Transport and Handling of Australia's Wool Production

Report

The general approach in this Report is to concentrate on the costs directly borne by wool at the various stages of ownership from grower to mill. However, these costs are reflected in income accruing to others and the conflicts of interest this fact creates are not lost sight of in the report.

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BUREAU OF TRANSPORT ECONOMICS,
CANBERRA.

TRANSPORT AND HANDLING OF AUSTRALIA'S WOOL PRODUCTION

3 DECEMBER 1971

The Honourable P.J. Nixon, M.P.,
Minister for Shipping and Transport.

TRANSPORT AND HANDLING OF AUSTRALIA'S WOOL PRODUCTION

On 23rd July, 1971 you asked the Bureau of Transport Economics to review all the available information on wool transport costs from the farm to overseas markets. In a press release that day you said that you had asked the B.T.E. to undertake the study in order to clarify the facts for the industry, the Government and all others who are vitally concerned about the position of the industry.

In view of the developments in the wool industry in the period since you asked us to carry out the study, the B.T.E. has aimed at producing a quick report. The complexities of the wool transport and handling task are such that we could well have spent a much longer time preparing a report - however, we have given a high priority to getting this report into your hands quickly and I now have pleasure in attaching it.

The report is necessarily a bulky one but the main points which the B.T.E. wishes to emphasise are summarised in Chapter 6. A series of annexes provide a great deal of factual information which was collected by the B.T.E. in the course of its enquiries.

In preparing this report we were greatly assisted by governmental and other organisations including the Australian Wool Board, the Bureau of Agricultural Economics, the C.S.I.R.O., the National Materials Handling Bureau, most State Railway authorities and some growers, private buyers and wool brokers.

R. W. Cole
Director

3 December, 1971

TRANSPORT AND HANDLING OF AUSTRALIA'S WOOL PRODUCTION

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CHAPTER 1. APPROACH AND SCOPE OF THE REPORT

Introduction. Wool traditionally has been a commodity bearing a high transport, handling and marketing cost. Although wool has not remained the sole export product of the inland, what Geoffrey Blainey has said about the conditions favouring the development of the early colonial wool industry remained broadly true for over 150 years -

> There was only one rural commodity which the soils and pastures of inland Australia could produce in large quantities in the era of dear inland transport. The commodity was wool. The climate and limitless grasslands were ideal for woolly sheep ... Above all, the price of wool in England was normally so high that Australian sheep graziers could afford not only the high cost of sending their wool far overland to the nearest port but also the cost of sending wool from an Australian port to Europe. Wool was valuable enough to pay its own way across the world . (1)

But whereas, this century, technological improvements (e.g. bulk handling methods) have reduced the costs of distributing some other rural products (e.g. wheat, sugar), cost-reducing innovations in getting wool from the farm to the overseas mill have been much less apparent - indeed, the industry has retained a substantial 19th century element in the marketing process(2). However, the substantial productivity gains in wool growing during the 'fifties and 'sixties tended to mask the stagnation in wool handling techniques and enabled growers to resist the cost-price squeeze. But in recent years wool's capacity to bear high transport, handling and marketing costs has diminished as wool prices have fallen steeply and costs have continued to rise.

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(1) G. Blainey, The Tyranny of Distance, 1968, pp. 124-5.

(2) See, for example, Annex B - a case study dealing with the progress of a hypothetical clip from farm to overseas mill.

The large drop in wool prices in 1971 has markedly accelerated this adverse trend. Wool is now no longer self-evidently 'valuable enough to pay its own way across the world'[1].

Thus, while for a century and a half the wool industry in Australia seemed viable virtually regardless of trends in transport and handling costs, economising on these costs is now very much the order of the day. In a nutshell, the industry cannot afford costs which, by more efficient arrangements, it could avoid.

The scope for increasing efficiency in transport and handling is a matter with which this report deals in detail. Here it suffices to cite a benchmark figure - it costs some $250 million annually, at present day prices, to get Australia's wool production through all of the processes involved in taking it from the sheep's backs and delivering it to the mill gate. These processes include not only the essential line-haul operations on land and sea but also shearing, handling, storage, dumping, etc. It is from within the processes costing this sum of $250 million annually that economies can be sought.

The traditional and yet complex processes which are involved in getting wool from farm to market are often noted as being in marked contrast to those involved in marketing wheat - or, more pertinently, to processes involved in getting synthetic fibres from the manufacturing plant to the processing mill. However, the contrasts are not really to the point - wool is neither a true bulk commodity nor is it a standardised production item. It is important to understand this. As The Economist once said, each sheep is a miniature 'extrusion plant' on its

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(1) The palliative effect of subsidies is ignored here.

own - and Australia has some 180 million of them producing a great variety of classes of wool for over 100,000 different and widely dispersed owners. It is these characteristics of the wool producing industry which make rationalisation peculiarly difficult.

The Study Approach In studying the transport problems of wool against the background just described the B.T.E. has had two aims.

(1) to describe and cost the existing system of getting wool from farm to mill gate; and

(2) to identify areas in which economies might be achieved and the conditions necessary for such achievement.

Various aspects of the economics of the wool industry have been worked on intensively by many bodies in Australia The B.T.E.'s first step, therefore, was to discuss with these bodies the aspects relevant to transport and handling It soon became evident, however that the transport and handling options which may be available are limited by the way in which marketing is organised or by where storage and port facilities are concentrated. For example, to a large extent the argument in support of a radical change in wool marketing rests on the lower cost transport, handling and storage options which are said to become available.

Because of this interlinking of transport and handling with other processes as wool is moved from farm to market it was found necessary to look at all of the activities involved in getting wool from farm to market although naturally, much more detailed attention has been focussed on the transport and handling parts of those activities. Detailed attention has been paid to other activites only when there are consequential implications for the way transport and handling is organised.

The general approach in the report is to concentrate on the costs directly borne by wool at the various stages of ownership from grower to mill. However these costs are reflected in income accruing to others and the conflicts of interest this fact creates are not lost sight of in the report. Nor is the separate interest of the national economy or community ignored - the possibility of the interests of the wool industry clashing with the interests of the economy does arise in the case of the line-haul land transport task and we deal with the resulting issue from both the industry and community point of view.

Arrangement of Report: The next chapter (Chapter 2) contains a general statistical description of the wool industry in Australia. Annex A provides a more detailed statistical coverage.

Chapter 3 goes from the general to the particular. It outlines the results of a case study of the movement of a hypothetical wool clip from a farm near Walgett to a mill in Nagoya, Japan, in 1969-70. The detailed supporting annex (Annex B) features a flow chart tracing every significant step in the movement of wool from the sheep's backs to the overseas mill gate, with all associated costs separately identified. By putting the processes of getting wool from farm to mill gate under the microscope in this way the generalised but bare-boned picture in Chapter 2 is fleshed out in a realistic way. The subsequent and more analytical chapters refer back to the facts brought out in this chapter.

In Chapter 4 the report turns to the possibilities of achieving economies within the existing marketing system - that is, the system under which the model clip dealt with in Chapter 3 was marketed. Relevant factual information is contained in Annexes C to H. In this chapter the much debated road versus rail issue and the shipping issue are discussed.

Chapter 5 deals with the implications for transport and handling of possible changes in the wool marketing system. Supporting details are contained in Annex I. We have relied heavily on the work of the Bureau of Agricultural Economics in dealing with the feasibility of such changes but the judgments as to the transport and handling consequences of such changes are our own.

Finally, in Chapter 6, the report sets out the main points which we believe emerge from our investigations. They are not so much conclusions about what can be done to achieve economies, however, as conclusions about what are the most practicable lines of attack on wool's transport cost problems. The distinction is made because few of the issues are clear-cut and in the case of those that are (e.g. shipping strategy), the tactics to be employed at any time depend essentially on the circumstances at that particular time.

CHAPTER 2. WOOL - THE STATISTICAL BACKGROUND

In this chapter the main general data relating to the production of wool in Australia and its transport from farm to overseas port are presented.

Production: In 1969-70 the gross value of Australia's wool production was $735 million[1]. This was the gross return to growers on total greasy wool production in that year of 2,036 million lb made up as follows:-

	Million lb
Shorn wool	1,850
Dead and fellmongered wool	22
Wool exported on skins	164
TOTAL	2,036

This wool was produced on 108,000 separate rural holdings running, in total, 180 million sheep. Details are shown in Annex A, Table 1, but in summary the position[2] was as follows -

	Number of holdings running sheep ('000)	Number of sheep (Millions)
New South Wales (a)	37	73
Victoria	31	33
Queensland	5	10
South Australia (b)	16	20
Western Australia	14	34
Tasmania	5	5
AUSTRALIA	108	180

(a) Includes A.C.T. (b) Includes N.T.

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(1) It fell sharply to $547 million in 1970-71 - however, this chapter concentrates on the year 1969-70, for which more complete data are available. The estimates of the gross value of wool production are taken from the white paper National Income and Expenditure 1970-71, page 7.

(2) At 31 March 1970.

The majority of these holdings ran less than 1,000 sheep although it is estimated that over one-half of Australia's wool production comes from the holdings running 1,500 to 10,000 sheep and over 10 per cent from holdings running more than 10,000 sheep.

During 1969-70, 193 million sheep, including 36 million lambs, were shorn. Average fleece weights were 11.0 lb. for sheep and 3.4 lb. for lambs, the weighted average being 9.6 lb. The resulting clip of 1,850 million lb. was made up into an estimated 5.95 million bales of wool (1). Details are shown in Annex A. Table 2.

Page 8 contains a chart showing how the wool supplies becoming available in Australia in 1969-70 were distributed. All figures are on a greasy equivalent basis. This chart shows that of the total available supplies, including imports (2), of 2,068 million lb. (3), a total of 1,927 million lb. or 93 per cent. was exported in various forms. Of the remainder 83 million lb. went into local production and 58 million lb. were added to stocks of raw and processed wool. Additional details are shown in Annex A. Tables 3 to 7.

This report is concerned primarily with the transportation of greasy wool from farms via selling centres, stores, ports, etc., to overseas mills. The concentration on exports follows from the fact that Australia's wool industry has been basically a raw material supplier to overseas mills - for example, in terms of bales of shorn wool over 5.5 million of the 5.95 million bales produced were exported in 1969-70.

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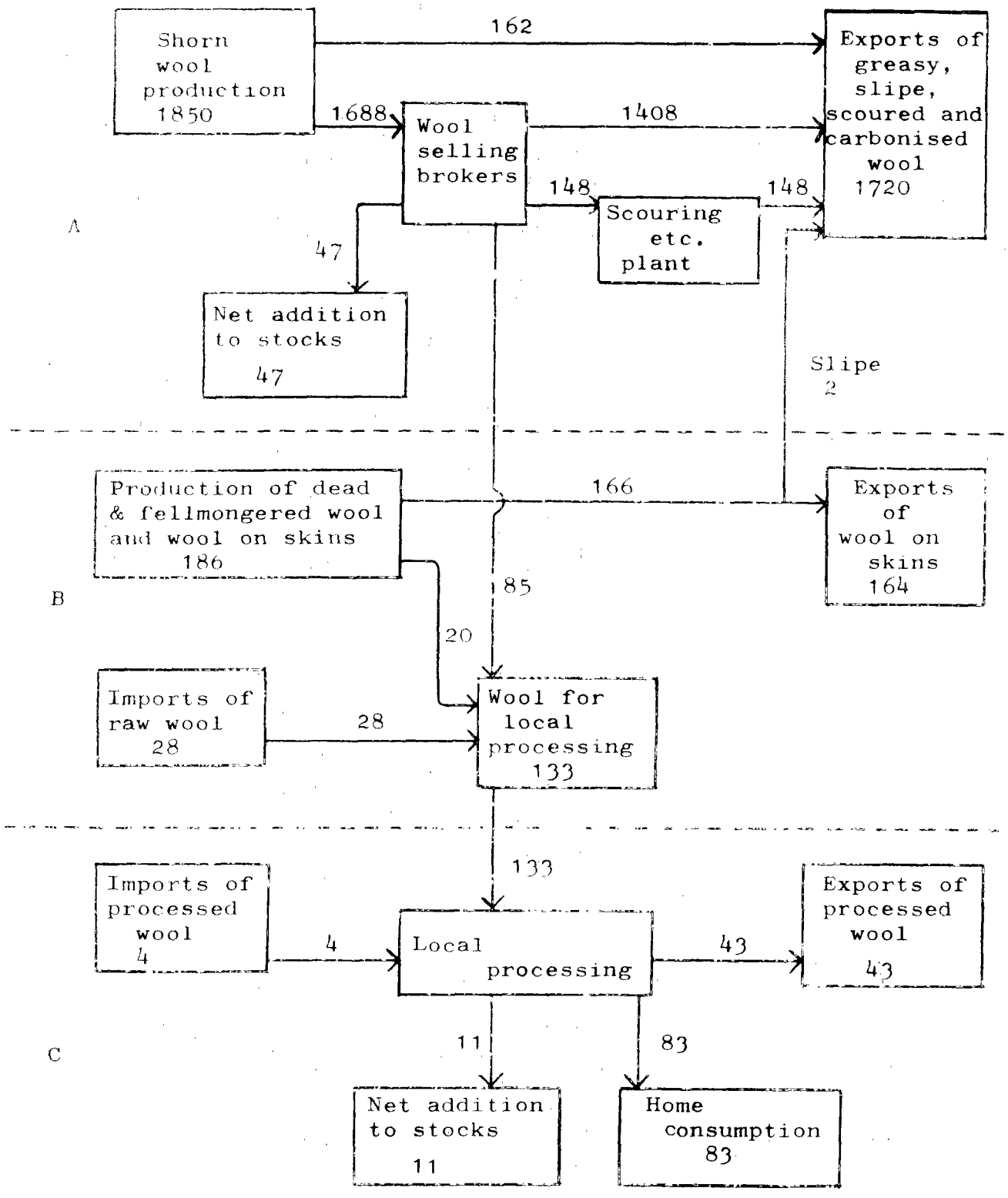
(1) Estimate based on average bale weight for each State in 1969-70 as reported by the National Council of Wool Selling Brokers. The average bale weight ranged from 291 lb. to 320 lb.

(2) In 1969-70 Australia imported 31.6 million lb. of wool for carpet manufacture, etc., mainly from New Zealand.

(3) Sum of component items; actual figure of total exports was 2,067 million lb.

WOOL PRODUCTION AND DISTRIBUTION, AUSTRALIA, 1969-70

(All figures in million lb greasy equivalent)



A. Raw wool movements included in the scope of this report

B. Other raw wool movements

C. Movements of processed wool

Land Transport Arrangements: Of the estimated 5.95 million bales of shorn wool produced in 1969-70 about 5.4 million bales, or 91 per cent, were transported from farms to brokers' stores for sale. The remaining 0.55 million bales of wool were sold through private buyers and in other ways.

