THE SHEEP INDUSTRY IN AUSTRALIA

INTRODUCTION

P.S. HOPKINS*

The sheep industry continues to command an important position in determining the balance of our nation's economy. The last financial year saw gross returns exceed $2.5 billion. By comparison, the total proceeds from our other major livestock products (beef, pork, veal, poultry, eggs and milk) totalled approximately $3.5 billion, whilst the vast array of crops produced throughout this continent returned a gross national income of almost $5.5 billion. The high level of revenue generated by the sale of sheep products indicates the extent to which the nation is dependent on this single component of our total livestock and cropping enterprises. If sheep are to maintain this position on the national scale of agricultural resources then it is important to consider current and future developments which contribute to industry progress. There is no room for complacency in a situation where market forces are continually changing. The need for flexibility and foresight is paramount.

The presidential address delivered to this Society at the last biennial conference questioned the suitability of our present day Merino to meet the challenge of future years. Some of the thoughts presented in this contract support our past president's concern for future developments, and expand upon his theme to embrace areas outside the genetics and management of our nation's flocks. The future viability of our industry will depend largely on the extent to which our production and marketing forces can be integrated to keep pace with national and international demands. It is imperative therefore that we adopt an enterprising and well-balanced approach which will meet the challenge of future needs. This approach must provide the prerequisites of sound economic and practical judgement as well as the incentive for industry personnel.

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The papers included in this contract embrace a diverse range of industry components. Their presentation is partly directed towards an understanding of the forces currently contributing to the operation of each facet of industry. The contributors have also described some future possibilities for maintaining the national importance of the Australian sheep and its products which are so widely sought after throughout the world today. These latter endeavours offer a measure of foresight which may provide some basis for future industry policy.

A PRODUCER'S VIEW OF THE NATION'S SHEEP INDUSTRY

F.M. DAVIDSON**

The history of the sheep industry in Australia is also the history of Australia's settlement and development by Europeans. The humble sheep took on noble stature as it developed the ability to produce a wealth of fibre to meet a growing world demand. The sheep man rapidly spread his flocks across this vast land, bringing settlement, trade and employment. Australia developed, riding happily on the sheep's back, and generally the sheep man was happy also, except when hit by droughts, flies, rabbits and all the other things that could go wrong.

Australia today is a modern, complex, urbanised, industrialised society, and in a different way, continues its ride on the sheep's back. The sheep man is not at all happy about that because, although his sheep in his eyes are still noble and strong, their profitability is only just sufficient for him to ride alone.

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Australia and the world

For many years, Australia's sheep population was the largest in the world. Today we vie with Russia for that honour with China an unknown quantity not far behind. However, there is no question of Australia's leadership in wool production. This country dominates the world trade in wool, supplying 70% of the total amount of apparel wool produced by the five major exporting countries. This situation provides both opportunity and risk for the sheep industry. Maintenance of world demand for apparel wools is critical to its future.

The Australian flock

Australia's flock is about 75% Merino. Wool production continues to dominate gross returns to sheep men for 1981-82. Estimated gross values of production from the 130 million plus sheep in Australia are:

- Wool $1 860 million from 133.5 million sheep
- Slaughter $652 million from 28.5 million sheep slaughtered
- Live Exports $167 million from 6 million sheep

I intend in this paper to deal with sheep for slaughter and wool growing.

Mutton

Historically, mutton has been looked on as essentially a by-product of the wool industry, with additional sources such as aged ewes from lamb-producing properties, and dual purpose sheep such as the Corriedale.

With some 250 000 tonnes of mutton now being produced, the mutton industry must be an important aspect of sheep production. Our major markets are Japan, Russia and the Middle East and maintenance of these markets individually and collectively is critical to continued export demand.

As a producer, I am only too aware of the range in quality and age of sheep going into the broad classification of mutton. I sometimes wonder if sufficient consideration is given to matching particular qualities of mutton to particular market requirements in order to maximise market opportunities. Certainly, strip branding to identify hogget was a major step in the right direction.

As a Merino breeder, I believe I am typical of the majority of breeders who now are selecting consciously with an eye on live sheep export and carcase requirements. The great challenge is to maximise returns from these sources while maintaining or improving the quality and weight of clean wool production. I believe that, as an industry, we must accelerate progress in these directions while acknowledging the specific regional and climatic influences that must be taken into account.

I do not believe that a desirable easy-care Merino sheep of good carcase and good wool production requires a dramatic change in our present Merino 'types. In fact large numbers now meet this criterion.

I believe that careful selection and further positive leadership by stud breeders who are prepared to turn their backs on the traditional preferences of the show ring can retain the essential Merino characteristics and greatly improve the "easy care" and carcase aspects.

I believe also that stud breeders should make available to their clients full objective measurement information and relative production of sale rams. Already many breeders are doing this, but unfortunately ram buyers are not yet
attaching sufficient importance to the information as an aid to their selection.

