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EPIDEMIOLOGICAL SURVEILLANCE OF LONG DISTANCE SEA TRANSPORTATION OF SLAUGHTER SHEEP

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Au cours de ces dix dernières années, des cargaisons de moutons destinés à l'abattoir ont été régulièrement expédiées par la Nouvelle-Zélande. La plupart en direction des nations du Moyen-Orient, en particulier vers l'Arabie saoudite. Une certaine controverse entoure ce commerce, donnant lieu à des commentaires publics allant tantôt en faveur, tantôt à l'encontre de sa prolongation. Des vétérinaires, accrédités par le responsable des services vétérinaires du ministère de l'Agriculture néo-zélandais, accompagnent chaque cargaison. Ils sont chargés d'observer et de rendre compte du bien-être des animaux durant le transit et le débarquement. Pour développer la surveillance, un système standardisé et complet de collecte de données a été introduit en 1992. Il couvre toutes les phases de chaque cargaison, à savoir : (1) le feedlot, (2) le chargement, (3) le voyage en mer, (4) le déchargement. Une brève description du système d'enregistrement est présentée.

Ce système de surveillance épidémiologique a permis de conduire des analyses plus approfondies. Avec pour conséquence une plus grande compréhension des problèmes de santé et de bien-être. Cette communication présente une synthèse de données concernant 37 voyages récents. Ce qui correspond au transport de 2 856 000 moutons, soit une moyenne de 77 000 animaux par cargaison. Les vétérinaires accompagnateurs ont consigné la mort de 42 000 individus (1,47%), dont 50% ont fait l'objet d'une autopsie. Des effets statistiquement significatifs ont été attribués à l'âge, au sexe et à la saison. Les données suggèrent également qu'un apport de nourriture sans restriction (disponibilité d'aliment supérieure à 15 heures par jour) pendant le voyage réduira le nombre de décès par inanition et étouffement qui sont les principales causes de mortalité.

La surveillance embarquée opérée par des observateurs vétérinaires indépendants est bien perçue par toutes les parties impliquées. Au cours des années, cette activité a conduit à de nombreuses améliorations. La collecte de données standardisées y a largement contribué. Elle a en particulier permis une comparaison objective et détaillée entre les cargaisons, comme on le montre dans cette synthèse.

INTRODUCTION

Over the last decade there have been regular shipments of slaughter sheep from New Zealand (NZ). Most have been to Middle East nations, in particular Saudi Arabia. Much controversy surrounds this trade, at times drawing public comment both in support of and against it continuing.

Veterinarians, who have been approved by the Chief Veterinary Officer of the NZ Ministry of Agriculture, accompany each shipment. Their task is to observe and report on the welfare of the animals during transit and at discharge. A 'Voyage Report' is submitted to the Chief Veterinary Officer when they arrive back in New Zealand.

In 1990, the reports from the first 37 voyages were reviewed (Ryan, 1990). Much general information was extracted from the narrative sections of these reports, but quantitative epidemiological analyses were hampered by the lack of a standardised data collection system. A recommendation of that review was that such a system should be introduced. This was accepted, and in August 1992, after trying various prototypes, we started a comprehensive surveillance system on all shipments.

In 1995, the Chief Veterinary Officer requested that the trade should be reviewed once more. The terms of reference were (1) to compare and contrast events on the first 37 and latest voyages, (2) to identify factors that contributed to welfare problems on the latest voyages, and (3) to identify areas where further research was indicated.

Standardised data from 37 shipments were available in late 1995, and it was agreed that the review should be limited to these voyages.

METHODS AND MATERIALS

There are four shipments phases; i.e. (1) feedlot, (2) loading, (3) the voyage, and (4) unloading. The feedlot phase starts 7 to 10 days prior to the expected loading date. All the sheep are accumulated on one or two properties where they are inspected. They are also introduced to concentrate ('pellet') feed, a new experience for sheep in NZ where they are totally grass fed.

The data collected during each phase is illustrated in Figure 1. The voyage phases was considered to start when the vessel departed from New Zealand, sometimes after loading at ports in both the South and North Islands. The final day of the voyage was as officially reported by the voyage veterinarian; this was generally the day prior to meeting the pilot at the destination.