Most of the total production of wool in each State has been sent intrastate to brokers' stores In two States. however. there has been a significant outflow to brokers' stores in other States. The larger outflow has been from N.S.W. - some 0.6 million bales of total N.S.W. production of 2.1 million bales went interstate to brokers' stores by road in 1969-70. Most went to Victoria (471,000 bales) but some went to Queensland (62,000) and South Australia (73,000). The other State experiencing significant interstate outflow of wool was South Australia - 123,000 bales went by road or rail to brokers' stores in Victoria in 1969-70(1). A considerable part of the wool sold privately in N.S.W. and South Australia is also sent interstate but precise estimates are not available. It should be emphasised here that this is not entirely a Section 92 phenomenon - in border areas the shortest and most direct route may be to a broker's store interstate.

In Annex A Table 8, three methods of transporting wool within Australia are distinguished. The distinction is on the basis of which mode - rail. road sea - does the initial line-haul(2).

The first method distinguished is the predominantly rail movement which consists of a road movement from shed to railhead and a rail movement from railhead to a rail terminal

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(1) Source: National Council of Wool Selling Brokers, Wool Review. 1969-70.

(2) After sale some wool is transported to a port of export other than that in which the broker's store is located. But the distinction here turns on the way the wool goes to the broker's store.

or at the port of export. (In some cases there is an additional road movement to broker's store but, as noted. our classification is based on the mode used for the line-haul).

The second method is road movement. either intrastate or interstate. all the way from farm to port.

The third and comparatively unimportant movement involves sea transport with road transport used to and from the wharves[1].

The division between the three forms of movement is estimated as follows:-

	Thousand bales
Line - haul by -	
Rail	3,327
Road	2,582
Sea	41
TOTAL	5,950

There are marked variations between States in the proportions of State production being moved predominantly by rail :-

	Percentage of Wool Production Moved by Rail
N.S.W.	63
Victoria	56
Queensland	50
South Australia	16
Western Australia	81
Tasmania	8

(1) This involves shipment from Kingscote on Kangaroo Island to Port Adelaide (33,000 bales), Flinders Island to Launceston (4,000 bales). Flinders Island to Melbourne (1,000 bales). and King Island to Melbourne (3.000 bales). The figures cited relate to 1969-70.

These varying percentages reflect geographical differences, varying State Railway pricing policies and State Government regulations affecting the use of road transport intrastate.

It is estimated that the cost of transporting wool within Australia was $16.1 million in 1969-70. The predominantly rail movement, with the associated road movements, is estimated to have cost $10.9 million in 1969-70. The road only movement is estimated to have cost $5.0 million and the road sea movements $150,000. Details are shown in Annex A, Table 9.

Shipment Overseas: It is in shipping overseas that the greater part of the purely transport cost of getting wool from farm to overseas mill is incurred.

The total number of bales of raw wool shipped overseas in 1969-70 was 5.53 million. Table 7 in Annex A lists the major countries of destination for Australia's wool exports and the volumes exported to each. The principal destinations were: Japan, 34 per cent; United Kingdom, 9 per cent; Italy, 9 per cent; France, 8 per cent; Belgium, 5 per cent; U.S.S.R., 5 per cent; and the U.S.A., 4 per cent. Details are shown in the diagram on page 12. It is estimated that in 1969-70 the total cost of shipping wool from brokers' and other stores to wharf and thence to overseas ports was $74.9 million.(1)

Total Wool Transport Cost - Summary: In attempting to cost the purely transport element in getting wool from farm to market consideration has been given to the farm to store movement and the store to overseas port movement. Although the bulk of the wool produced in a year is also exported in that year it is the case

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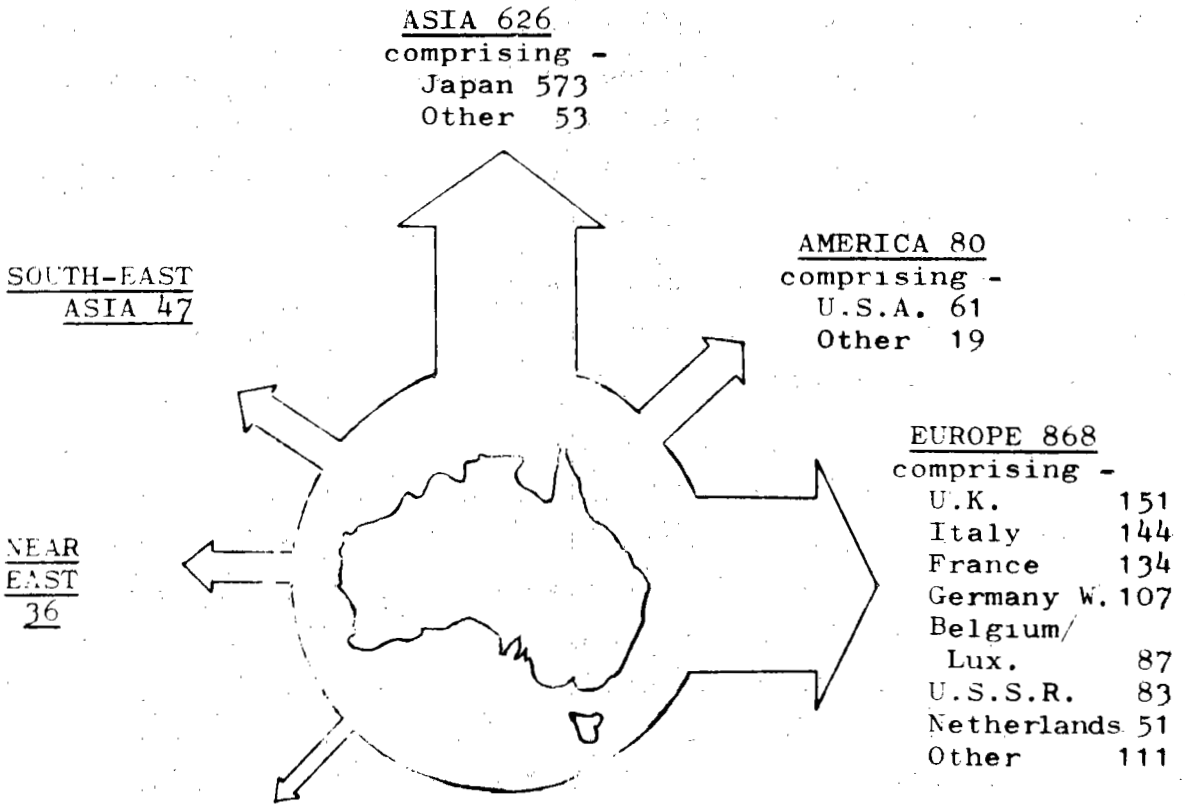
(1) This cost includes charges for elements other than the sea line-haul. For an example, see the table in Chapter 3, page 18.

DESTINATIONS OF AUSTRALIAN WOOL EXPORTS, 1969-70

(Million lb weight of greasy, slipe, scoured and carbonised wool exported)



TOTAL EXPORTS 1,662

Note: Countries receiving less than 50 million lb are not shown separately.

that some wool exported will have been produced in an earlier season. However, there was virtually no change in the value of wool sold and awaiting shipment in 1969-70 and the estimates of transport cost in 1969-70 in relation to wool production in that year thus do not appear to be affected by any abnormal relationship between production and export.

As indicated earlier, the cost of transporting wool from farm to store in 1969-70 is estimated at $16.1 million and, from store to overseas ports, $74.9 million. The total cost identified is therefore $91.0 million. In terms of bales or lb (greasy equivalent), these totals amount very approximately to:-

	Per bale	Per lb
	$	cents
Farm to store	$2\frac{1}{2}$	< 1
Store to overseas ports	13	> 4
	> 15	> 5

Other Costs: The cost of transporting wool from the farm to the overseas port is not, of course, the whole or even the greater part of the cost of getting wool from the sheep's backs to the overseas mills. Some minor transport costs are omitted (e.g. from overseas port to overseas mill); in addition, there are large handling costs, storage costs, marketing costs, wool shed costs, and so on. There are a great many steps in the full process of getting wool to the overseas mill and as each step is inextricably linked with its successor, there is a need to look at the whole flow of wool from farm to market. The object is to isolate and scrutinise those factors of direct or indirect relevance to transport and handling which contribute most to the costs of getting wool to market. Then the question can be posed: which of these costs are likely to be amenable to reduction?

The key point is that although, in 1969-70, it cost about $90 million to transport wool to overseas ports, it cost in total, some $250 million, or almost three times as much, to get the 5.5 million export bales off the sheep's backs and delivered at the overseas mill. That is, it cost something like $45 per bale or 15 cents per lb and it is to all of the processes and activities in respect of which this cost was incurred that the search for economies is necessarily directed. This report focuses on transport and handling. But many of the steps involved in getting wool to market - including many not primarily classified as 'transport and handling' steps - have a bearing on what transport and handling does cost. As a starting point, therefore, it is desirable to trace through these steps to both identify their importance, especially in terms of cost, and to ask whether economies bearing on transport and handling are possible.

In the next chapter a detailed case study shows how a total cost of $47 a bale is built up in the process of getting a typical clip from the sheep's backs to overseas mill gate.

CHAPTER 3. GETTING WOOL FROM FARM TO OVERSEAS MILL GATE - A CASE STUDY

Purpose of Case Study: Generalisations about the flow of wool from farm to mill gate necessarily conceal a great deal of detail. Yet it is only in looking at precisely what happens to wool as it proceeds to mill gate that an understanding can be reached of why the process costs as much as it does and of the scope for and problems of achieving cost-reducing changes.

For this reason we have carried out a case study of the movement of a reasonably representative clip from a farm near Walgett, New South Wales, to a mill in Nagoya, Japan, in 1969-70. This case study is presented in Annex B. Attached to Annex B are flow diagrams depicting in detail all significant activities, and their associated costs, involved in getting wool from the sheep's backs to the overseas mill.

This chapter is a brief summary of Annex B.

The Model Clip: All data used in Annex B are realistic in that they reflect actual events in 1969-70. However, the wool clip which is followed through from farm to mill gate is modelled on those actual events rather than exactly representing them in respect of any one actual clip.

Our model is a typical well-managed property located about 28 miles from Walgett, in the pastoral zone of New South Wales. The property has approximately 6,300 sheep. Output in the 1969-70 season is put at 210 bales, with an average weight per bale of 322 lb. The clip is assumed to have been sold through a broker in Newcastle and shipped through Nagoya, Japan, for use in a textile mill.

Costs Met Directly by Grower: In our model clip the first and largest cost arose in the wool shed itself. It cost the Grower on our model property $3,475 to shear his 6,300 sheep, class the clip and pack it into bales. Details are shown in Annex B, pages B4 and B5, and in Diagram D.1 attached to that annex.

The final bale make-up of the model clip was 130 bales of fleece wool, classed into 13 lots (62 per cent of the clip), 30 bales of broken wool in 3 lots (14 per cent), 25 bales of pieces in 6 lots (12 per cent), 13 bales of bellies in 2 lots (6 per cent) and 4 bales of locks, 6 bales of crutchings and 2 bales of other wools forwarded to the Broker as one lot.

The total wool shed costs of $3,475 were equivalent to $16.54 per bale.

Our model clip went to the Broker's Store by road/rail/road. Charges for the first leg, from the property to the railhead, by road were paid for by the Grower. Details are shown in Annex B, pages B5 and B6, and Diagram D.2.

The charge for this service was $315 or $1.50 per bale. This was a higher than normal charge, reflecting the fact that the bales had to be lifted from ground level to the road vehicle at the wool shed.(1)

Costs Met Directly by the Broker: From the time the bales reached the railhead to the time of sale all costs incurred were paid by the Broker and charged to the Grower's Account.

The first cost covered by the Broker was for the transport from the railhead to the Store. The all-inclusive charge for this was $731 or $3.48 per bale. This charge by the New South Wales Government Railways covered the line-haul, assistance given by the rail shipping agent at Walgett in transferring the bales from the road vehicle to the rail wagon, payment for unloading by contract at the Newcastle rail siding, and payment for contract road cartage to the Broker's Store.

With insurance cover the total cost which was directly met by the Broker, acting as agent for the Grower, in getting the wool from the sheep's backs to the Broker's Store was $752 or $3.58 per bale. Details are shown in Annex B, pages B6 and B7, and Diagram D.2.

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(1) In constructing the model, consideration was given to basing it entirely on best practice techniques; however, it was decided that, although the incorporation of an inefficient though not uncommon arrangement in the model made it in that respect doubtfully typical, there would be even less realism in assuming the adoption of 100 per cent best practice techniques.

The Broker, as agent for the Grower, also paid the storage insurance cover, stored the wool, prepared it for sale, appraised its value and advised buyers that it was available for sale. The various steps involved are described in Annex B, pages B7 to B11 and in Diagram D.3. The total cost of warehousing and sale preparation for the 210 bales was $812, or $3.87 per bale.

Finally, the Broker sold the wool. The expenses incurred are detailed in Annex B, pages B11 to B14 and in Diagram D.4. They totalled $771 or $3.67 per bale.

Gross Sale Realisations: The wool fetched $21,458 and, after deducting the various Broker's costs and charges, the amount payable to the Grower was $19,123 or $91 per bale. Details are shown in Annex B, pages B13 and B14.

Net Grower Realisations: From the Grower's wool cheque of $19,123 amounts payable in respect of wool shed and road transport to railhead costs had to be netted out - the Grower's net realisation was thus $15,333 or $73 per bale.

Costs Met Directly by the Buyer: As well as the selling expenses met by the Broker on the Grower's behalf, purchasing expenses were also incurred by the Buyer. The Buyer paid for core test reports and staff and office administration overheads. The total cost of these was $889 or $4.25 per bale. Details are shown in Annex B, pages B14 to B22 and Diagram D.5.

As consignor of the wool the Buyer also covered expenses involved in shipping wool to the Mill. The necessary arrangements included transporting the wool from the Broker's Store to the dump, counter-marking, dumping and unitising of the bales, cartage to the wharf and centralising and co-ordination of lots to consolidate a mill lot (ranging from 25 to 300 bales), paying the stevedoring charge and ensuring that the bales were loaded and stored on the ship.

Details are shown in Annex B, pages B22 to B26 and Diagrams D.6 and D.7.

Shipping expenses in total amounted to $2,412 or $11.52 per bale. The total was made up of a $9.87 per bale shipping freight rate and a $1.65 delivery charge to the dump.