The average cut per sheep in recent years is practically static at around 4.3 kg with variations because of seasonal conditions and the proportion of ewes and lambs in the flock. As an industry we must intensify our efforts to lift productivity through increased average clean fleece weight. Equally we must look for greater productivity through higher fertility and lamb survival, and greater mutton potential.

Prime lamb production

Lamb production has reached a reasonably stable situation at 16 million slaughterings, and a marginal rise can be expected in the years ahead. About 80-85% of the lamb produced in Australia is consumed locally, but there is potential for specialised production for particular markets; e.g., Middle East preference for light, lean lamb carcase of 8 to 12 kg.

I am sure our lamb producers can and do produce high quality products but the livestock markets often receive excessive numbers of "off types", and both unfinished and overfat lambs.

Steady progress is being made in selecting for higher fertility, and top producers are getting good results. I presume breeders are considering whether any benefit would be gained from importing new genetic material or other breeds (quarantine permitting) to improve lamb production across Australia's wide range of climatic and pasture conditions.

Australian wool production and international trends

During the 1970s, total wool production in the five major exporting countries declined by 12% to around 1 435 million kg (greasy). Periodic poor seasons, increased competition from alternative land-use enterprises, and the long-term adverse movements in wool growers' terms-of-trade appear to be the major factors responsible for this observed decline in wool output.

In that time there have been significant changes in micron category of wools offered for sale. Over the decade to 1981 world production of 25 micron and finer wool declined by 20%, and of 26-30 micron by 5%, while production of 31 micron and coarser increased by 8%. Most of the decline in finer wools resulted from a reduction in supplies from Australia (-21%), whereas all the increase in coarser wools occurred in New Zealand (+14%). While there may be some further increases in production in New Zealand, production in Australia is expected to rise only gradually in the 1980s from 438 million kg clean in 1981/82 to about 460 million kg clean in 1986/87.

Long-term Australian wool production will depend mainly on the extent to which wool growers diversify further and on their ability to improve productivity. Factors underlying projections on wool production are:

- The area sown to wheat will continue to expand over the next five years to a record 13.5-14 million hectares by 1987. The main reasons for the continued expansion of wheat production are the relatively high cash returns and the opportunity to partially substitute capital for labour. The loss of pasture land to cropping enterprises over the next five years could reduce total grazing capacity by the equivalent of about 8 million dry sheep.

- Cattle numbers are projected to increase from 26 million to about 27-27.5 million over the next five years. Most of the increase will be
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attributable to reduced slaughterings in the short to medium term.

- Sheep meat production is projected to decline slightly in the short term and live sheep exports to increase slightly above the 6 million in 1981/82.
- Other factors which will influence sheep numbers and wool production include a likely increase in the percentages of breeding ewes and lambs and a consequent slight decline in average fleece weights to around 4.2 kg.

The most likely projections are for sheep numbers to increase from 133 million in 1981/82 to about 140 million by 1985/86. However, there are major uncertainties associated with the projections, particularly in relation to trends in the levels of livestock slaughterings, continuity of live sheep exports and growth in the percentage of breeding ewes. Assuming continued access to live sheep export markets, the producer can expect to maintain his economic viability with some increase in meat as a source of income.

Wool promotion and the Reserve Price Scheme

(i) Promotion Global promotional strategies in terms of research and development, market development and advertising will to a large extent determine wool's share of increased fibre consumption. Intensified activity by IWS to promote wool will be directed at those markets where consumption is most likely to increase. For example, in 1982-83, strong efforts will be directed towards the American and Chinese markets. This latter market implies an emphasis on offensive strategies within developing countries with potential for increasing wool consumption. Within the traditional wool markets, defensive strategies will be maintained with the emphasis on exploiting fashion changes and the positioning of wool "up-market".

There should be a continued consumer preference for natural fibres over the early 1980s, particularly in developed countries where there is more emphasis on "environment awareness"; however more casual lifestyles will have a detrimental effect on demand for the more formal apparel wool products.

Promotional strategies by the IWS should ensure that wool maintains its share of the volume of fibre consumed over the next five years. However, wool's share of any increased fibre consumption will be relatively small. Projections are for an average growth in demand for wool as a whole of 0.25-0.75 per cent per annum over the next five years. This implies a growth in Net Domestic Consumption (NDC) of 5 to 10 million kg clean for all wool and 3 to 5 million kg clean for apparel wool per annum through to 1987.

(ii) The Reserve Price Scheme This scheme, currently in its eighth season, is now broadly accepted by wool growers and users as an integral part of the wool marketing system. Increases in the market indicator floor price of 14.8% and 12.3% introduced at the beginning of seasons 1980/81 and 1981/82 reflect the more aggressive stance adopted recently by the AWC in setting the floor. On current estimates, the average market price for 1981/82 is likely to be only 25 cents above the floor compared with 45 cents and 77 cents respectively during the previous two seasons.