A system of standard data collection sheets was developed, along with a set of instructions for the voyage veterinarians. Of particular note were descriptions of clinical and pathological syndromes, and codes thereof. On

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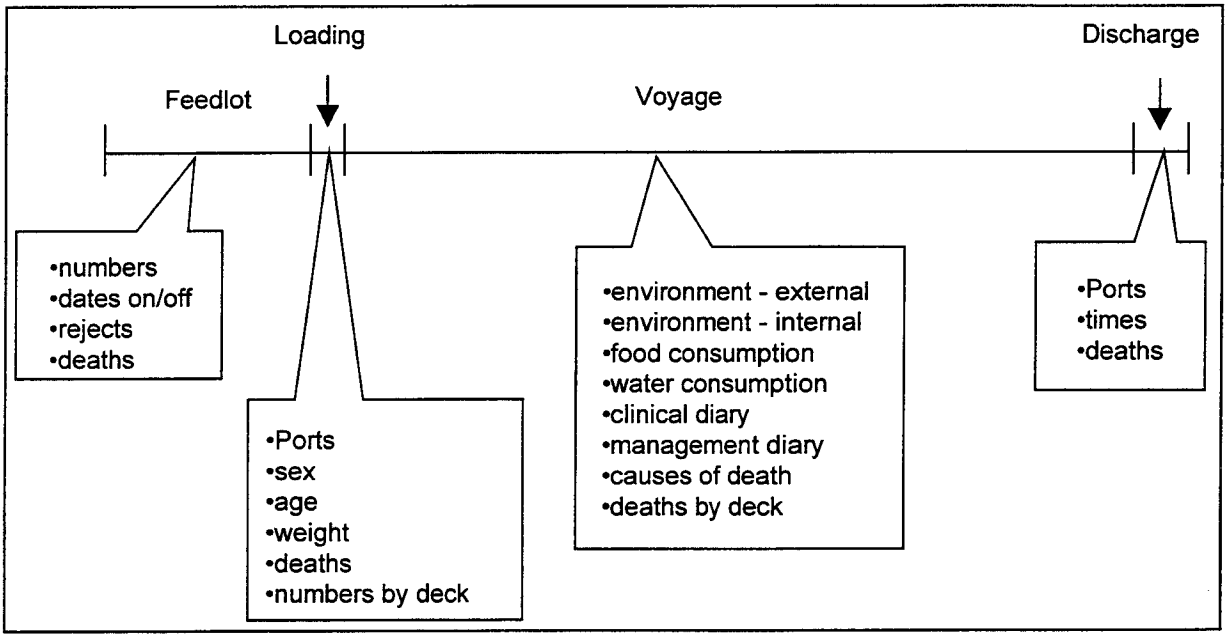
their return the veterinarians submitted the data sheets to the MAF Quality Management (MQM) epidemiology unit at the Ruakura Research Centre. Data were entered into a SIR (Scientific Information Retrieval) relational database.

In the review of shipments, after checking for and fixing (editing or deleting as appropriate) obvious errors or inconsistencies, various data sets were generated from the SIR database and transferred to the statistical software package, SPSS, for analysis. Both univariate and multivariate techniques were used in the analysis. As many data distributions were very clearly not normal, non-parametric tests (both independent and paired) were used commonly. On occasions parametric techniques were employed, sometimes with log transformed data.

Figure 1. The phases of each shipment, with a list of data items collected.



A series of measures of mortality were developed for the review, as follows:

• Feedlot mortality	Total feedlot deaths / 100 sheep entering the feedlot
• Feedlot mortality rate	Feedlot deaths / day/ 10,000 sheep
• Voyage mortality	Total voyage deaths / 100 sheep loaded
• Daily mortality	Daily sheep deaths / 10,000 sheep alive at the start of the day.
• Voyage mortality rate	Total voyage deaths / day / 10,000 sheep
• Unloading mortality	Total deaths during unloading / 100 sheep alive at end of voyage phase
• Unloading mortality rate	Total deaths / day / 10,000 sheep
• Consignment mortality	Total voyage and unloading deaths / 100 sheep loaded.

RESULTS

Over the 37 voyages a total of 2,856,000 sheep were exported, an average of 77,000 per shipment. Twenty five percent (25%) were less than 1 year old, 50% 1 to 2 years old and 25% 2 to 3 years old. Only 4% were ewes; the balance being 50/50 males (rams and cryptorchids) and wethers.

The average mortality rate on feedlots was 1.1 deaths/day/10,000, half that found in the first shipments. The time that sheep spent on feedlots has been reduced from 7 to 20 days to 4 to 10 days. The lower mortality rate and period on feedlots resulted in a feedlot mortality of only 0.07%, one third of that observed in first 37 shipments.

Rejections and deaths during loading were minor (0 to 32 deaths, mean = 7), as in the first shipments.

As on the early voyages, the New Zealand veterinary observers who accompanied each of the shipments reported that the majority (95% to 97%) of sheep on these latest voyages arrived in very good condition.