Details of the shipping freight rate are shown below:-

GROSS CONVENTIONAL RATE FOR WOOL SHIPMENT
FROM NEWCASTLE TO NAGOYA, JAPAN
SEASON 1969-70

Service	For 322 lb Bale	Proportion of Freight Rate
	$	%
. Counter-marking	0.10	1.01
. Dumping (3 Band)	1.28	12.97
. Unitising (6 Bale Units)	0.55	5.57
. Cartage to Wharf	0.35	3.55
. Co-ordination/Centralising	0.18	1.82
. Wharf Receival	0.28	2.84
. Wharf Dues	0.28	2.84
. Loading and Stowing	1.05	10.64
. Bill of Lading	0.20	2.03
. Sea Freight	5.20	52.68
. Unloading at Overseas Port	0.40	4.05
TOTAL	$9.87	100.00

It will be noted that the pure line-haul charge amounted to little over one-half of the total shipping freight rate and that most of the balance was for services performed within Australia.

Costs Met Directly by the Mill: The Mill is taken to have paid for the moving of the bales from the wharf apron to the mill gate located in Nagoya, Japan. Details are shown in Annex B, pages B26 and B27, and in Diagram D.8.

The cost of movement from wharf to mill gate is put at $486 or $2.33 per bale.

Summary of Model Clip Costs: The average total expense of getting each bale from the sheep's backs to mill gate was $47.26.[1]

Details of the estimate are shown below:-

TOTAL MARKETING EXPENSES - WALGETT CLIP

1969-70 SEASON

Type of Marketing Activity	Estimated Expenses per Bale for Model Clip	Proportion of Marketing Expenses per Bale
	$	%
. Wool Shed Costs	16.54	35
. Transport - Shed to Store	5.08	11
. Warehousing and Sale Preparation Expenses	3.87	8
. Selling Expenses	3.67	8
. Purchasing Expenses	4.25	9
. Shipping Expenses		
- Sea Freight and Unloading	5.60	12
- Other	5.92	13
. Mill Handling Expenses	2.33	5
TOTAL	$47.26	100

(1) Roughly comparable estimates were made by the Department of Trade and Industry for the 'Workshop on Wool Transport' in October 1967 and by the Australian Wool Board (A.W.B.) in 1971. The 'Workshop' estimates for transport and handling of the 'Bourke Bale' ranged between $28.12 and $30.20 (excluding wool shed costs); the A.W.B. estimate, relating to the national average for the season 1969-70, was $41.81 per bale. Available data do not permit estimates to be made within an accuracy of one or two dollars per bale; hence in this report the figure of $45 per bale has been used as a reasonable average.

The amount of $18.93 per bale was incurred in respect of activities directly related to transport. This was equivalent to 40 per cent of total per bale costs. The next largest component of total costs was incurred in the wool shed - 35 per cent of total costs in all. Warehousing, sale preparation, selling and purchase expenses (all of which contain elements of handling costs) made up the remaining 25 per cent of the total costs of getting wool from the sheep's backs to the mill gate.

CHAPTER 4. ECONOMIES WITHIN THE EXISTING WOOL MARKETING SYSTEM

Introduction: This chapter discusses the scope for economising on the transport and handling of wool, given the continuation of the existing marketing system. Much of the discussion would remain relevant in the event of a radical change in the marketing system but economies which could be attained only with such a change are left for discussion to Chapter 5.

The discussion in this chapter is concerned both with economies attainable through improved efficiency of operations and with economies arising from the arrangement of reduced charges for existing sections of the transport task, especially the line-haul from farm to broker's store and from the seaboard to the overseas mill.

The chapter looks at the scope for economies under six main headings -

The Wool Shed
Transport from Farm to Broker's Store
Warehousing and Preparation for Sale
Selling and Purchasing
Broker's Store to Ship's Side
Shipment Overseas

Each section is supported by an annex (Annexes C to H). A bibliography on innovations and technological developments relevant to wool handling and transport is included in Annex J.

THE WOOL SHED

General Considerations: Wool shed operations, in so far as they affect handling costs or subsequent transport costs, are dealt with in detail in Annex C. The main points made in that annex are summarised below.

Activities within the shearing shed are governed by the physical characteristics of the shed and by the restraints imposed on the grower and the shearing team by the determinations

made under Industrial Awards. They are constrained also by the difficulties of attracting suitable labour.

The way in which wool is dealt with in the wool shed influences subsequent transport and handling costs. The essential elements in wool shed operations are shearing the sheep, classing the wool and pressing it into bales. It appears that opportunities to reduce costs in an efficiently run wool shed using current best practice techniques may be modest. However, not all sheds comply with current best practice techniques. As long ago as 1951 it was pointed out that:

> the value of wool in all grades is reduced by the presence of dust, brands, unevenly shorn wool, second cuts or skin pieces, by inexpert piece-picking, over-classing and inefficiencies in classing and by faults in baling and presentation. All of these (inefficiencies) occur or arise during 'handling' (in the shed) in one form or another. (1)

There have been improvements since but demand for many clips continues to be adversely affected by practices such as those referred to. For example, studies of shearing shed designs and operations in 1969 and 1970 by the National Materials Handling Bureau show that sheep yarding, shearer movements, wool handling and bale pressing operations in many wool sheds could be done more efficiently. Greater efficiency could produce savings, not only in the shed, but subsequently through higher net realisations and warehousing, selling and shipping economies.

In brief, the way in which wool is prepared in bales to leave the wool shed will influence growers' net returns. The

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(1) Ministry of National Development, Division of Industrial Development, Materials Handling in the Wool Industry, 1951 p. 20 (Basic Working Document for the Materials Handling Testing Station).

conclusion follows that close attention to wool shed activities, and their implications later on, is necessary. It may be that, in sheds run using current best practice techniques, there is not much scope for effecting economies. Nonetheless, any reduction in costs would be helpful, especially as wool shed costs comprise about one-third of the total cost of getting wool from the sheep's backs to the overseas mill gate.

There is also the question of improvements in best practice techniques. Answers which are frequently suggested include the introduction of faster shearing machinery, the classing of wool into fewer lines, the packing of wool in bales to greater density and better lay-out of sheds. Where improvements require capital outlays the further question of whether there are net benefits to be gained from their introduction arises. Here a cautious and, in the current circumstances of the industry, perhaps even a sceptical attitude seems warranted, but this should not lead to neglect of the issue altogether. Some of the ways of improving techniques which merit consideration are discussed below.

Shearing. The B.T.E. is not competent to assess the scope for economies in shearing. However, research and investigations carried out in a number of places suggest that significant gains in labour productivity in shearing could only be made if there were marked changes in the way shearing is organised:-

1. the use of highly skilled and integrated shearing teams working at large central shearing and packing complexes;
2. the use of mobile sheds, where suitable, fitted out with chain shearing equipment.

The chain shearing concept appears to hold promise as an important innovation capable of mitigating the problem of rising costs of labour. On its own, it would be likely to be viable only in large sheds which currently use six or more

stands. The high capital cost of the equipment required would preclude a widespread introduction, although, it is quite possible that the concept itself could be incorporated into a mobile shearing outfit which would cater for the small grower.

Classing: The way in which wool is classed in the shed affects subsequent handling costs. Recent research into mill requirements suggests that too much time and effort is spent in classing the wool clip into lines, with consequential increases in handling costs later on. If the flock is well bred and homogeneous, there may be economies in simply culling the bellies and heavily stained, cotted and heavily burred pieces in each fleece - that is, current practices of heavy skirting, piece-picking, and other culling from the main fleece wools by the classer and his assistants are of dubious economic value. Elimination of these actions could permit the presser's time and effort to be used more economically and bring about reductions in the overall shearing costs by making some labour intensive activities redundant. The basic requirement would still remain, however, of culling out stained or discoloured fibres.

Pressing: Most wool presses still in use are of the hand-operated single or double box type. Loose wool is gathered from bins in the shearing shed by the armful and carried to the wool press for trampling and pressing. The weight to which a bale can be pressed depends on the yield of the wool it contains and filled bales in practice vary considerably in compression, length and weight. These variations add to transport, storage and handling costs all the way from the shed floor to the mill gate.

If the same amount of wool as is baled and pressed at present were packed in a form occupying only half of the volumetric space, transport facilities (whether rail, road or sea) could be loaded at close to weight capacity. The result would be a lower transport vehicle requirement with a consequential reduction in the real resource cost of transporting wool.

In addition greater use could be made of mechanical handling equipment and standardised loads in the transfer of bales from road to rail to road. Such pallet-sized loads would reduce delays and manhandling costs.

Limitations on the density to which bales can be packed are imposed under existing marketing arrangements which provide for the shed-pressed bale to be opened, appraised, emptied, repacked and re-pressed, reweighed and core sampled and then dumped and unitised.

However, as is argued in detail in Annex C, there are economies to be gained by the grower who can pack his wool more densely up to the ceiling of 450 lb. Heavier bales would result in reduced transport, handling, warehousing and selling costs. There is no question but that a large number of growers could obtain net benefits from packing wool more densely.

TRANSPORT FROM FARM TO BROKER'S STORE

Introduction The movement of wool from farm to brokers' stores is a part of the whole task of getting wool from the sheep's backs to overseas mill gate that has attracted much attention. For example in October 1971 the Australian Wool Board released a 104 page report entitled Wool Transport in Australia, dealing exclusively with this issue. This attention stems not from the absolute magnitude of land transport costs in the total of costs borne by wool - less than $3 a bale out of total costs of some $45 a bale is incurred in respect of domestic land transport - but from the restraints on competition between the competing transport modes.

As is indicated in Chapter 2, the greater part of the line-haul of wool is undertaken by rail. But over 30 per cent of wool goes all the way from farm to broker's store by road and the remainder, of course, goes from farm to railhead by road. The percentage of wool moving predominantly by rail varies markedly from State to State - details are shown in Chapter 2 and Annex A. An important factor limiting freedom of modal

choice is State legislation regulating intrastate distribution of freight between transport modes.(1)

This legislation is also in part responsible for movement of wool interstate, since the interstate transport of wool permits escape from restraints on intrastate modal choice. However, it should be stressed that some interstate movement is to be expected - that is, in some areas the shortest and most direct route is interstate. Nonetheless, much of the wool that flows interstate from New South Wales, at least, clearly flows because of the situation created by the juxtaposition of restraints on intrastate road transport and Section 92 freedom of interstate road transport.

The Australian Wool Board View: There have been several studies of the transport of wool from farm to broker's store(2). The most recent and most important is the already mentioned Australian Wool Board (A.W.B.) publication Wool Transport in Australia.

The A.W.B. report first considers the position from the point of view of the woolgrower. It estimates that in 1969-70 it cost $15.44 million, or $2.80 a bale, to transport Australia's wool clip from farm to store. (Given the degree of estimation, this is close to our estimate of $16.1 million).

The A.W.B. report goes on to argue that if growers sent their wool by the cheapest means currently available the total cost of land transport would fall to $12.96 million, or $2.35 per bale.

Finally, the report argues that if State Governments abandoned restraints on road transport altogether it would be

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(1) Annex D discusses the effect of State legislation on intrastate rail/road modal choice.

(2) See Annex J - Bibliography, under heading 'Transport from Farm to Broker's Store'.

possible to transport the clip from farm to brokers' stores for $8.95 million, or $1.62 per bale.

That is, a potential saving of some $6.5 million is pointed to, of which $2.5 million could be gained if growers currently acted in their own economic interests and another $4.0 million could be saved if State Governments removed competitive restraints on intrastate road transport.

The A.W.B. report underpins the analysis leading to these conclusions with an argument to the effect that it is not only in the woolgrowers interests, but in the community's interest generally, that intrastate road transport should be freed. The argument is explicitly based largely on the writings of Professor H.M. Kolsen(1) and, as these are lengthy and complex, succinct summary is difficult. However, the essence of Professor Kolsen's thesis, as relied on in the A.W.B. report, was put by him as follows in his Submission to the Victorian Land Transport Inquiry:

> An efficient transport system is one in which each mode performs those tasks for which it has inherent advantages. This means that quality of service is an important characteristic. Resource cost will be minimised when the system sells all services at prices which reflect relative real costs. This would result, at least roughly, under conditions of competition, given that the real costs of inputs are also met by each of the transport suppliers.

The theoretical basis for this is that the most efficient allocation of resources within an industry (e.g. transport) is attained if, in each competing enterprise in it (e.g. road, rail), what is termed the price : marginal resource cost ratio is the same. This is a technical term but its meaning is simply that the community would gain from moving resources

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(1) In particular The Economics and Control of Road Rail Competition, 1968 and 'Efficiency and Regulation in Land Transport', Submission to the Victorian Land Transport Inquiry, 1971.

within an industry towards enterprises with the higher ratios. That is, if in one use resources committed costing $100 earn a return of $110 and in another $120 the price : marginal resource cost ratio is higher in the latter and there would be a net gain in shifting resources from the former towards it. Costs here, of course, include costs incurred not only by the enterprise but by the community generally.

This last point leads to an obvious practical issue - in relating price : marginal resource cost in the road transport industry there is the problem that the industry does not pay directly for its permanent way. This is in contrast to railways which do pay for and maintain their permanent ways. On the other hand, the road transport industry does pay a variety of taxes not paid by the railways.

The A.W.B. report, following Professor Kolsen, quotes an estimate of total Commonwealth and State Government taxes on motor vehicle users[1] and relates them to total road expenditures. The figures, in respect of the latest year for which a calculation was made (1967-68), are:-

Total taxes	$899 million
Total expenditures	$572 million
Expenditure as a percentage of taxes	64 per cent.

From this, the A.W.B. report, still drawing on Professor Kolsen, concludes:-

> As it is clear that road users are net contributers to public funds, more sophisticated proponents of regulations maintain that certain classes of road users (particularly heavy vehicles) do not pay enough. The argument generally takes the form that

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(1) Including taxes on motor spirit, automotive diesel fuel, customs duties on motor spirit and parts, sales tax on motor vehicles and parts and taxes on ownership and operation of motor vehicles. Also included are local government rates for road purposes.

> the cost of heavy vehicle damage to roads is greater than the revenue obtained from this class of road user.
>
> Little quantitative data is available on this point. Although heavy vehicles may contribute proportionally less in revenue than in costs, the revenue from the total transport sector greatly exceeds the expenditure on that sector, and it is, therefore, likely that payments by heavy vehicle operators exceed the expenditure specifically made necessary by their use of the roads.(1)

The conclusion then follows that a closer equivalence of the price : marginal resource cost ratio within land transport would be obtained if competitive restraints on road transport were lifted.

What appears above is a brief summary of the whole thesis. It has not been gone into in more detail because the basic theoretical argument is, in general[2], unexceptionable. Issue is taken, however, on a question of fact - do the tax payments made by the road transport industry in the course of buying and operating motor vehicles more than cover the costs which may be imputed to it for use of roads?

Before commenting on this, however, it is proper to note that the conclusions of the A.W.B. report have been challenged by a number of the railway authorities. Some of the comments made are quoted in Annex D, Appendix 2.