I believe strong market support by the AWC linked to a continuing programme designed to boost world demand for wool is essential for the future if the necessary proportion of the consumer's textile dollar is to remain with the wool growers.
The cost savings flowing from investment in R & D activities are often overshadowed by underlying inflationary pressures in the rural economy. The exact pay-off from such investment is difficult to quantify. The maintenance of R & D effort in the current economic climate is critical, as during the next five years net returns to farmers will decrease. However, wool growers will also face significant real cost increases in key areas of wool marketing. These areas include land transport, packaging and handling, wool harvesting and wool preparation. Cost saving innovations in all these areas will strongly influence net returns over the next five years.

The effect of cost/price pressures on net industry revenues is uncertain. The effects of rising input prices will be minimised by improved technical efficiency and increased economies of size. However, many costs are incurred outside the farm gate and are, therefore, beyond the control of wool growers. These "external" marketing costs which are reflected in farm gate prices will be a major factor, together with farm productivity and national economic policies, in determining profitability of sheep enterprises during the next five years.

Prices paid and received, industry structure, etc.

Trends in the costs of wool production and marketing will have an important bearing on future developments in the wool growing industry. From the wool growers' viewpoint costs of production and marketing can, to some extent, be modified either by altering the enterprise mix, adopting cost-saving innovations, or improving on-farm productivity. Faced with declining real prices, many wool growers will attempt to maintain net returns by minimising costs.

In recent years, the index of prices paid for agricultural inputs has tended to increase at a slightly faster rate than the wool price index. Price rises recorded for major agricultural inputs have been variable with the price of fuel increasing faster than wages and, to a lesser extent, machinery. Prices for contractors' services have risen the least of agricultural inputs owing mainly to more efficient continuous machinery usage. In addition, contractors have probably substituted capital for labour for a number of activities, e.g., fencing, sheep handling equipment, etc.

The terms-of-trade for wool growers since 1975/76 have not worsened since real incomes have been about constant. Principal changes in the wool growing industry during that period include the adoption of new technologies which reduce the labour component, an increase in the size of the production unit, more efficient use of machinery, and developments in anthelmintics, chemicals and fertilizers.

During the past ten years, the wool growing industry has changed significantly in size and character. In response to the 25% drop in sheep numbers and the increase in farm size, the number of wool growers (with more than 200 sheep) has declined from around 87,000 in 1970 to 67,000 in 1980. Any further reductions in numbers of wool growers are expected to be small.

With wool prices being determined in the major economies of the northern hemisphere, the value of the Australian dollar is critical in transferring such prices into Australian dollar prices at auction. The large revaluation of the dollar during 1980/81 and weakening currencies in important European countries raised effective wool prices in buyers' currencies and lowered the $A prices received by Australian growers. During 1980/81, the $A appreciated by 9.3% against the trade weighted basket (TWB) and 20% against a wool trade weighted basket (WTWB). During the first 4½ months of 1981/82, the tendency has been
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reversed owing to depressed export markets, lower US interest rates, higher Australian inflation relative to the rest of the world and lower real energy prices. However, over this period the $A has devalued by only 0.8% and 0.6% against the TWB and WTWB respectively, an insignificant off-set to the unfavourable impact of previous revaluations of the $A.

Protection of Australian manufacturing industries has an effect both directly and indirectly on the cost burden of the wool industry. The following are specific aspects of the impact of protection:

(i) it increases cost of production because of the use of inputs from assisted industries and because of the need to compete with assisted industries for resources such as labour and capital

(ii) it affects exchange rate because exporting industries receive lower prices in Australian currency for goods exported

(iii) it tends to restrict access to new export markets, especially in developing countries.

These are some of the reasons why wool growers feel there is still too much of the national sport of riding on the sheep's back. For those posing the question of levels of assistance to the wool industry, the IAC has calculated that level to be “zero”, in stark contrast to many other industries in Australia.

I have dealt at some length with issues concerning wool because they are the dominant factor influencing future profitability for the sheep industry. In conclusion, I want to refer again to some major points of industry significance.

A large proportion of sheep flocks are in the mixed farming lands where farmers have alternative production, particularly crops. Indeed, most farms are in a mixed enterprise situation. Expansion of cropping on such farms competes with sheep for land use, puts particular pressure on pasture resources at certain times and exacerbates the effect of less than average rainfall. All these factors increase the possibility of periodic stress to sheep and have a consequent adverse effect on wool production. Furthermore, survival through the 1970s forced many farmers to stretch management and labour resources very thin. With some pride, one man could be caring for up to 10,000 sheep. It was a holding situation with properties put on a care but low maintenance basis.

Some profitability has returned to the wool industry, and with it a lot of confidence in the future. In return for the investment they make in their industry to lift production and productivity, the sheep men of Australia want to see their products convertible into longer term profitability and security.

TOWARDS SALE BY DESCRIPTION

R.A. ROTTENBURY*

Introduction

The Australian Wool Corporation has made a firm commitment to developing a system of selling wool by description. This concept has been the goal of many people employed in the wool industry for over 30 years.

Presently, more than 96% of the wool sold at auction is sold by sale by sample and test certificate. This could be called partial sale by description.