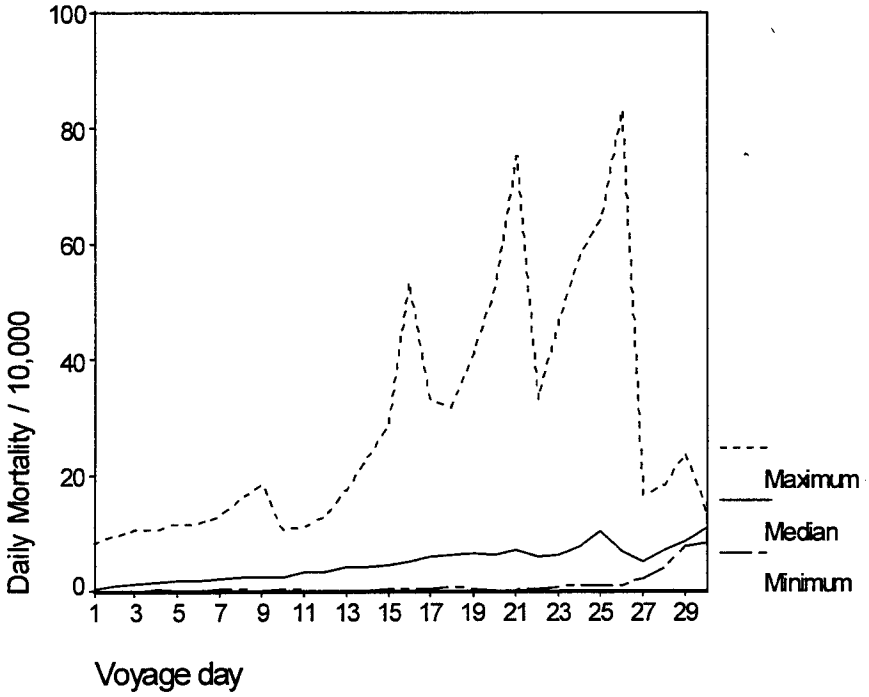
Voyage veterinarians recorded 42,000 deaths (1.47%) during the voyage phase (departure until arrival at the port of discharge). We estimate (data from one voyage was missing) that 19,100 deaths (0.68%) occurred during the unloading (arrival until complete discharge). Consignment mortality (departure to discharge) is therefore 2.14%. This is 16% less than that recorded on the first 37 voyages.

The duration of both the voyage and unloading phases had generally increased. The latest shipments to Jeddah took 4 to 5 days longer than the earlier ones.

The mean voyage mortality was 1.41% (range=0.21% to 4.26%). There were 5 shipments with higher than expected mortalities; three were associated with epidemics of pneumonia in young rams and cryptorchids, one with mechanical failure of the watering system and one with high deck temperatures or humidity. The mean voyage mortality is significantly lower than the 1985/1989 figure.

To obtain an overview of mortality over the course of the voyage, we calculated daily mortality in terms of deaths / 10,000 sheep alive at the start of each day. Generally there is a steady increase as the voyage progresses (Figure 2).

Figure 2 Maximum, median and minimum daily mortality (deaths/day/10,000) for each voyage day.



Half of all deaths were subject to necropsy examination. The three most common causes of death were inanition (i.e. failure to eat) (41%), pneumonia/pleurisy (32%) and smother/suffocation (15%). Together these made up 88% of all deaths.

We found no association between time on the feedlot and voyage mortality.

The mortality among different classes (i.e. age and sex) of sheep varied significantly. Ewes and wethers aged greater than 1 year are at least risk; rams and cryptorchids greater than 1 year at moderate risk; and all sexes aged less than 1 year at greatest risk.

When the above 'stock class effect' is controlled, we found there were significant seasonal differences in voyage mortality. Departures during the NZ summer were at greatest risk, winter at least risk. (Note: Winter data are sparse).

Unacceptable deck environmental conditions were reported 38 times. Most of these occurred on one vessel that was used for only one shipment.

Deck type (open or closed) and deck loading density were not associated with voyage mortality.

The data suggests that *ad lib* (> 15 hours per day availability) feeding during the voyage will reduce deaths from inanition and smothering.

In addition to inanition, pneumonia/pleurisy, smother/suffocation and scouring, voyage veterinarians reported that heat stress, eye problems, lameness and dehydration were important clinical problems.

All but one of the serious management problems concerned feeding and watering of stock.

The average unloading mortality was 0.66% (range=0.06% to 1.9%). This is similar to that which occurred during the first 37 voyages. As for voyage mortality, high discharge mortality was strongly associated with the percent of male lambs (less than 1 year old) carried; further, when this factor is controlled a significant seasonal effect is also apparent, with departures during the NZ winter at least risk (Note: Winter data are sparse).

CONCLUSIONS

Our first attempts to introduce a data collection system were not successful. The first version, which was complex and long, was designed to replace most of the narrative style. Some veterinarians rejected this. The voyage reporting procedure finally adopted is a combination of both narrative and data sheets. (To further gain acceptance by observers, a set of standard tables and graphs is produced for each shipment report.)

On board surveillance by independent veterinary observers is welcomed by all involved. Over the years this activity has resulted in many improvements. The collection of standard data has enhanced this; in particular it has enabled an objective and detailed comparisons between shipments, as shown in this review.

BIBLIOGRAPHY

Ryan T. 1990. Slaughter Sheep Exports: A review of shipments of slaughter sheep from New Zealand 1985 –89. Ministry of Agriculture and Fisheries, Wellington, New Zealand.