Road Hauliers - Taxes and Road Track Costs: The first point to be made is that of the quoted $899 million collected in taxation in 1967-68, $202 million is in respect of local government rates for road purposes. These are not properly regarded as a tax on the road transport sector even though they are spent on roads.

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(1) Australian Wool Board, Wool Transport in Australia. August 1971, p.51.

(2) The theory supporting the equivalence of the P : MRC ratio is, strictly speaking, correct only to the extent that the price elasticity of demand for services of competing resources are similar. This is probably roughly true in respect of that demand for road and rail transport which is affected by restraints on road transport. (The strict rule is that optimisation of resource usage requires that each price should exceed its related marginal resource cost in inverse proportion to its demand elasticity).

The tax base is land, not motor vehicle ownership and operation. Hence taxes on the road transport sector in 1967-68 totalled $697 million, not $899 million. Expenditure in relation to taxation was 82 per cent, not 64 per cent. This greatly weakens the plausibility of the A.W.B. conclusion quoted on pages 28 and 29.

The additional question could be asked why it is proper to impute taxes such as sales tax and motor spirit excise to road expenditure. There is, in fact, no legal or ear-marking relationship. However, in the purely notional calculation of resource costs it is correct to disregard taxation payments. It is where the tax falls and not how it is spent which is relevant - but it is not possible to have it both ways and include taxes spent on roads, though not collected on the basis of road use, and also taxes not spent on roads though collected on the basis of road use.

We turn now to the main point - the road expenditure responsibility and taxation liabilities of heavy vehicles.

There are no conclusive research results pointing to the extent to which taxes paid by the road transport industry in the course of buying and operating heavy vehicles cover road expenditures incurred by the community as a result of their operations. Having said that, however, it can be said that the deduction[1] that road hauliers fully pay, through taxation, for the roads they use, cannot be made validly on the basis of figures of <u>total</u> road expenditure and <u>total</u> taxes paid in respect of all vehicles.

There is first the question of a significant omission on the road costs side. The costs, to the community, of vehicles using roads, include not only construction and maintenance of the roads themselves, but also the costs of police, some

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(1) As in the final sentence of the quotation on page 29 above.

traffic controls, pollution and accidents. The last. in particular, could add considerably to the total cost of having freight carried by road rather than rail. For example, a recently published intensive study of the cost of accidents[1] concluded that the social cost of accidents in the nation in 1969-70 could have been of the order of $700 million - equivalent to more than the total of all road expenditures in that year. This estimate is based on a small sample (The Australian Capital Territory) and is heavily qualified by the authors. It is certainly not used here to suggest a 'correct' figure. But it is certainly correct to say that the community bears heavy costs. running into hundreds of millions of dollars annually, as a result of road accidents and that they are relevant in any calculation of the 'marginal resource cost of using the roads. Of course, vehicle owners themselves pay a considerable part of the cost of accidents through insurance but there remains a community cost in the form of subsidised medical and hospital services. social service payments and the intangible costs caused by personal injury and death in road accidents.

The B.T.E. is commencing some quantitative studies in this area but at this stage it is possible only to say that the cost figures quoted in the A.W.B. report are, because of the omission of costs associated with road usage but not directly reflected in road expenditure figures, too low by a significant margin.

There is a further important point While some plausibility may seem to attach to the earlier quoted deduction that a margin between total road expenditure and total taxes paid by road users of 64 : 100 (or. as argued here, 82 100) is sufficient to remove the possibility that some classes of road users may not pay enough. the proposition is not. on examination, self-evidently valid.

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(1) P.N. Troy and N.G. Butlin, The Cost Of Collisions, 1971, p. 15.

The first point to make is that heavy vehicles do add disproportionately to road expenditures, both as regards construction and maintenance. The assessment of the cost responsibility for road expenditures of various classes of vehicles is complicated greatly by problems relating to engineering standards, construction methods, vehicle size, average miles done per vehicle, number of vehicles using the road, etc. Apart from difficulties in obtaining needed engineering data there are conceptual problems relating to the way cost responsibility for roads should be allocated to various classes of vehicles. Attempts have been made to assess the cost responsibilities of heavy vehicles in other countries but no consensus has emerged as to what they are. Work has been done on the subject in Australia but no results have as yet been published.

A United Kingdom Ministry of Transport White Paper, Road Track Costs, published in 1968, concluded that in that country heavy goods vehicles caused road expenditures about $4\frac{1}{2}$ times greater than the average vehicle on the road and more than 6 times greater than the average private car. Greater differences have been suggested in some United States studies. However, the literature on the subject is notable mainly for debate and disagreement[1] and it is not possible at this stage to cite an acceptable rule of thumb for imputing road cost responsibility to heavy vehicles. This is particularly the case because no satisfactory up-to-date data are available on the relative mileage travelled by heavy vehicles and all other vehicles in Australia. It is assumed here that average mileage of the former is twice that of the latter - this assumption is based

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(1) See, for example, a general survey of the state of the art: Study and Research on Road Technique and the Economy of Infrastructures, International Road Transport Union, Geneva. This study contains, in Appendix 1, a study on road track costs in the German Federal Republic in 1964 which concluded: 'The share of infrastructure expenses due to heavy traffic ... works out ... somewhere between 24.79 per cent and 29.79 per cent'.

on a crude extrapolation of the results of the Commonwealth Statistician's 1963 Motor Vehicle Usage survey[1]. If anything, this assumption is conservative.

The United Kingdom study cited above defined heavy vehicles as goods vehicles exceeding 30 cwt unladen weight. For our purposes heavy vehicles are taken in this report to be vehicles with carrying capacity of more than four tons - a more relevant minimum in respect of long-haul freight movement. For illustrative purposes, here, let it be assumed that, in Australian conditions, each heavy vehicle has a cost responsibility for road expenditure 10 times greater (or 5 times greater per mile) than the average vehicle on the road. This assumption is broadly consistent with the United Kingdom estimate (remembering that in that study 'heavy vehicles' are a good deal lighter and that road cost responsibility in general rises much faster than the carrying capacity of the vehicles[2]) but further work is required before it, or any alternative assumption, can be used with conviction.

But purely to illustrate the possibilities of having total taxes paid by road users greatly exceeding road expenditures while total taxes paid in respect of heavy vehicles fall short of road expenditures, consider the following sums. If heavy vehicles do contribute 10 times as much as the average vehicle to road costs, some 24 per cent of road expenditure in Australia can be imputed to the 3 per cent of the vehicle population which comes into the over 4 ton carrying capacity category. In 1969-70

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(1) Commonwealth Bureau of Census and Statistics, Survey of Motor Vehicle Usage, 1963, p. 5 (Ref. 14.4)

(2) The United Kingdom White Paper Road Track Costs, page 113, contains tentative estimates of the per mile road maintenance costs attributable to vehicles of various unladen weights within the heavy goods vehicle class. The estimates are tentative because of the problems of estimation. They show that the per mile road maintenance costs attributable to vehicles of unladen weight in excess of 8 tons exceed those of vehicles at the low end of the heavy vehicle scale (i.e. of $1\frac{1}{2}$-2 tons unladen weight) by from 7 to 15 times and the possibility is not ruled out that the extent of the excess could be higher.

24 per cent of total road expenditures, including land acquisition, equalled $163 million.

Available data do not permit an exact estimate of how much taxation would have been payable in respect of heavy vehicles in 1969-70. Our estimate, which is set out in detail in Annex D, is that the net tax payable was $141 million. This total includes an allowance for taxes which would have been payable had all vehicles with carrying capacity in excess of four tons, including governmental vehicles[1] and vehicles enjoying concessional rates, been subjected to taxation on the same basis as privately-owned vehicles.[2]

That is, on the illustrative assumptions set out in the preceding paragraphs, there was in 1969-70 a moderate shortfall of taxes paid for the purchase and operation of heavy vehicles in relation to their cost responsibility for roads. That calculation takes no account of the community-borne costs of police, some traffic controls. accidents and pollution.

Having got to this point, it should be stressed that the calculations are illustrative only of a possibility. Further quantitative work is needed - in particular on the calculation of the extent to which the road cost responsibility of heavy vehicles exceeds that of all vehicles. The B.T.E. is commencing a study in this area but overseas experience suggests that it will be difficult to arrive at an estimate which can be conclusively demonstrated to be valid.

Nonetheless, pending further work or evidence, it cannot be concluded that heavy road vehicles have been covering, or even nearly covering, their full road track costs including the police, accident and pollution costs which can be imputed to them. It follows that it is not evident that the desired equivalence of the

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(1) Excluding vehicles of the armed forces.

(2) The estimate does not include any provision for road maintenance or co-ordination taxes and fees not actually paid and thus is, in that respect, an underestimate. However, in certain other respects, the method of estimation was generous in imputing taxation payable - see in particular pages 1-2 of Annex D, Appendix 3.

price : marginal resource cost ratio in road and rail transport would be attained by letting market prices determine modal choice free of any restraints.

Savings to Woolgrowers from Removal of Restraints: Whether or not the community benefits, however, woolgrowers would benefit from a lifting of competitive restraints on road transport of wool[1]. Any added road costs would fall, not on them, but on the community generally.

It can be questioned, however, whether the savings would be as large as the $6.5 million cited in the A.W.B. report. First, some $2.5 million of this is available to growers now and to the extent that they are not taking advantage of cheaper transport routes there must be offsetting benefits (e.g. relationships with brokers, concessional rail charges to farmers who may need to use rail in times of drought, etc.).

As to the remaining $4 million, the calculation is based on road freight charges which it is estimated would be quoted if all restraints on road transport were lifted. These estimates assume reasonable backloading would be available. No allowance is made for the effect on road freight charges of longer waits at stores if more road vehicles were arriving. Nor is allowance made for the costs to the road transport industry of increased road congestion - but congestion would increase if there were a marked swing towards road transport. It is probable that, in fact, road freight charges would not on average be as low as assumed because on balance the optimistic end of the range of possibilities seems to have been selected. Nonetheless, as stated, woolgrowers would enjoy some reduction in costs.

Moreover, some gains to woolgrowers could be expected from the railways' reactions. Rail charges for the transport of wool in some States could well be reduced if competition from road hauliers were permitted to intensify.

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(1) The argument dealt with in earlier pages is essentially an argument for lifting of restraint on road transport per se.

Charges and Costs on Rail and Road: In considering the question of minimising resources used in carrying out the transport task, this point merits elaboration.

Railways typically have long-run marginal costs running well below average costs due to the existence of long lived indivisible assets such as track, tunnels, earthworks, and stations. There is a considerable body of contentious literature on this aspect of railway economics, much of it concerned with pricing policy in relation to costs. However, the only point it is necessary to make here is that it is worthwhile for railways to take on any business at least covering long-run marginal cost even though, if all business were taken on that basis, large losses would inevitably result. Because of the latter qualification railways tend, where the market permits, to charge rates well above long-run marginal cost in order to help cover fixed costs.

This is sometimes interpreted as some users subsidising others - however, such an interpretation overlooks the point that the railways would be in a poorer position to maintain services to all users if those users paying only a little above long-run marginal cost were driven out of the system by increases in charges.(1)

The possibilities of flexible rate setting in relation to costs can be seen clearly in the Victorian Railway's freight charges for wool. As would be expected, charges vary from location to location but the variation is not in inverse relation to proximity to destination (mainly Melbourne) but in inverse relation to proximity to economic interstate routes. Thus with some exceptions, particularly in the south-east of the State, charges tend to fall as the distance from Melbourne increases.

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(1) None of this is to deny the possibility of excessive profits being made on some freight tasks or the charging of some users at less than long-run marginal cost.

In other words, where the traffic can only be obtained by cutting charges down towards but not below what is conceived to be marginal cost it is financially logical to do this. Where the traffic is 'captive' (that is, alternatives are restricted or uneconomic) charges are set so as to permit a contribution to overheads.

It should be mentioned at this point, however, that although a great deal of useful information relating to the carriage of wool by railways has been obtained, the B.T.E. has not been able to obtain any useful data on the costs (however defined) of transporting wool on the State railway systems. It seems, however, that in the case of Victorian lines, at least, it has been considered worthwhile to carry wool for close to 200 miles for as low as $1 a bale.

There is little doubt, therefore, that in general wool is a fairly profitable commodity for railways to carry - 'profitable' here meaning that revenue from wool makes a useful contribution towards meeting fixed costs.

If railways were subjected to greater road competition, it would be rational economic behaviour on their part to reduce charges closer to long-run marginal costs in order to keep their wool traffic. But it should be stressed that in such circumstances railway deficits would rise, though by less than if the wool traffic were not kept at all.

In brief, railways have a good deal of flexibility in rate setting and are probably in a position to exercise it should more competition from road hauliers be permitted. For example, since road transport has been freed of restrictions in South Australia the railways have endeavoured to meet increased road competition by quoting special (lower) rates.

Road transport operators, however, do not have this flexibility. Because they have little in the way of fixed and large indivisible assets, road hauliers' long run marginal

costs would be little different from their average costs[1]. It would not pay to charge below long-run marginal cost and freedom to charge much above average cost is limited by competition[2].

The Road/Rail Balance Sheet: Freeing road transport to compete with rail would in all probability, therefore, result in some shift of traffic to road in the relevant States and in some reduction in the railways' rates so as to attract and retain traffic. The net effect would almost certainly be an increase in the proportion of wool moving by road as happened in South Australia following the removal of restrictions. From the user's viewpoint this would be a desirable development. However the other side of the ledger would contain added community costs in respect of increased road usage and increased railway deficits.

This issue is thus a large one, transcending in importance the potential savings of up to several million dollars for woolgrowers. Essentially what is involved is the place of road and rail in national transport systems - a matter running far beyond the bounds of the subject matter of this report

The key point to be emphasised is that although generally speaking, the free operation of the market can be expected to lead to a better economic result than a system of restraints or rationing, there can be exceptions. The different ways in which the road and rail infrastructures are financed leads to the possibility of the unrestricted operation of the market actually distorting resource usage. It does not follow, of course, that restraints on competition currently imposed

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(1) They would be more comparable with railways if they directly paid for and owned their permanent way, the road system

(2) Due to the ease of entry and the flexibility of the equipment employed the road transport industry is very competitive.

in most States actually lead to an optimum resource usage - indeed, this seems very unlikely - but, as noted earlier, judgments on this require to be based on detailed analysis of the place of road and rail in the whole transport system.(1)

Prospects for Improving Efficiency of Rail Transport: Reductions in costs (as distinct from charges) of transporting wool by rail could be obtained if the number of pick-up points were reduced. At present, the number of railheads where fewer than 100 bales are picked up vary from 12 per cent in Western Australia to 57 per cent in South Australia. It seems likely that the use of consolidation stations would both reduce the per mile cost of the road haul from farm and would offer, also, economies to the railways. These would take the form of reduced delays in hauling wool and better utilisation of wagons. The New South Wales Department of Railways has made arrangements with road hauliers in some areas to carry out this service.