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The certificate gives results of objective measurement on the two main characters in wool valuation - the amount of fibre in the greasy sale lot (by determination of yield and vegetable matter) and the average diameter of the fibre. The remaining characters are appraised by inspection of the display sample.

Efforts by the AWC towards total sale by description are giving encouraging results and point to the feasibility and eventual adoption of the system. These efforts concentrate on three main issues:

(a) New measurement techniques

(b) Increased extension efforts

(c) New administrative procedures.

New measurement techniques

The most challenging task that remains in the effort to perfect measurement techniques is to devise a method of predicting fibre length after wool has passed through the latter stages of processing (scouring, carding and combing). There are two approaches to the problem, the staple approach and the fibre approach, both of which are technically sound.

(i) The staple approach. This involves the measurement of the length and strength of a staple. The variation in these two characteristics accounts in part for the variation in card loss, noillage and fibre length in the top that would be observed in a specified worsted processing arrangement. Other characteristics causing variation in the top (yield, vegetable matter, fibre diameter) are already measured objectively. In this approach staples are drawn at random from the display sample and fed through devices which determine length and strength. However, both the sampling and testing phases are time-consuming, and procedures will have to be automated before they can be evaluated under commercial conditions. An advantage of the staple approach is that it provides a comprehensive list of raw wool characteristics. Apart from offering a better understanding of the ways particular wools perform during carding and combing, this knowledge may be useful for prediction purposes at later stages of processing.

There may be other characteristics that will also assist in prediction although it is not expected that their influence will be of great significance. Resistance to compression, which gives an objective measure of crimp, and staple structure are likely candidates.

(ii) The fibre approach. Fibre length in the top is of vital importance to the spinner. Wool buyers are frequently asked to deliver to the topmaker a consignment of greasy wool that will have a fibre length in the top of not less than, say 70 mm. Why not carry out "miniprocessing" and produce a sliver of fibres that can be measured for length in the same way as a top is measured? Slivers produced from both scoured and greasy wool staples subsampled from display samples are giving excellent results in laboratory trials although much work remains to be done. An advantage of the system is that should there be characteristics that we cannot measure commercially at present, such as tip damage, or other factors that have not yet been identified, their influence will still be reflected in the results obtained.

At present, developmental work is concentrated on the staple approach with a view to its commercial introduction. In the meantime research will swing toward the fibre approach so that proper comparisons can be made over the next few years. Regardless of which technique is finally adopted the prediction of
fibre length in the top probably represents the last major technical barrier to sale by description. Problems such as the presence of stained and pigmented fibres in white wool must be overcome although the solution may lie in preventative techniques and appropriate guarantees rather than routine measurement.

**Increased extension efforts**

Although sale by sample and test certificate represents a milestone in wool marketing, the procedures for testing yield and fibre diameter have been familiar to the processor. This does not apply in the case of new measurements such as staple strength where the units of measurement (Newtons/kilotex) and the range of values obtained (e.g., 0-60 N/ktx) are quite foreign. It has been concluded that a major extension programme directed towards the processor is necessary to explain the nature and value of new measurements. This programme is called TEAM (Trials Evaluating Additional Measurements).

The TEAM project is a collaborative effort between the CSIRO Division of Textile Physics, the Australian Wool Testing Authority, and the Australian Wool Corporation. The main aim is to obtain a range of measurements on a considerable number of commercial consignments and to demonstrate the relationship between these measurements and subsequent topmaking performance.

Twelve mills embracing nine countries will each order, through normal channels, 20 consignments representing the type of wool they process. The wool buyer and selling broker will co-operate with the research team to ensure that every sale lot in each of the 240 consignments is sampled and tested for yield, vegetable fault, fibre diameter, staple length, staple strength, and colour.

The mill will return a full combers report and will be asked to collect additional information that may be useful for the interpretation of results.

It is hoped that the trial will demonstrate the benefits of additional measurements and that a demand for measurement will develop. Perhaps of greatest importance is that the TEAM project demonstrates that the AWC recognises the magnitude of the extension programme which is needed if market reform is to be accepted. The data emanating from the programme will provide a powerful bridge between the wool grower and the processor.

**New administrative procedures**

Under sale by description, major advantages will hopefully accrue from computerisation of marketing operations. This should enable full use of programmed selling and the matching of sale lots into consignments meeting certain commercial and technical specifications.

A standardised format is required for recording the many pieces of information. For example, owner’s identification, lot identification, classer’s description, quantity and quality should be shown for each lot of wool. It is hoped that data on quality would consist primarily of measurement results although it is more than likely that a number of assessments such as type of classing, standard of classing and even certain wool characteristics such as tip configuration and other aspects of style will continue to be assessed subjectively by the AWC.

The main problem associated with the introduction of such a scheme will not be a technical one. Rather it will centre on obtaining agreement from the various sectors of the industry on uniform systems of identification and
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specification. Currently, for example, there is no national scheme for
description of bales or classed lines, nor is there a system of identification
numbers for wool growers. When attempts to remedy such limitations are
considered, rightly or wrongly, to impinge upon vested interests, progress
becomes difficult.

