sea to air exports. However, there have been enough reportable mortality incidents to prompt AQIS to stop approving shipments over ten days' duration since early 2008. There is also some disquiet within industry over the behaviour of some air exporters. Although the latter has generally not manifested itself in high mortality rates on aircraft, it may have other adverse consequences such as high pre- or post-export mortality rates.

Because the recommendations of More and Brightling (2003) have not been implemented in any systematic way, it has not been possible to validate these recommendations nor the best practices identified in the report. Published investigations of reportable mortality incidents are of very limited value and there appears to have been no new scientific research of relevance since 2003, so this review has relied heavily on the collective wisdom of industry stakeholders in its conclusions. The evidence is that both the best practices and the gaps identified by More and Brightling (2003) remain current.

The major unresolved issue in goat exports is how to successfully prepare the goats for the conditions experienced on board ship (or to a lesser extent the aircraft) and at the destination. The immediate pre-export feedlot phase of this process has an optimum timeframe of 7 to 10 days that is limited by the build-up of infectious organisms such as Salmonella. There is a need for a domestication phase prior to the pre-export feedlot and this is the part of the export process that seems to cause the greatest difficulty for the industry. Some people know how to get it right, but while there are guidelines, there are no 'hard-and-fast rules' for the optimal length of this phase, nor the quality of its management.

In addition to the problem of defining strict process standards for pre-feedlot domestication, there is the difficulty of ensuring compliance with any standards that might be developed. Any additional time spent by animals in preparation represents a cost to exporters so there is a powerful incentive to cut corners, especially for air exports where problems with poor preparation rarely have the opportunity to surface. AQIS does not have control of this part of the chain. An outcome-based standard showing the readiness of a goat for export would be ideal, but there are few apparent options in this respect. The use of food dye in the ration, which shows up around the mouths of those goats that are eating from troughs and is absent in non-feeders, offers one possibility for a test that is reasonably objective.

This review recommends a number of steps to address the issue of inadequate pre-export domestication. It is accompanied by a draft best practice manual on the preparation of goats for export, suitable for circulation to and comment from industry.

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9 Appendices

9.1 Persons consulted in the preparation of this report

A number of exporters, industry experts, and government departments were consulted in the production of this report. Their assistance in the preparation of the report is gratefully acknowledged.

9.2 Abbreviations used in this report

ABS	Australian Bureau of Statistics
ALEC	Australian Livestock Exporters' Council
ALES	Australia Livestock Export Standards
AQIS	Australian Quarantine and Inspection Service
ASEL	Australian Standards for the Export of Livestock
CRMP	Consignment Risk Management Plan
DAFF	Department of Agriculture, Fisheries and Forestry (C'th)
DAFWA	Department of Agriculture and Food Western Australia
DSE	Dry sheep equivalent
EAN	Export Advisory Notice
FOB	Free on board
IATA	International Air Transport Authority
LESAC	Livestock Export Standards Advisory Committee
LESAG	Livestock Export Standards Advisory Group
NLIS	National Livestock Identification Scheme
NOI	Notice of intention
QA	Quality assurance
R&D	Research and development
ULD	Unit load devices