Worthy of consideration also is the use of detachable freight trays(2) in the road/rail/road haul. These trays are an open type container/pallet fitted with side and end gates, similar to a fixed tray of a semi-trailer. They can be loaded onto a road or rail vehicle. The tray can be taken to a property for loading in the normal manner, transferred from road to rail and again transferred to road at the rail destination. The use of these trays could reduce loading and unloading costs.

Finally, if changes in the way wool is marketed led to a system of regional centres such as is discussed in Chapter 5, the economics of road and rail haulage would be affected. The

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(1) The Victorian Government in 1970 instituted a Board of Inquiry into Land Transport in Victoria. The report of the Board is expected to be presented shortly.

(2) Commonwealth Railways use these trays at present.

prospect of regular high volume line-hauls of wool to port would permit better utilisation of rail's economies of scale. The typical system would involve road transport to the regional centre and rail transport from there to port. This point is developed further in Chapter 5.

WAREHOUSING AND PREPARATION FOR SALE

General: Diagrams D3 and D3(a) in Annex B depict the interrelationships between bale handling activities in a wool store and the cost of sale preparation. In particular, the diagrams throw light on the extent to which the Broker, acting as the Grower's agent, continually manhandles the 300 lb bales.

Prospects for effecting significant economies in sale preparation activities appear to hinge on moves towards bulk handling procedures, bulk classing of wool into lots of at least 3,000 kg and the acceptance of large bales as a sale unit.

Sale Agents: Brokers' profits from wool handling come from acting as agents for growers in warehousing, preparing wool for sale and arranging for buyers to purchase the wools which he requires. The broker's ability to obtain economies of scale in manhandling wool bales considerably influences his earnings per bale.

The opportunity for reducing unit handling costs in wool stores by the use of fork lift trucks and sophisticated automatic weighing, sorting and movement equipment is generally restricted by the lack of suitable floor space to optimise the circular flow of bales, coupled with union demarcation arrangements. Inner city site locations, labour difficulties and the practice of hand-trucking of bales to chutes and elevators have accelerated warehousing costs and inhibited the adoption of appropriate and modern materials handling flow procedures.

The optimum efficiency situation may be location of single storied wool stores at decentralised centres, in close proximity to rail and road transport facilities. In such locations land and buildings are cheaper the labour force is stable and

hard-working and the hardstanding single level floors of such stores facilitate the use of alleyways wide enough to accept wool trucks, fork lift trucks and other items of equipment designed to reduce manhandling of bales. However, final judgment on this depends on many other matters, not least the way in which the marketing system changes.

Bulk Handling: Research and investigations into bulk handling methods for wool include examination of the use of idle plant and equipment of the cotton industry. Experiments in these areas have covered such things as grading and classing at decentralised handling and packing sheds, the use of large hydraulic presses and pressing wool into large bales of up to 1,000 lb.

The concept behind these innovations is development of an acceptable and much larger sale unit than the conventional 300 lb bale[1]. Research to date points to the advantage of adopting broader classing lines for wools of homogeneous physical characteristics by bulk mechanical handling procedures in decentralised handling and packing sheds.

Bulk Classing: There appears to be considerable evidence to support, even within the existing marketing system, a move away from traditional classing into numerous lines towards a system of broad classing of wool within individual clips.

The objective of such changes in classing would be to increase lot sizes offered for sale without jeopardising the value of the wool at the processing stage. Skirted fleeces, uniformly classed into broad lines at large packing complexes, could facilitate the use of a conveyor system of bulk handling of wool and put an end to the problem of small lot sales.

Sale preparation activities involving the interlotting of 2 and 3 bale lots, blending, reclassing and resorting of wools,

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(1) As noted earlier, economies would in any case be realised if growers themselves produced heavier bales up to the 450 lb ceiling.

seem to be aimed at increasing the gross realisations on all the bales in a particular clip. However, in the present market circumstances the cost of these actions may not be covered by the increase in auction price paid for the lot.

Larger Bales: With acceptance of bulk handling and classing of wool the industry would be enabled to take advantage of cost savings in handling and transport inherent in large bale units of up to 3,000 lb.

According to the National Materials Handling Bureau the preferred bale weight for minimising transport and handling costs for wool is 1,400 kg (3,086 lb) although even larger parcels could be put together. There are various ways of doing that - see, for example, the discussion in Annex G of high density pressing of 5 bale units - but the key point is that wool packages of the future should be put together with an eye to compatibility with transport and handling media.

SELLING AND PURCHASING

General: The Case Study considered in Annex B showed that considerable handling and selling preparation activities are necessary before wool is finally sold (see discussion in Annex B, pages B7 to B14).

In Annex F, innovations and technological developments applicable to selling and purchasing are detailed in the context of prospects for changed procedures which may reduce consequential handling and transport costs for wool.

In this connection, it is important to appreciate that declining wool sale realisations add to the need for the wool industry to seek out new sales procedures involving the offer to wool buyers of homogeneous wools in large packs with adequate catalogue descriptions.

Selling: It is the growers who bear at least the greater part of selling costs. They pay either directly in commission, freight charges and warehousing, or indirectly through the prices they

receive for wool offered; that is, buyers lower their bidding limit to offset service costs they incur in purchasing wool on commission for overseas mill clients[1]. The magnitude of these purchasing expenses was considered in detail in Annex B, pages B14 to B22.

A basic problem in selling is that the sale unit is of limited size and sales procedures are geared to identifying a particular line with an individual grower. The effect of these procedures on transport and handling costs is significant, as Annex B indicates.

Use of scientific measures of the physical characteristics of wool would enable larger sale lots to be assembled and offered to the buying trade. If this change could be successfully effected the industry could expect reduced transport and handling charges for wool purchases, simply because larger parcels of more homogeneous wools would be available to buyers for consignment to the mills.

The key to development of improved sale and consignment procedures is objective measurement and selling by sample and description. These particular innovations are discussed in more detail in Chapter 5.

Pre-Sale Testing: The present scheme of core testing is aimed at verifying purchases with the specifications contained in the order from the mill client. Actions taken to verify assembled mill lots through the use of core testing by an independent

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(1) These practices conform with economic theory. The price elasticity of demand for Australian wool is high and the price elasticity of supply of Australian wool is low. In such circumstances the supplier tends to reap the benefit/incur the costs of favourable/unfavourable developments in prices or costs. It should be added, however, that in the particular circumstances of 1970-71, in which woolgrowers are receiving deficiency payments in respect of wool sold, the 'passing on' of cost increases or decreases initially paid by buyers or mills will be to the benefit of the Budget rather than the woolgrower. However, as the deficiency payment scheme is to run for one year only this point has been ignored in this report.

authority can be very costly - e.g. $2.95 per bale in the case study in Annex B.

Wool buyers could lower their purchase risks, and simplify the purchase of wool to meet specific orders, if the same core testing procedures were effected before the sale. This, however, would require a change in the existing sale arrangements.

New Forms of Sale Transaction: Scientific measurement and sale by sample and description could permit a breaking of the nexus between location of sale and the physical presence of the bales on offer. In that event the wool could be disposed of through new and more efficient selling procedures.

These procedures might include changes in the timing of the sale, changes in the methods of sale and changes in the instruments of sale. Through such innovations the industry should be enabled to take advantage of cheaper storage costs in regional centres. The assembly of large units into larger transport packages to, say, not less than 3,000 kg, should result in reduced consignment expenses for the buyer. (This aspect is discussed in more detail in Annex G).

New sale procedures, which could be adopted by the industry as alternatives to the auction system, include direct selling from stocks held by the buyer or the broker, sales from stocks held in an overseas location, use of forward contracts and credit sales, and sale offers at various stages in the wool processing chain.

Trends in Wool-Buying Operations: The principal method of wool buying at present is commission buying. However, with the use of core testing procedures the buying trend is now towards increased purchases on firm offer, with uncommitted purchasing by the wool buyer becoming increasingly less important.

Private Buyers: These activities are increasing, though on a fairly modest scale. The operations of many private buyers are efficient, based as they are on mill-orientated classing standards

in order to develop large scale lots of wools which are homogeneous and correctly graded with respect to yield potential. Private buyers benefit from lower sale preparation and warehousing costs in decentralised locations and handling cost savings arising from the consolidation of wool loads into more economic transport parcels. Added to these efficient operations is a large measure of business acumen, on the part of many private buyers, in dealing with growers and mill clients.

Buyer's Profits: Returns to buyers per bale account for only a small fraction of the sale price of a bale. Thus buyer's profits seem to depend to a large extent on economies of scale flowing from large throughputs each year.

Sale Lots: A change from the traditional 6 to 8 bale lots to 25 to 100 bale lots would mitigate considerably the warehousing, sale preparation and selling expenses borne by the grower, and the purchase and consignment expenses required to be built into the price bid at auction by the buyer. A reduction in marketing costs per sale unit would enable higher prices to be offered, simply because the risks inherent in failure to meet mill specifications for a lot in respect to yield and fibre diameter would be reduced.

BROKER'S STORE TO SHIP'S SIDE

General: Past investigations into the consignment of wool bales to overseas ports have pointed out that, because of rising freight rates, there was a need for a new approach to sorting, dumping and loading wool bales on board ships in Australian ports. Indeed, in 1967 Sir William Gunn expressed the view that the wool industry would seek complete control over the packaging and physical distribution of its product in order to have wool handling charges reduced(1).

The Yennora concept was specifically developed in

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(1) Departments of Trade and Industry, and Primary Industry,

order to take advantage of the superior control and cost savings made possible by organised handling and movement of bulk cargo items such as wool bales. Unfortunately, the optimum bale flows associated with the wool village concept are yet to be achieved.

More detailed comments on this and other matters associated with the movement of wool from broker's store to ship's side appear in Annex G.

Wool Bale Consignment: The case study in Annex B illustrated the multiplicity of actions required to consign wool bales to an overseas mill client (see Annex B, pages B22 to B26 and Diagrams D.6 and D.7).

There are no less than twelve separate charges raised against each bale in every mill lot consigned by a buyer to an overseas port. However, a reduction in unit consignment costs by shipment of larger parcels of wool may have to wait on a change in the marketing arrangements with respect to larger sale lots.

Dumping: Savings in wool shipment costs could be achieved by high density dumping and unitising of individual bales since there are economies arising from increased payloads available to shipping interests obtaining high density cargo. The use of dumped bales, in association with unitising and I.S.O. containers, presents possibilities for substantial savings on freight costs for wool transport overseas. However, the increased use of large wool packages in the future will depend to a great extent on the cost of making up mill lots by the wool buyers and the acceptance by overseas textile mills of high density dumped wool.

Development of Handling in Ships: The most logical means of speeding up ship turnaround in ports is through innovations and technological developments which are based on terminal and port facilities and vessels capable of handling bulk or unitised cargoes.

Most of Australia's wool exports are now carried by some type of container ship but it will be shown in the following

section that modern bulk carriers are a realistic alternative. In either case, consignment procedures should be modified to ensure that these new facilities are used to advantage. This would be best achieved by a detailed consideration of wool packaging, transit times, probabilities of transit delays, the economics of storage and the accumulation of stockpiles at areas overseas, and despatch of wool bales in larger parcels than the traditional 300 lb bale.

SHIPMENT OVERSEAS *

Introduction: The earlier sections of this chapter have led up to the ship's side and in doing so have commented on handling matters that are closely related to the type of shipping service required for wool. Here we are concerned primarily with the sea leg and the charge for it - a charge which is only about one-half of the Conventional Freight Rate, the remainder of that rate being for land-based operations. In this context, the type of service is again considered, but in terms of economy of ship operation.

Most of Australia's wool exports are carried in ships belonging to member lines of various shipping conferences. These are 'outward' (with respect to Australia) conferences, being distinct entities from the corresponding conferences of shipping lines carrying cargo to Australia. Despite this technical distinction, however, the membership of an outward conference is essentially the same as the membership of the corresponding inward conference and in some instances they share the same administrative staff.(1) In the case of the Australia/Europe Shipping Conference, most of the corresponding southbound traffic is carried by two conferences, the Outward Continent/Australia Conference and the U.K.-Australia Conference, all three having the same London address. This close relationship between northbound and southbound conferences is stressed because it is fundamental to our discussion of freight rates.

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(1) See Croner's World Directory of Freight Conferences.

* In conformity with shipping practice, all money values in this section are given in United States dollars (at the exchange rates prevailing prior to August 1971).

The other conference of great significance for Australia's wool exports is the Australia Northbound Shipping Conference which takes in Japan as well as a number of other East Asian countries. Other conferences of lesser importance for wool exports are the Australia/U.S. Atlantic and Gulf Conference, the Australia, New Zealand and South Sea Islands Pacific Coast Conference, and the two conferences to East and West India.

Europe and the U.S.S.R. together take about half of all Australia's wool exports (see Table 7 in Annex A) and, consequently, our treatment concentrates on the Australia/ Europe Shipping Conference. Because of its importance, this conference has attracted most of the attention in discussions of freight rates and alternative shipping possibilities for wool. In contrast, the Australia Northbound Shipping Conference has attracted much less attention even though Japan takes two-thirds as much wool as the whole of Europe and the U.S.S.R. (Table 7, Annex A).

The discussion in this part of the report differs from most of the other parts in that it has less to say about technical economies and more about the economics of rate formation. It shares with the earlier section of this chapter, concerned with rail and road haulage, the emphasis on pricing when the carrier has large fixed costs to cover. It will be stressed that the economic relationships are such that there is no way of finding a 'correct' freight rate for wool by some calculation of an accounting nature. However, there are upper and lower limits to a rationally determined freight rate and within these limits there is some latitude for negotiation and manoeuvre.

One of the major points to be made is that wool cannot be treated alone. Rarely in the liner shipping world is a service based on one commodity with no backloading, and yet it is only in this simple case that the freight rate for a single commodity can be directly related to costs. In the normal case there is at least one other commodity being carried (on the

return leg) and it is usual for many commodities to be carried on each leg of the voyage. The shipowner's costs must be shared among all these commodities.

One good reason for making a re-assessment of shipping arrangements and freight rates at the present time is that several new ship technologies have been introduced in recent years. It would be a mistake to be unduly influenced by the early disappointments when the container service failed to live up to excessively optimistic forecasts. There have even been suggestions of reverting entirely to conventional shipping for the carriage of wool; this would be turning the clock back at a time when there is little doubt that most conventional ships will eventually be displaced by container vessels, bulk ships and roll-on roll-off vessels. It is to the container and bulk ships that attention will be given in this discussion and some tentative figures will be offered on the potential operations of bulk ships as an alternative to existing conference services.