Some likely developments

Final comments relate to the way in which sale by description may come
about. There is a sharp contrast here with sale by sample. Although sale by
sample altered the physical shape of the sale room quite markedly, all the
traditional valuing tools of the buyer could be applied. Changes brought about
by sale by description will be far more radical.

Until buyers have full confidence in the description of the wool offered it
will be necessary to have an arrangement for some years whereby samples can be
examined. On the other hand commercial pressures will continue to urge the
industry to rationalise its operations.

One feature that the wool grower must accept is that the description
provided for the buyer must be guaranteed. This point is often raised to dampen
enthusiasm but it should be of little concern. Every measured characteristic
will carry a guarantee that the test has been carried out according to a
standard procedure. If an error is proven then responsibility lies with the
testing authority, as it does already in the case of yield and fibre diameter
measurements.

It is logical to assume that information based on subjective assessments,
e.g., the standard of clip preparation or style, will be provided by the AWC
as part of its normal valuing operation and that these assessments will be
guaranteed by the Corporation within certain limits. It would be advisable to
devise objective procedures for settling disputes relating to such appraisals.

It should be remembered that the Corporation has disposed of its own stocks
by sale by description for some years. The disposal of individual sale lots is a
very different matter; however, in the light of increasing cost pressures on the
marketing system the prospect of a guaranteed description dominated by test
results makes the advent of sale by description a strong possibility.

THE AUSTRALIAN LIVE SHEEP EXPORT INDUSTRY - "CURSE OR SALVATION?"

R.J. LIGHTFOOT* and C.L. MCDONALD*

Introduction

The export trade in live sheep from Australia to the Middle East has
developed rapidly in recent times, and has received considerable attention from
the media. Unfortunately this coverage has tended to focus on the industry's
growing pains. Objections to the trade by meat workers, animal welfare groups
and more recently, communities surrounding the assembly areas and ports of
shipment have received widespread comment, particularly when newsworthy
incidents such as shipping tragedies or the closure of abattoirs have occurred.
Throughout such news coverage, the benefits of the trade to the farming
community, allied industries and the Australian economy have usually received
scant treatment. Such matters are only poorly understood by the general public
and have often been viewed with a degree of scepticism.

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The objective of this paper is to present a more balanced overview of developments in the live sheep export industry, and in particular, the effects of the trade on future trends in the Australian sheep industry.

**Historical background**

Although the export of sheep to the Middle East is relatively new to Australia, there has been a substantial live sheep export trade around the Mediterranean, through the Red Sea and across the Persian Gulf to the Middle East region for many centuries. With demand routinely exceeding supply, and with the preference of Muslims for fresh sheep meats killed according to their traditional *Halal* customs, the predominantly Muslim people of the Middle East have long been importers of live sheep.

It is also relevant to note that Australia was exporting live sheep long before trade with the Middle East began. Exports from Western Australia to the Singapore region date from well before the turn of the century and 100 000 sheep per annum of traditional heavyweight *wethers* are still shipped to this country on a regular basis. It was undoubtedly the forerunner of Australia’s present live sheep export trade, but today it appears almost insignificant when compared to more than 5 million sheep per annum currently shipped to the Middle East region.

In its formative years, the Australian live sheep export trade was regarded merely as a profitable outlet for *wethers* cast for age from the Merino wool industry. Today it is a large and vital rural industry in its own right, returning to Australia more than 150 million dollars per annum in export income. Despite claims of harm to the slaughter industry, live sheep exports have increased trade and employment through the shearing, stock assembly, feed processing, road transport, veterinary services, shipping and commerce industries. Benefits flowing directly to the sheep producer have also been substantial. The effects are most marked in Western Australia where gross income in the sheep enterprise from the sale of stock has risen from 12 per cent to over 30 per cent with further increases expected in future years.

**The Middle East market**

The Middle East region emerged as a significant buyer of Australian sheep during the early 1960s. Some 65 000 head were shipped to Kuwait in 1962/63 and trade to the region continued to expand as markets in Iran, Saudi Arabia, Libya, Qatar and Bahrain were developed. Until the mid 1970s, Western Australia supplied the great majority of the trade and today this State still provides over 50 per cent of all sheep exported. Total Australian exports to the Middle East now exceed 5 million sheep per annum (Fig. 1).

The marked growth in recent times was sparked by the energy crisis of the early 1970s when the Middle East region began to capitalise on its natural petroleum resources. Government policy in most Middle East countries to raise overall living standards (including the per capita consumption of meat) paved the way to expanded trade in both live sheep and sheep meats. Their traditional trading partners in live sheep, North Africa, Turkey and the Eastern block countries (Hungary, Bulgaria, Rumania) remained substantial though variable suppliers, but could not meet the greatly increased demand. Australia, with its enormous population of sheep and comparative geographic proximity, was strategically placed.
Commercial initiative and market research by private industry and Government agencies played important roles in expanding knowledge and establishing initial trading arrangements through the early 1970s. First reports soon confirmed that the Muslim population of these countries preferred sheep meat to that of other species. Their strong preference for fresh meat to be eaten on the day of slaughter was also verified, as was their dislike of excessively fat meat and of relatively dark meat from cast for age Merino wethers. It was not to be unexpected that their first choice was for fresh lean meat from young sheep similar to that derived from the fat tail-carpet wool breeds which are native to the area.