The Determination of Conference Freight Rates: The very existence of a shipping conference can be taken to indicate that the cost to member lines of providing the service is lower than the cost to outside operators of providing an equivalent service.(1) Otherwise, the low cost outside operators would compete the conference out of existence. Only where traffic is very dense, it has been argued, can competitors offer an equivalent service at lower cost.(2)

Thus, under conditions of moderate traffic density, the conference lines may charge either a little less or substantially less than the potential competitor could charge. Their decisions, if they are rational price discriminators and maximisers, will depend upon the price elasticity of demand for their service. Only when elasticity is high does it pay to set the freight rate substantially below the rate that could be offered by potential competitors.

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(1) Esra Bennathan and A.A. Walters, The Economics of Ocean Freight Rates, 1969, pp.11-14.

(2) The Economics of Ocean Freight Rates, pp.14-16.

As Bennathan and Walters point out, the usual rule-of-thumb approach to this question is to assume that relatively high-valued commodities have an inelastic demand and that relatively low-valued commodities have an elastic demand.(1) For its weight, and even for its volume, wool is a high-valued commodity; consequently, it is charged a freight rate which is higher per pound than the rates for most other export commodities (see following table). Thus, the conferences implicitly treat the demand for transport of wool as inelastic. However, the authors quoted above also note that the rule-of-thumb over-simplifies this elasticity, which depends on a number of factors; value is only one.

COMPARISON OF UNIT VALUES AND FREIGHT RATES, 1969-70

Australian Export Commodities

Commodity	Value U.S. Cents/lb (F.O.B.)	Freight Rate[a] UK/Continent U.S. Cents/lb	Stowage Factor cu ft per ton
Dry Cargoes			
Wool	48.8	3.2	120
Wheat	2.5	0.6	47
Sugar	4.3	0.6	35
Dried Vine Fruit	16.5	1.7	55
Canned Peaches	13.3	1.7	50
Cargoes Requiring Cooling or Refrigeration			
Fresh Apples	5.8	4.0	80
Butter	26.0	3.3	55
Cheese	24.4	3.5	55
Beef & Veal (frozen quarters)	45.3	4.8	120

(a) Includes charges for actual sea freight (F.I.O. rate), loading and unloading.

It is relevant to note that since 1969-70 there has been a large decline in wool prices and it has been this, more than anything else, which has forced attention towards shipping freight rates.

(1) The Economics of Ocean Freight Rates, p. 21, footnote 5.

Price Elasticity of Demand for Sea Transport of Wool: In Annex H, the elasticity of demand for sea transport of wool is calculated from Bennathan and Walter's formula which incorporates the elasticity of supply of wool, the elasticity of final demand for wool, the cost of sea transport and the price of wool at the point of final demand. The resulting elasticity of demand for sea transport is less in absolute magnitude than -0.1. This means that a 10 per cent rise in the freight rate would result in less than a 1 per cent drop in the amount shipped, and even this small drop would take several years to occur.

A further point made clear by using the formula (see Annex H) is that the increases in the elasticity of demand for wool, due to greater substitutability of synthetics, cannot be expected to raise the elasticity of demand for sea transport to a level that would significantly affect pricing policy. Even if the demand elasticity for wool in importing countries were to treble, demand for sea transport of wool would still not be more elastic than -0.1.

Application of the formula shows that the rule-of-thumb approach to pricing gives the right answer largely for the wrong reason. The rule-of-thumb relates to a particular term in the formula; that term is the proportion of the final price of wool at the consuming mill that is contributed by the sea freight. However, the extremely low transport demand elasticity is due much more to the very low elasticity of supply of wool. Roughly speaking, the result follows because most of Australia's wool is exported; because the quantity produced is largely determined by the sheep population and climatic conditions; and because there is not much latitude for substituting domestic consumption for overseas sales of wool.

In summary, there is very good reason for the conference lines to hold the wool freight rate as high as possible. It is rational behaviour. Furthermore, the level of the freight rate does not, in itself, provide grounds for the exporters of a particular commodity to seek a reduction. There are two reasons for this; first, each conference line must seek to make a normal

profit over its entire operation and there is a high proportion of costs common to all goods carried. Secondly, the only thing that limits the freight rate on wool is the rate that potential competitors would carry it for. The latter also relates to the question of common costs, in this case the common costs of the various goods carried by the potential competitors.

The Common Costs Issue: To stay in business, a shipowner must more than cover his total costs in order to make normal profits. A large component of these costs comprises the fixed overheads that are mainly due to the capital cost of vessels; another large component, crew's wages and fuel costs, is more or less fixed while the ship is in operation. Neither of these cost components can be directly associated with a particular commodity carried on a particular leg of a voyage.

Public debate on the common costs issue, as it affects wool, has tended to take the form of arguments on whether this commodity is bearing an unfair proportion of costs as compared with other commodities. This is futile. Because the common costs not associated with any commodity are so large, and must be covered, the conference sets the freight rates in such a way that those commodities able to bear a large share of costs are made to do so and those which can only bear a small share likewise do so. This is largely a matter of competitive alternatives and of the elasticity of demand for shipping services in each case.

Although discussion of this topic has generally centred on the relative shares of shipping costs borne by various agricultural exports, the analysis in terms of elasticity of demand for transport strongly suggests that there is a considerable difference between the shares of common costs carried by agricultural and non-agricultural cargoes. Using the formula, it can be shown that the elasticity of demand for ship services for most agricultural exports is low; consequently, the freight rates can be pushed to the limit just below the level at which they could be carried by competing ships. Some industrial products, by

contrast, have high elasticities of supply and consequently much more elastic demands for shipping services. Similarly, there is a relatively high elasticity of demand for transport of minerals because elasticity of supply is high and, in this case, freight is a large proportion of c.i.f. price. In seeking these cargoes, a conference is likely to offer relatively low freight rates, because the demand for transport is elastic.

The Bargaining Position of Australian Wool Exporters: Even if a single body were to take on the role of monopolistic exporter for the whole of the Australian wool clip, there would be severe constraints on the bargaining strategies to be adopted. The crucial point has already been made that the costs of competing shipowners cannot be expected, in general, to be less than conference costs. However, conference costs are low only for the service offered - one which, amongst other things, provides frequent sailings.(1) The real question in the case of wool is whether such sailing frequency is needed. It may be that a competitor offering a different type of service with a different type of ship and less frequent sailings could satisfy the needs of the wool industry and in this case their costs might be fairly low in relation to the costs of the conference lines.(2)

Should an offer be made by an outside operator to carry wool at a lower freight rate, the position of the conference lines is clear On the assumption that they have acted rationally. taking into account the low elasticity of demand for sea transport of wool, the freight being charged is well above marginal costs Consequently, they have a powerful incentive to make a counter-offer rather than risk the loss of a cargo which makes a very substantial contribution to covering the common costs of vessel operations.

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(1) For example, the Australia to Europe Container Service provides approximately a 5-day sailing frequency and conventional vessels operating within the same conference as AECS provide additional sailings.

(2) Acceptance of such an offer would involve some type of monopoly power to ensure that all wool would be shipped by the non-conference service A precedent exists in the exclusive power conferred on the Australian Meat Board by the Meat Industry Act to act as the agent of the owners of meat in making contracts for its carriage by sea.

On this basis, we can review the events of 1971. First, the Australian Tonnage Committee (representing the Australia-Europe Conference) proposed a general rise in freight rates on the grounds that shipping line costs had risen substantially. Increases in total operating costs undoubtedly had occurred. Although Australian shippers agreed to a 15¾ per cent rise in freight rates for general and refrigerated cargoes, the offer of an 11½ per cent increase for wool was rejected.

Subsequently, it was reported in the press (we understand reliably) that quotations for a 'reasonable and adequate' service had been received by the Australian Wool Board from non-conference shipping lines; one of these offers was reported to be about $US12.75 per bale compared with the existing conference rate of $US14.10 approximately.(1) The outcome was an agreement by the Conference to a standstill in the freight rate on wool.(2) This capitulation indicates the value to the Conference of the wool cargo, corroborating the theoretical conclusion that wool makes a relatively large contribution to covering the common costs of shipping line operations.

The second response of the Conference gives some support to the idea that, to maintain costs substantially below those of competitors, it may be necessary to offer a different type of service. As reported in the Shipbuilding and Shipping Record the Conference has proposed a 'financially suitable shipping service', with some emphasis on smoothing the uneven flow of wool from the farm to the ship.(3) The possible modifications to the service contemplated by the Conference as a means of reducing their costs are indicated in the second paragraph of the report. This is quoted in full as it is understood to be an authoritative account of Conference views at the time:

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(1) Australian Financial Review, 12 July 1971, p.3.

(2) Sydney Morning Herald, 30 July 1971.

(3) Shipbuilding and Shipping Record, 17 September 1971 p.7.

> 'Substantial savings could be made, for instance, with the abolition of the requirement that wool is shipped within 16 days of its sale at auction. Other substantial economies are seen as possibilities if the shipper will forego his right to nominate his ship and sailing date, enabling the cargo to be shipped in the first available vessel. With a container ship sailing every five days, this sacrifice, argue the Lines, would be no hardship. Other savings contemplated by the shipowners, who have the figures to prove that the cost of getting the bale to the ship is comparable with the 12,000 mile sea leg, include the assembling of wool into warehoused dumps to ensure an even flow of cargo to the berth, thus avoiding excessive overtime'.(1)

The reference to assembling wool into warehoused dumps is significant because this would also be necessary if wool were to be shipped by bulk carrier - the basis of the outside offers reported in the press. Obviously, it is reasonable for the Conference to seek for itself this modification in the method of shipping wool if it would be an important element in the cost-cutting arrangements of a non-conference service. In other words, one answer by the Conference is to provide a lower level of service, comparable to that offered by bulk carrier.

The other answer is to match the freight rate offered by the outside carrier; here it is pertinent to ask how low could the offer of a non-conference service go. To find an answer, calculations of hypothetical bulk carrier operations have been made (see Annex H) and their implications are summarised in the following paragraphs.

The Viability of the Bulk Carrier Alternative: The existing Conference service to Europe is very largely provided by container ships so that we are concerned with the capacity of these ships to meet potential competition. The principal performance characteristic of the container ship is its speed of turnround, a characteristic which has become the dominant influence on economy of ship operation.(2) Coupled with this is rapid delivery of consignments. The container itself gives

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(1) Shipbuilding and Shipping Record, 17 September 1971, p.7.

(2) R.P. Goss. 'The Turnround of Cargo Liners and its Effect upon Sea Transport Costs', Journal of Transport Economics and Policy. Vol. 1, No. 1, 1967, pp.75-89.

additional advantages, particularly in forwarding on to mills from ports of discharge. It is also a fact of the Australian trade that there are more full containers moving south than north, so that there are ample containers for the export of wool.

The main potential competitor for the container ship in the wool trade is the modern bulk carrier. The major advantages of such a vessel are low capital cost and relatively low operating costs. It is evident that the reported offer to transport wool by bulk carrier to Europe for $US12.75 was not sufficiently below the conference rate to Europe of $US14.10 to compensate for the somewhat inferior service that would be offered.(1) Otherwise, the exporters would not have remained with the Conference. Thus, the margin of superiority in the service offered by the Conference at that time was worth at least $US1.35, the difference between the two rates. Nonetheless, the important question is whether an offer could be made at an even lower rate.

In Annex H, it is shown that a shipowner who desires a yield or internal rate of return of 12 per cent on the capital invested in the ship (equivalent to a 13 4 per cent capital recovery factor if the actual life of the ship is 20 years) would require a net revenue per day of $US2,900 from a 30,000 ton bulk carrier costing $US7.5 million. It is assumed that no more than 7,000 tons (49 000 bales) of wool would be lifted per voyage, not because of the capacity of the ship but because the shippers would suffer an intolerable delay if a larger consignment had to be accumulated. The only other cargo assumed to be carried is a typical bulk cargo of coal from the east coast of North America to Japan.

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(1) The service could be assumed to be inferior in the following respects:

- Sailings would be less frequent.
- The non-conference operators are an unknown quantity to the wool trade and there is consequential risk involved. This point can be assumed to become less important as more knowledge is gained.
- Financial penalties would probably be involved in any contractual arrangements made outside the conference and in circumstances similar to the second half of 1971 such penalties would be payable.

Under these conditions, the shipowner would achieve the desired rate of return over the whole round voyage at an F.I.O. sea freight rate for wool of $US65 per ton or $US9.30 a bale. To compare this figure with the reported offer of $US12.75 gross, we first substract from the latter the on-shore charges given in Chapter 3 of $US5.40 per bale (when rounded up to account for a few small increases), leaving an F.I.O. sea freight rate of $US7.35 per bale. This is well below the $US9.30 required to cover the costs of the hypothetical bulk carrier.

The reported offer and the hypothetical example can readily be equated, however, if it is assumed that the bulk carrier could also load a moderate quantity of lower value cargo in Australia for delivery to Europe. The calculations in Annex H show that even 5,000 tons of additional cargo at $US20 per ton would enable the bulk carrier to take wool at $US7.55 per bale, ($US53 a ton) - a little above the reported offer - and still make the desired return on capital.

The additional cargo could be of some relatively heavy commodity such as metal or canned fruit. Even with the two types of cargo the total load would only be 12,000 tons in a bulk carrier capable of carrying 30,000 tons.

The significance of obtaining some other cargo than wool goes even further. Should the carrier be able to obtain regular consignments of 10,000 tons of the heavy cargo at the F.I.O. rate of $US20 per ton then he would be able to offer an F.I.O. freight rate for wool at $US39.25 per ton or $US5.61 per bale.

In considering potential freight reductions, it must be recognised that additional costs would be incurred by changing to a bulk carrier service. Had a contract been made in 1971, one substantial cost would have been a penalty for the shortfall in the amount of wool offering for shipment in the six months ending December, 1971. We estimate that the penalty could have amounted to something of the order of $US0.50 per bale when spread over the volume of wool normally carried by the Australia/Europe Shipping Conference.

Summary: The foregoing calculations are sufficient to show that the bulk carrier does offer a real competitive alternative to the conference service and the reality of the threat undoubtedly underlies the recent steps taken by the Australia/Europe Conference to improve the efficiency of wool movement.(1)

If the final outcome is that the Conference retains the wool trade but at an appreciably lower freight rate then the bargaining strategy of the exporter interests, represented by the Australian Wool Board, will have been successful. But, whatever the result, the shippers of some other goods, northbound or southbound, are likely to suffer. Assuming that the Conference retains the wool, it would seek to maintain its normal operating profit by raising freight rates on other goods. Should the Conference lose the wool, on the other hand, it would probably reorganise its service, but in any case a heavier burden would fall on the remaining export and import cargoes.

In plain terms, our discussion has shown that, for strong economic reasons, there is only one approach that offers any reasonable hope of holding down the wool freight rate. This is the approach taken by the Australian Wool Board in finding a viable low cost alternative to the conference service. Other approaches tend to be ineffective because shipowners' costs do rise, they do have to be covered and, in the absence of any alternative, wool is a commodity that will bear a higher freight simply because of the inelasticity of the demand for wool transport overseas.

Although this discussion has dealt with shipping possibilities within the present marketing system, the comments and conclusions are relevant to a changed marketing system. Chapter 5, following, deals with potential changes in the marketing system and their transport implications: there it is shown that our conclusions regarding overseas shipping would tend to be strengthened, if anything, because a radical change in the marketing and handling system could readily be combined with shipping changes.

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(1) The Australian, 28 October 1971

CHAPTER 5 POSSIBLE WOOL MARKETING REFORMS - IMPLICATIONS FOR TRANSPORT AND HANDLING

Introduction: Whereas the discussion in Chapter 4 was limited to economies within the framework of the existing marketing system, this chapter deals with the economies that might be made by changing the system itself. Almost all of these could be achieved by exploiting the potential benefits of objective testing. The changes would be consistent with an acquisition scheme for wool. However, the essential feature would not relate to change of ownership but rather to the ability of a controlling body to determine how wool is to be sold, where it is to be stored, and how it is to be transported after delivery to store.

There are many features of current wool selling practice that foster inefficiency, but one stands out. Under the wool selling regulations, all bales being offered for sale must be stored on the brokers' premises and be available for inspection by the buying trade upon request. This requirement has two effects. First, it means that all bales must be transported to the wool store at the selling centre and handled in store, usually many times. Secondly, it means that the store must be large enough to accommodate every bale being offered for sale. In country areas, the latter is not a very important factor because land is relatively cheap, but in city centres the heavy investment in land and building adds substantially to the cost of selling, particularly in the case of multi-storied stores where logistic problems are accentuated.

All bales are required on the brokers' premises despite the fact that only a proportion of them are displayed for buyer inspection. The reason is that buyers reserve the right to examine all the wool being offered in a lot if they consider that the show bales may not be representative. To eliminate the need to have all bales available, research has been directed to providing an adequate description of all bales of wool by objective testing. If such a description, based on scientific measurement, becomes generally acceptable then the sale and storage functions can be separated.

In fact, processes and transactions in the latter stages of the wool marketing chain - for example the manufacture and sale of wool tops[1] - have for some time been based on scientific tests of fibre properties, namely diameter and length. Similar tests can now be made on greasy wool so that not only can the buyer's needs for an adequate description be met, but information of value for top-making can be obtained earlier. Furthermore, wool valuation based on these objective tests is claimed to be more efficient than the present methods. Research conducted by the Bureau of Agricultural Economics has demonstrated that valuations based on visual and tactile appraisal are more widely distributed around the mean valuation for a given lot than those based on objective measurement.[2]

A brief description of objective measurement is given in Annex I; the implications for the marketing system are considered in the following sections.

Market Changes Based on Objective Measurement: A market based on objective measurement could take a number of different forms. Two changes in current practice have already been tried. Instead of the requirement that a proportion of bales from each lot be displayed, a simplified procedure is to display only a small sample. The Australian Objective Measurement Project has so far conducted six sales on this basis. The most recent trial, held in Sydney in November 1971, involved 1,600 bales of wool.[3] In this sale, a 1 kilogram (2.2 lb) sample from each lot was placed in a bin for buyer assessment (see photograph page 61). Test results for yield and fibre diameter accompanied each sample.

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(1) A top is an untwisted parallel assembly of combed fibres wound on to a special type of spool.

(2) S.A.S. Douglas and G.A. McIntyre, 'A Comparison of Subjective and Objective Estimation of Yield and Fineness of Greasy Wool', Wool Economic Research Report, No. 20, Bureau of Agricultural Economics, 1970.

(3) Sydney Morning Herald, 5 November, 1971.

BUYERS VALUING OBJECTIVELY TESTED SAMPLES OF WOOL
IN AN AUSTRALIAN OBJECTIVE MEASUREMENT PROJECT
TRIAL CONDUCTED AT YENNORA, N.S.W., IN NOVEMBER 1970

Note the form of the display in contrast to the traditional show bale display in the background.

(Photograph by courtesy of The Land Newspaper)

A second variation is the approach adopted by Economic Wool Producers Limited. The first sale by this grower - controlled company was held in September 1971 with 1,645 bales of wool. Small samples of the wool were displayed in offices located in Sydney, Melbourne and Adelaide. This is in contrast to the traditional practice of displaying wool in a single centre. Two other marketing changes adopted by Economic Wool Producers were the introduction of sale by tender instead of the usual progressive bid auction and also the requirement that lot size consist of a minimum of 25 bales(1). The success of the first Economic Wool Producers' sale, in which 94 per cent of the wool was reported to be sold to the trade(2) suggests that buyers are beginning to buy wool on the basis of scientific test results without having access to display bales.

These trial sales are only a beginning and there are even larger economies to be achieved by further adapting the marketing system to objective measurement. The potential economies from divorcing the sale and storage functions are mainly in labour saving, the use of cheaper land for storage, the opportunity to adopt improved plant and equipment for wool handling, and an associated rationalisation in the use of transport facilities, particularly rail and sea.

Perhaps the greatest economies will follow from improved layout of wool stores. Freed from the display functions, a store can be arranged so that there is an unimpeded flow of bales from point of receival to point of despatch, with ready access to stacks. A great deal of labour would be saved by eliminating the need to display a high proportion of the bales. The associated multiple handling would also be eliminated. The layout of the store would permit free use of

(1) In future Economic Wool Producers' sales this is to be reduced to 3,000 kilograms, or about 21 bales.

(2) Australian Financial Review, 30 September 1971.

fork-lift trucks which have often been severely impeded by the design of older wool stores.(1)

This type of improved store layout and the consequent labour economies arising from the separation of the storage and sale functions could be achieved in a near-metropolitan location. However, greater gains could be achieved by so completely separating the sale and storage functions that wool stores would be located close to the production sources while sales would be conducted in the commercial capitals.

The actual location between source and seaboard would be largely a matter of minimising transport costs, which in turn are strongly influenced by density of packing. The higher the density the lower the real cost of transport. Generally speaking, high density packing in the shearing shed is precluded by the cost of the equipment required and also by the need for manhandling in smaller sheds.(2) However, transport and handling costs would be minimised if wool were assembled, compressed and unitised as close as possible to the point of production. This could be achieved by the introduction of regional handling centres.

In Chapter 3 of this report the total cost of marketing a typical bale of wool was shown to be about $47. Of this, over one-half represents transport, handling and storage charges. The main contributing factors to this high cost were the low density of conventionally packed wool, the high overheads of metropolitan storage and the high cost of congestion in such locations. Quality of labour must also be considered, in Chapter 4 it was suggested that in practice the efficiency of country labour compares favourably with the efficiency of city labour. On all of these grounds, the regional centre

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(1) See Annex E.

(2) This does not mean that a moderate increase in average weight of bales, as suggested in Chapter 4, is not feasible.

offers clear advantages. By compressing wool to high density at an early stage, not only would transport costs be minimised but there would be considerable saving in each subsequent handling, whether in store or between transport modes. Another saving would be in the component of overhead costs due to the rental value of the land occupied by the wool store. The cost of a square foot of land used for storage in the country is likely to be a small fraction of that in the city.

Regional Wool Handling Centres: The concept of the regional centre is not new, in that centres such as Goulburn and Albury have been operating successfully for many years. The Bureau of Agricultural Economics has also been investigating the possibility of establishing regional centres to handle wool in a market based on pre-sale objective measurement.

In Annex I an attempt has been made to estimate the cost per bale of handling wool in a regional store. Some of the figuring is necessarily speculative but allowance for a considerable margin of error still leaves the regional store well ahead in terms of cost minimisation.

The results in Annex I indicate that, after an allowance for profit is made, the estimated charge is considerably below the charges at present levied. This not only reflects better location but also the reduction in handling operations under an improved marketing system. With an annual throughput of 250,000 bales, costs would fall from the present $7.18 to $3.82 per traditional bale - a cost saving of $3.36 per bale. The estimated $3.82 charge for the services of the hypothetical regional centre includes dumping and unitising for which, traditionally, an additional charge of about $1.85 is made over and above the normal wool store charge. A throughput of 250,000 bales is estimated to be close to the optimum in terms of operating cost per bale, given the best plant available for this purpose. However, if the throughput fell to 150,000 bales annually, cost savings of $1.42 per bale are estimated to be available.

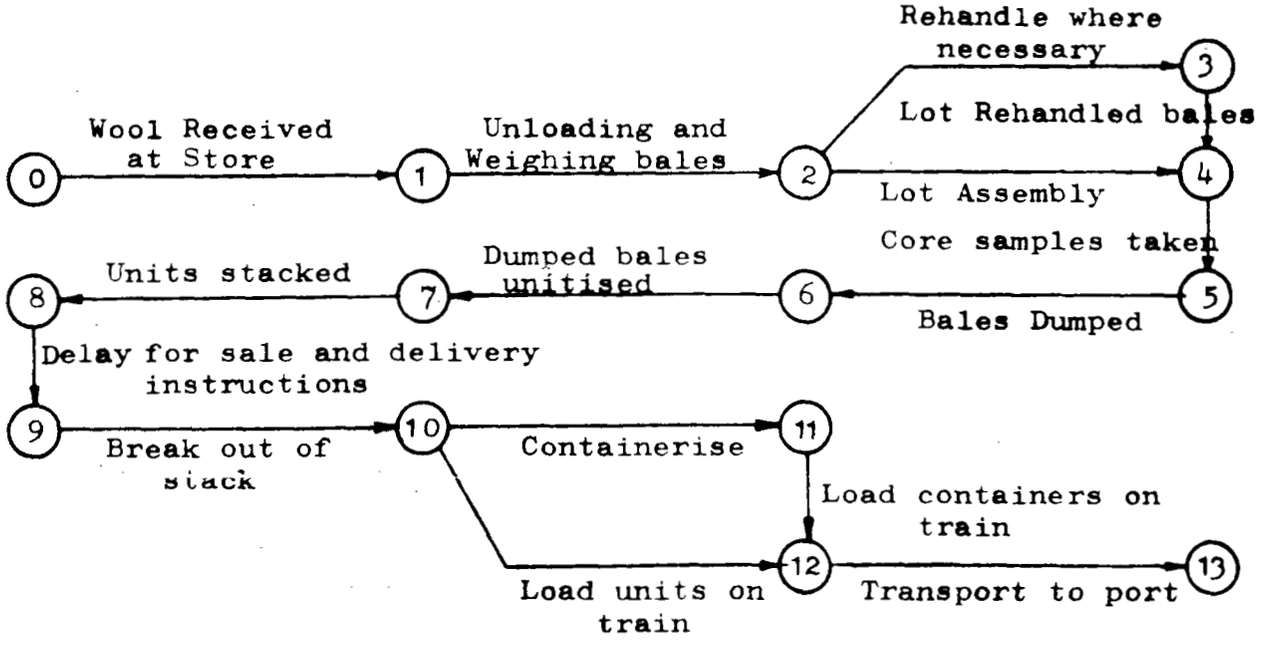
Apart from the elimination of display, the major innovation in the operation of these regional stores would be core sampling to establish the physical characteristics of the wool at an early stage after receival. Machines doing this

are relatively inexpensive. The most costly items of plant would be the dumping and unitising presses. In total, the plant and machinery would cost about $1 million whereas the building would cost some $ 3.5 million (see Table 1 in Annex I).

Wool grown in a district serviced by the regional centre would be transported to it either by road or rail. On arrival at the store, all bales would be weighed and assembled into sale lots and then core sampled. Following this, each bale would be dumped and unitised into five-bale units. These would be stacked in sale lots until delivery instructions were issued. Depending upon other aspects of the new marketing system, either the wool would not be delivered until sold, as in the traditional system, or alternatively it might be shipped out in a planned sequence, to be sold at any stage in transit or even from store at an overseas destination.

The wool would be taken from the bulk stack and either containerised or loaded on a wagon in units for transport by rail to the port. The simple flow diagram, set out below, illustrates the various operations carried out in the regional store. It is difficult to estimate the individual economies that would result from more efficient handling within the store but an examination of the flow diagram clearly indicates the lesser number of handling operations involved compared

Flow Diagram Showing the Operations Within a Regional Store



to those set out in diagram D.3 attached to Annex B showing warehousing and sale preparation activities.

Yennora, of course, has the potential to handle wool in this way. But the idea of a Yennora type complex was conceived at a time when separation of the storage and sale functions was not considered imminent. If such a separation does occur a metropolitan wool complex, except in respect of wool drawn from the adjacent wool growing areas, offers no benefits compared with a rural complex - and its costs would be higher.

Rail Transport: The savings in resource costs from the transport of the unitised bales can be estimated by comparing present train loadings with what would occur under the proposed organisation. Assuming that a conventional train load of undumped wool consists of 40 wagons, each with a capacity of 51 bales, the total load would be 2,040 bales - a net load of only 282 tons which gives a gross tonnage considerably below normal train capacity. By dumping and unitising bales the volume to weight ratio is substantially reduced and a stowage rate of 113 per cent higher than the current rate is possible. This greatly raises the ratio of payload to the gross tonnage of the train. A maximum train load[1] of unitised bales (either containerised or not) could carry 3,150 bales (30 containers of 105 bales each) and the railways would experience a 54 per cent increase in gross revenue per train. Against this there would be only a slight increase in traction cost per train which might be more than offset by the efficiency of loading unitised wool. The resulting net benefit would be a gain to the community, whether it was retained by the railways or distributed to the users in the form of lower freight rates.

Another important consideration with respect to the railway is that the regional centre would serve as a centralising depot for large quantities of wool. The present arrangement, with a few exceptions, is that wool consignments - many of them extremely small - are picked up from a large number of stations and minor stopping places to be taken to the selling centres nominated by the wool growers. Much of the wool would still reach the regional centre in small consignments

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(1) Assuming grades up to 1 in 40.

along branch railway lines but the main line haul from the centre to the port would be less costly to the railways. Thus, the cost savings, suggested earlier, are probably conservative.

To achieve the full economies of transport possible with the system being discussed, it would be essential for the transport link between regional centre and ship's side to be capable of moving a large volume in a short time. This is a function to which railways are well adapted. It is envisaged that a shipment from one port could be timed to arrive by rail as the ship was loading. For example, 5,000 tons could be moved in no more than ten trains. Such an operation would require a high degree of transport co-ordination.

Overseas Shipping: Provision of an appropriate shipping service under the new marketing arrangements would be closely related to the question of where the storage function would be best performed in the wool marketing chain. It must be performed somewhere because the mills can only absorb wool at a limited rate. In a market based on objective measurement it would be possible, depending on storage costs, to send wool overseas before sale. Hence it is conceivable that it could be stock-piled at any stage.