The Middle East consumer's preference for young lean sheep, however, has not always been reflected in commercial contracts. This has often led to confusion between producers, Government agencies responsible for regulations and advice, and the exporters. One reason for this apparent dilemma is that Middle East buyers are very price conscious and have therefore tended to let contracts on the basis of lowest price per tonne liveweight. The price tendered by exporters is determined initially by the cost of purchasing and assembling sheep in Australia, but it is substantially influenced by the cost of shipping. Owing to the Department of Transport's "pen space requirements" which govern maximum stocking densities for sheep in transit by sea relative to liveweight classes, heavyweight wethers are cheaper to freight in terms of dollars per kilo (liveweight) than lighter sheep such as hoggets or lambs. For example, a ship with 30 000 m² pen space could carry some 88 240 sheep averaging 60 kg liveweight – a total of 5 294 tonnes. If the same ship carries 40 kg sheep, however, approximately 103 500 head are permitted on board giving a cargo of only 4 140 tonnes. The heavier wethers are therefore considerably cheaper to freight.

Despite such problems, specifications in commercial contracts for the supply of live export sheep are becoming increasingly detailed compared with the early days of the trade. Most importing countries now specify relatively tight requirements with respect to age, weight, and sex. There is a trend towards younger sheep (less than 3 years of age) at correspondingly lower liveweights, with little tolerance of ewes (cross-breeds, owing to the Merino embargo) being included in the consignment. Further improvement in specification is partly limited by the problems inherent in developing accurate technical descriptions for sheep "on the hoof", and an efficient means of measurement in very large mobs of sheep.

New Zealand and Argentina are often seen as potential competitors with Australia in the live sheep export market. In New Zealand the export of live
sheep for slaughter has been banned for some years and transport distances are also greater. New Zealand has become an accomplished trader in frozen lamb to the Middle East region, however, and its farmers turn off over 15 million wether lambs each year. Given a change in government policy and suitably modified production systems, this country has the capacity to supply very large numbers of heavyweight lamb for live shipment to Middle East countries. Argentina exported small numbers of sheep to the Middle East during the 1970s but its Government did not encourage the trade. As sea distances are also quite considerable and as Argentinian agriculture is turning towards increased cropping and beef production at the expense of its sheep population it is unlikely to be a significant competitor in the future.

The assembly/transport systems

The great majority of sheep intended for live export are purchased "on farm" rather than through the saleryard system. Some export companies have their own buyers whereas others appoint commissioned stock agents to purchase sheep for assembly and shipment.

Assembly is an essential phase of the live sheep export process in order to facilitate the accumulation and preparation of cargoes often totalling over 100,000 head. On arrival at the assembly area, the sheep are drafted, drenched, shorn and vaccinated as required while gradual introduction to the shipboard ration of pellets proceeds. The time spent by sheep in assembly prior to export varies considerably but would average from 1 to 2 weeks. Once the sheep are preconditioned for shipment they are then either trucked or railed to port for loading aboard ship which is usually completed within 2 to 3 days. The efficient movement of animals during wharfside inspections by Government authorities, up the gangplank and through to the final penning is a feature of this phase.

Assembly areas in Australia range in design and construction from large paddocks stocked at 5 to 10 square metres per sheep through to fully roofed feedlots with slatted flooring and relatively high sheep densities. Companies are continuing to make substantial improvements to the assembly process and several new facilities of advanced design have been constructed in recent times.

The ships employed for the export of live sheep in the early 60s provide stark contrast to those dominating the trade today. The old ships - small, partially modified freighters, usually carrying some 10 to 15 thousand sheep penned principally below deck where they were fed hay on the pen floor - are being progressively replaced by large, elaborately fitted jumbo tankers, carrying upwards of 120,000 sheep. Such vessels are fitted with tiers of above deck pens, ventilated naturally by virtue of their open sides and assisted by forced ventilation to the interior regions. With growing experience, greater cognizance of the special needs of sheep transported in high density situations is apparent throughout the vessels' design. Ration formulation and feeding systems with commercially prepared shipper pellets have improved substantially and watering systems are becoming automated, thus ensuring adequate supplies at all times.

Despite the fact that further improvements are desirable in some areas, the changes brought about through active consultancy involving shippers, engineers, veterinarians and scientists have seen a marked reduction in the average levels of sheep mortality occurring in transit. For example, in Western Australia levels have fallen from over 4 per cent in 1975 to less than 2 per cent today.
Animal Production in Australia

The Australian sheep production systems

The impact of the live sheep export trade on livestock population parameters and production systems is naturally most apparent in the western and southern regions of Australia which have been engaged in the trade for many years. In Western Australia particularly, the last decade has seen a dramatic reduction in the average age of the wether population (Table 1). Here, the full mouth wether, once the mainstay of the wool industry, could now be classified as an endangered species with an average of fewer than 30 animals remaining per farm. The wether flock continues to become younger as farmers routinely turn off their wethers for sale at progressively younger ages. The average age of all wethers shipped from Western Australia in 1981 was approximately 3 years and it is estimated that some 15% of all exports were less than 18 months of age. This tendency towards younger wethers aligns well with Middle East preferences.

TABLE 1  Age structure of the Western Australian wether flock
Number (millions) at March 31

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<tbody>
<tr>
<td>1–2 years</td>
<td>3.2</td>
<td>2.7</td>
<td>3.4</td>
<td>3.8</td>
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<tr>
<td>2–3 years</td>
<td>2.2</td>
<td>2.2</td>
<td>1.7</td>
<td>2.1</td>
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<tr>
<td>3–4 years</td>
<td>1.1</td>
<td>1.7</td>
<td>1.0</td>
<td>0.6</td>
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<tr>
<td>Over 4 years</td>
<td>3.1</td>
<td>1.3</td>
<td>0.8</td>
<td>0.3</td>
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<tr>
<td>TOTAL</td>
<td>9.6</td>
<td>7.9</td>
<td>6.9</td>
<td>6.8</td>
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In association with the population changes outlined above, the proportion of breeding ewes in the average Western Australian flock has also been affected. Throughout the past decade it has gradually increased from the 40 per cent traditionally maintained in the past, to almost 50 per cent today. Farmers are recognising that flocks with a high proportion of breeding ewes are able to turn off many more young animals for sale and, given acceptable prices, improve overall returns. Gross margin analysis based on 1981 prices indicated that returns from a Merino flock with 60 per cent breeding ewes, and managed to turn off wethers for sale at 12 to 18 months of age are approximately 15 per cent higher than an otherwise equivalent flock with 40 per cent ewes selling wethers at 5 to 6 years of age.

Concern has been expressed in some quarters with regard to the likely effects of such changes on the wool clip. Calculations suggest, however, that although total production may fall slightly as the proportion of ewes increases, mean fibre diameter tends to decrease as the bulk of the wool comes from breeding ewes and young stock. The net effect on overall returns from wool is therefore relatively marginal.

While the Merino is an ideal sheep for live export an increasing proportion of farmers involved in the supply of stock to this trade are recognising that the improved growth and quicker finishing characteristics of first cross lambs from Merino ewes can give earlier turnover and greater flexibility to their production systems. Sales of Border Leicester, Poll Dorset, and Suffolk rams in Western Australia indicate the popularity of such breeds for use as a terminal sire in flocks geared to the live sheep export industry.

Substantial price premiums are often paid by exporters for well finished sheep of suitable weight through the February to June "out of season" period. As a consequence many farmers in Western Australia are reverting to an earlier
autumn lambing which will enable them to sell 55 kg+ wethers at 20 to 24 months of age with a minimum of hand feeding.

Much effort in recent years by both farmers and scientists has been devoted to developing efficient production feeding systems to grow and finish wethers for live export. Most systems are based on ad lib. feeding with rations of sufficient quality to finish adults, hoggets or weaners for out of season sale at times of short supply. In the case of most cereal grains, particularly for young stock, a supplement is required to raise the effective protein content of the ration. However, not all of the profitability within such systems results from taking advantage of the seasonal price peak. An important consideration is that the wethers are turned off earlier than would be the case on natural grazing alone, and as a result, more breeding ewes can be carried. With more breeding ewes, more lambs are bred and hence more wethers sold. Carrying this principle to the extreme, a few innovative farmers have adopted management systems geared to turn off heavyweight lambs for live export. The lambs, usually autumn/winter born, are finished to approximately 45 kg liveweight for sale at 10 to 12 months of age. In a similar move, a small number of pastoralists have entered into contractual arrangements with wheatbelt farmers who undertake to finish their weaners on excess stubble and seconds grain for sale as shippers. As is the case in the farming areas, such systems permit the pastoralists to increase the proportion of ewes and expand total turnoff from their leases.

As farmers modify their previously wool dominated enterprise to one in which management is geared more closely to the live export trade they are becoming increasingly conscious of flock fertility and its significance to overall farm profitability. Increased reproductive efficiency is not an easy goal but in the short term improved nutritional management of the breeding ewe at mating and during lambing holds most prospect for increasing the number of lambs born and successfully reared. In the longer term, improvement in the genetic capacity of the Merino to rear lambs through selection and/or crossing will become an important consideration for those involved in producing rams. Unless breeding ewes have the genetic capacity to respond adequately, extra nutritional and managerial intensification may not be warranted.

The future

(i) The Middle East market. The future will see an increase in the technical specification of livestock contained within contracts to supply Australian sheep for live export. The majority of importing countries are no longer content to receive the surplus "cast for age" culls from the wool industry. The trend is towards contracts that clearly specify younger sheep within acceptable weight ranges. Contracts for premium stock should be let at premium prices.

The withdrawal of Iran from the live sheep export trade in recent times highlights the relative instability of some of our trading partners in the Middle East region. There would seem to be a need on behalf of exporters and governments to further improve the international spread of our markets and so ensure minimum impact on Australia in the event of an unforeseen political disturbance affecting trade.

A number of factors point towards continued growth in the live sheep export industry, albeit at a somewhat slower rate than that experienced through the 70s. Supplies in both Western and South Australia are limited and so, at least in the short term, exporters will turn to south-eastern Australia for additional sheep.

(ii) Production systems. Given the continued stimulus of improved prices for
live export sheep, it seems likely, at least in those States on the western and southern seaboards of Australia where live sheep exports can continue most profitably, that the trend towards increasing the proportion of breeding ewes in the flock and turning off *wethers* at a younger age will be maintained. In Western Australia it is expected that within the next 10 years some 60 per cent of sheep on farms will be breeding ewes and most export *wethers* will be less than 2 years of age.

Interest has also been shown in developing new breeds more suited to the specialised requirements of the Middle East. Observers are aware that the locally bred fat-tailed rams command substantial price premiums when sold adjacent to imported Australian *wethers*. With suitable quarantine precautions applied to the importation of new genotypes, the multiplication of such sheep in Australia could be most profitable. Even without the fat-tail genes, enterprising breeders could develop with existing breeds a new strain of synthetic sheep more suited to Middle East tastes.

Undoubtedly, the continuation of the live sheep export trade will see the development of more intensive sheep production systems. This is most apparent through currently high levels of investment by farmers in grain storage and feeding systems and particularly in the thirst for managerial and technical knowledge concerning breeding and feeding programmes for early turnoff. It is important to note, however, that the most successful sheep farmers are not only better managers with a higher level of technical knowledge in their management decisions, but they have also developed marketing skills and are more attuned to market trends.

(iii) Assembly/transport The logistic and technical problems inherent in the assembly and management of sheep loads totalling over 100,000 sheep provide considerable incentive to devise improved systems. Much work of a scientific and practical nature remains to be done in this area. The future will see the development of systems that significantly enhance the adaptation of free grazing sheep to the intensive pellet-fed conditions required on board ship. Priority should be given to developing ways to overcome the "shy feeder" problem and to improve the nutritional formulation and physical specification of rations in order to minimise wastage and stress from assembly through to reception overseas.

The trend towards larger more efficient vessels specially adapted to the live sheep export trade is already apparent and will continue. Part of the pressure for such change is economic as more modern ships significantly reduce the cost of transport per head. An additional impetus, however, stems from increased public concern for the welfare of sheep on board ships and the need for improved systems to reduce weight loss and mortality rates in transit.

An area sometimes forgotten in the rush to complete contract arrangements and the immediate reality of assembly and shipping, is the quality of management and facilities available to receive sheep within importing countries. Stock may be held for several weeks prior to slaughter with one or more transport phases intervening between disembarkation and slaughter. A high degree of technical competency is required at this stage to avoid further wastage. Facilities and management continue to improve in some countries, particularly where vertical integration of export/import processes exists, but in others there is a need for sound technical consultancy to achieve appropriate standards.

(iv) Social issues The growth of the live sheep export industry has seen it in conflict with community action groups on several fronts. The concentrated assembly of many thousands of sheep on a continuing basis in close proximity to urban areas has promoted spirited objections to uncontrolled noise, odour and dust.
pollution. Such problems can be alleviated, if not totally overcome, through careful planning in respect of location, facilities, and management.

Opposition from the meat industry unions to the live sheep export trade has become a fact of life through the 1970s. The charge that the export of sheep in "live" rather than in "carcase" form has caused a downturn in employment opportunities in the meat trade has resulted in bitter disputes leading in some cases to physical confrontation. The early history of the trade in Western Australia saw the introduction of ratios and quotas relating live sheep to carcases in an attempt to reach a settlement. In more recent times farmer organisations have been united in their resolve against any form of restriction on the free trading of sheep and this action has been supported by the present Government in Western Australia. The recent threat of ACTU resolutions concerning the ban of live sheep exports has been put aside, at least tentatively, with Federal Government resolve for further investigations into market prospects and employment surrounding the meat industry, generally. Attempts by meat industry unions to restrict live sheep exports in the future are likely to meet growing opposition from within union ranks, especially from those sections associated with waterfront labour, transport, feed processing and shearing.

Finally, comment must be made on animal welfare, perhaps the most vexing of the social issues affecting the trade. To date opposition to live sheep exports has been spasmodic, prompted by the instance of an occasional major tragedy such as the sinking of a ship. There is, however, growing concern among welfare organisations and increased resolve in their opposition. The industry itself has assumed a high degree of responsibility on this issue and has effected substantial improvements in assembly and transport systems leading to considerable reductions in mortality, and improved maintenance of liveweight en route. Nevertheless, the future must see increased emphasis throughout all strata of the live sheep export industry to further improve performance in this respect.