The option of sending wool overseas before sale would enable the body controlling export movements to guarantee large ship loads. At present it is common for ships to carry less than 10,000 bales when in fact much larger consignments could be carried. Even if consignment before sale were not instituted, the improved flow of wool through handling centres would probably make it possible to guarantee larger ship loads.

A modified shipping service to achieve the economies possible with larger and more timely consignments could certainly be provided within the existing conferences and may well become one of the topics of the study group recently initiated by the Australia to Europe Conference.(1) However, the economies would be difficult to calculate for a conference service

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(1) The Australian, 28 October 1971.

carrying a multiplicity of cargoes and it has been found simpler, for the purposes of this discussion, to calculate the economies possible with the type of bulk carrier service that was considered as a possible alternative in Chapter 4.

On the assumptions set out in Annex H, the freight rate which could be offered for wool by a shipowner requiring an internal rate of return on ship capital of 12 per cent would be $US65 per ton for a consignment of 7,000 tons (49,000 bales) of wool to the United Kingdom. With an additional 5,000 tons of other low valued cargo at a rate of $US20 per ton the F.I.O. rate on wool could be reduced to $US53 per ton ($US7.55 per bale).

It was noted in the discussion of Chapter 4 that the 7,000 ton limitation on shipments was simply a matter of meeting buyers' requirements under the traditional marketing system. With this limitation removed by a rationalised marketing system, it would be possible for a 30,000 ton bulk carrier to take a full cargo of 12,000 tons (84,000 bales) of wool, taking into account the high stowage factor (volume for weight) of wool. On the assumptions made before, this cargo of wool could be carried for an F.I.O. freight rate of about $US40 per ton ($US5.70 per bale) and still yield an internal rate of return of 12 per cent on capital for the whole round voyage. This would be a reduction of $US1.75 on the rate implied by the reported offer to carry wool under the existing marketing system (see Chapter 4) or a reduction of $US1.85 on the hypothetical rate calculated for similar conditions but on the assumption that 5,000 tons of other cargo could be picked up in Australia.

These hypothetical rates have all been computed on the assumption that each ship calls at five Australian ports to load wool. By loading at fewer ports further reductions would

be possible. The saving would be of the order of $US0.75 per bale if a ship were to call at only one port instead of five.(1) It is unlikely that port calls could be reduced to this extent but at the height of the season it might be feasible, under the improved marketing arrangements, to obtain a full load at only two or three ports.

Australian wool exports to countries currently using the Australia/Europe Conference service are about two million bales per annum. Ignoring seasonal fluctuations in production this quantity could be shipped with two sailings per month, each lifting 12,000 tons of wool. To offset the effect of landing larger shipments with longer intervals between arrivals than under the present system it would be necessary to provide storage overseas. The amount of storage is difficult to specify but it might be as high as 70,000 bales. The cost would depend upon local conditions and thus cannot be estimated with any degree of confidence. However, it is unlikely to exceed $180,000 a year or $0.09 per bale spread over the two million bales normally carried by the Australia/Europe Shipping Conference.

The scheduling of a service involving minimum loads of 12,000 tons or more involves considerably more attention than it can be given in this report but it does remain a definite possibility.

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(1) This calculation has been based on the formula and assumptions in Annex H(B), with the following additional assumptions:

- on the average, time saved by by-passing one port is
  - 0.4 day of sailing time
  - 0.75 day of port time (apart from loading time)
- the charge for an additional Australian port call is approximately)US3,500.

CHAPTER 6. SUMMING-UP

Introduction: As stated in Chapter 1 the objectives of this report are:

(1) to describe and cost the existing system of getting wool from farm to mill gate; and

(2) to identify areas in which economies might be achieved and the conditions necessary for such achievement.

A great deal of factual information has been assembled and this is set out in the preceding chapters and their supporting annexes. Much of the work done has not been original but the report does bring together, in one document, information not readily accessible elsewhere.

The Statistics: The main aggregate statistical data are set out in Chapter 2. In 1969-70 shorn wool production totalled 1,850 million lb or 5.95 million bales. Of this, 5.5 million bales were exported.

The cost of getting the 5.5 million export bales from sheep's backs to overseas mill gate was about $250 million - equivalent to about $45 per bale or nearly 15 cents per lb. Of the total cost of $250 million, some $16 million, or a little less than 1 cent per lb, was incurred in transporting wool from farm to brokers' stores and another $75 million, or more than 4 cents per lb, was incurred in transporting it from brokers' stores to overseas ports.

Detailed Costs as per Case Study: In addition to these transport costs (which include handling components) very substantial handling and storage costs are incurred at various stages in the progress of wool from farm to mill gate. A case study outlined in Chapter 3 and discussed in detail in Annex B throws light on this. The case study deals with the movement of a hypothetical 210 bale clip from a farm near Walgett to a mill at Nagoya, Japan, in 1969-70.

The total cost of getting that clip from the sheep's backs to the mill gate was estimated to be $47 per bale.(1) Details of the estimate are shown below:-

	$	Percentage of Total (a)
Wool Shed Costs	16.54	35
Transport - Shed to Store	5.08	11
Warehousing	3.87	8
Selling Expenses	3.67	8
Purchasing Expenses	4.25	9
Shipping Expenses		
- Sea Freight and Unloading	5.60	12
- Other	5.92	13
Mill Handling Expenses	2.33	5
	47.26	100

(a) Figures do not add due to rounding.

A set of flow diagrams attached to Annex B depicts in detail the relationship between these costs and their associated activities as the Walgett wool clip moved through what might be regarded as an exceedingly large number of steps to the overseas mill gate.

Opportunities for Cost Reduction: In the absence of knowledge about how wool is to be marketed in the future it is not possible to specify an optimum system of transport and handling. There are, however, economies which could be worked towards regardless of developments in marketing. It is possible also,

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(1) This was higher than the estimated average cost for the whole Australian clip mainly because the land transport costs were high - see Annex B.

to say something about the transport and handling economies which would follow from a move towards objective measurement of wool characteristics before sale, with sale on the basis of the resulting description.

Economies attainable within the existing system are discussed in Chapter 4 and economies associated with objective testing in Chapter 5.

Procedures Adding to Costs: It is evident that there is a variety of procedures employed in the wool industry which add unnecessarily to costs. Leaving aside those which can be varied only if the marketing system were changed, these include:-

(1) poor work-flow procedures in many small wool sheds;
(2) the use of low density bales - the traditional 300 lb bale is an inefficient package in which to move a bulky raw material;
(3) the classing of wool into too many lines, with consequential additions to handling costs in brokers' stores;
(4) the existence of many uneconomic rail pick-up points for wool;
(5) the offering by brokers of small lots to buyers who are generally seeking to build up 25-100 bales of uniform wool type to meet individual mill orders.

In addition, charges for the carrying of wool on both land and sea may be capable of being varied.

The Wool Shed: Practices in most wool sheds add unneccessarily to costs. In particular, bales are typically pressed to average a little more than 300 lb. There would be significant transport

and handling economies in pressing them to 350-450lb.[1] This would be feasible, though with more pressing effort, in most sheds.

Growers also add to subsequent costs by classing the clip 'right out'. Economies in the wool shed and in transport arrangements and handling would be obtained if it were classed into fewer lines containing more bales.

Adoption of these practices in the wool shed would reduce the number of wool packs needed, reduce land transport expenditures, reduce subsequent handling and storage costs, reduce (where applicable) testing charges and, perhaps, reduce shipping expenses. Against this, there would be increased pressing costs and increased repacking costs on the show floor. In net terms, savings of up to $3 per traditional bale would be likely to result from an increase in average bale weights of 100 lb and classing into fewer lines. As the savings largely depend on a reduction in the number of bales, pro rata savings would be obtained from a lesser increase in bale weights.

Transport from Farm to Brokers' Stores: There are inefficiencies in present arrangements to transport wool from farm to brokers' stores. Leaving aside the question of delivering heavier bales to the transport media, most of them can be remedied only if changes in the present system of marketing are effected. Under present marketing arrangements, however, there could be some reduction in the costs to the railways of carrying wool if their common carrier obligations were

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(1) The optimum weight is at the low end of the range in the case of high yielding wool, and vice versa.

varied so as to restrict wool bale deliveries to fewer pick-up points. At present there are far too many stations accepting uneconomically small consignments of bales. The benefits of fewer pick-up points would probably accrue to the railways rather than to woolgrowers.

The main public discussion on the transport of wool from farm to brokers' stores has centred on the merits or otherwise of freeing road transport to compete with rail for the carriage of freight intrastate. There are, however, community costs in the form of increased road maintenance and congestion costs, accident costs, police costs and pollution resulting from the increased usage of roads by heavy vehicles. In addition, a complete freeing of road transport would increase railway deficits.

There would be savings to woolgrowers of something less than $1 per traditional bale if road transport were free to compete with railways for the transport of wool intrastate. However, in net terms, the increases in community costs and railway deficits associated with a complete freeing of road transport to carry wool would be likely to exceed the benefits to woolgrowers.

More generally, it must be said that the place of road and rail transport in State or national transport systems is a much wider matter than can be considered in the context of the carriage of one commodity. Certainly we have regarded it as beyond the scope of this report.

Warehousing and Preparation for Sale: In the absence of a change in the marketing system handling costs would be reduced by the adoption of the interlotting of wools produced in medium and small clips to increase lot size. It is not practicable to estimate the extent of the likely savings but they would be small.

Selling and Purchasing: The present system of selling and purchasing is most amenable to improvement by a radical change in the marketing system. But, failing that, transport and handling economies could be achieved by increasing sale lots of broadly classed wool types from 6-8 to 25-100 bales. It is not practicable to estimate the extent of the likely cost savings but they would be small.

Broker's Store to Ship's Side: The incorporation of dumps in brokers' stores, rather than having them located separately, as is the general case at present, would permit a reduction in, though not an elimination of, the $1.65 'delivery charge' levied on buyers. What would be saved would be the charge for the actual delivery (30 cents) and the loading and delay costs, which could be at least as much again.

Shipment Overseas: Shipping freight rates charged for carrying wool are based, not on costs, but on what the market will bear. This is rational behaviour on the part of shipping conferences which set rates on commodities carried so as to cover marginal costs and make as large as possible a contribution to meeting fixed costs. For reasons set out in Chapter 4 it has been possible to charge comparatively high rates to carry wool, the major limitation being the charges and quality of service offered by alternative shipping services.

An alternative bulkship service for wool is feasible. It could almost certainly underprice conferences at present freight rates though the frequency of service would be less. The extent of underpricing could conceivably be $2.50 or more per traditional bale though this is optimistic and a more likely saving would be $1.50 per bale. In these circumstances and from their point of view, the correct stance on the part of wool shippers is on the one hand to seek out alternatives and, on the other, to continue to seek a freight rate standstill (or reductions) from conferences.

In brief, the Australian Wool Board strategy on the question of shipping freight rates to the United Kingdom and Europe earlier this year was in the interests of the wool industry. The economics of the situation point to the desirability of persisting with the search for more economic freight rates, with or without a lower level of service, and inside and outside of the conferences. Success, however, would result in pressure on other freight rates as conferences sought to maintain their net earnings. Some of this pressure would affect outward cargo from Australia (i.e. other Australian exporters) and some inward cargo.

The Existing Marketing System - Summary: In total, the possible ways of economising on the transport and handling of wool within existing marketing arrangements would be unlikely, on the basis of necessarily rough figuring, to reduce costs per traditional bale by more than $5. In practice, the feasible savings are less because some degree of failure in achieving 100 per cent of theoretically available economies is inevitable.

In brief, under present marketing arrangements it is unrealistic to expect improvements saving much more than 1 cent per lb. That, of course, would be well worthwhile but ambitions could be set higher. However, for additional savings it is necessary to look at changes in marketing arrangements.

Marketing Reforms: Changing the wool marketing system to take full advantage of the economies offered by objective testing would confer substantial benefits on the wool industry. These would result from the separation of the sale and storage functions made possible by testing the wool on receival and effecting its sale on the basis of the test results and a very small sample. The transport and handling benefits under such a system fall into three categories :-

(1) economies within the wool store;
(2) more efficient use of rail transport;
(3) better utilisation of ships and more efficient scheduling of export shipments.

Eliminating the operations of opening and displaying bales would enable the wool store to be designed purely for rapid sampling, dumping, unitising and storage - with free flow of bales in and out. It is estimated that the charge for handling a bale of wool through such a store could be as much as $3.40 below the charge for handling a bale through a traditional wool store.

Separation of the sale and storage functions means that the store could be located close to the area of production rather than in crowded urban areas, to achieve maximum efficiency in transport, as well as obtaining other benefits. A regional centre in which wool was tested, dumped and unitised would provide large assemblies of densely packed wool, ideal for line haulage in unit trains to the seaboard. The major benefit would be an increase of about 50 per cent in the payload per train but there would also be other gains in efficiency of railway operation. These might be partially offset by increased costs, for some growers, of getting wool to the regional store compared with the existing railhead. However, in our calculations we have not attributed any net benefit to railway economics - this is almost certainly conservative.

A modified marketing system, with regional wool centres, would have the advantages of cheap storage and a planned flow of wool without the disruption caused by traditional sale and display processes. Thus, it would be possible to accumulate a full shipload of wool at regional centres and consign it by unit train, either in containers or unitised bales, for rapid loading. The saving in sea freight alone (to Europe), resulting from full cargoes of wool, could be about $2.80 ($US3.10 at the exchange rate prior to August 1971). The on-shore charges of some $5.00 that are included in the gross

freight rate would be reduced by $1.85 for the dumping and unitising performed in the regional centre and by about a further $0.50 through more efficient cartage, receival and co-ordination procedures. Under such a system, it would also be possible to reduce the number of ports of call in Australia on each voyage, with an average saving of about $0.30 per bale.

Savings in transport, storage and handling costs resulting from taking full advantage of the economies offered by objective testing total, on this figuring, $8.85 per traditional bale exported to Europe. In addition, of the savings which could be aimed for within the existing marketing system, at least $1.50 would continue to be attainable with the marketing reforms described - that is, the savings associated with fewer wool packs, smaller numbers of heavier bales to transport to the regional centre and partial elimination of the 'delivery charge'.

In brief, perhaps $10 per traditional bale, or over 3 cents per lb, could be saved by a move to a system of marketing which was optimum from the point of view of transport, handling and storage. It has to be said, of course, that much of the figuring leading to this conclusion is speculative. In practice, things would not work out just as depicted. But it does seem that quite large savings <u>are</u> attainable.

This report has dealt only with matters relating to transport, handling and storage. There may be other benefits associated with marketing reforms but these have not been considered. The Bureau of Agricultural Economics is currently studying the broader implications of marketing reform.

ANNEX A

STATISTICS OF WOOL PRODUCTION, MOVEMENT AND HANDLING

INTRODUCTION

This Annex contains basic statistical data concerning the production, movement, handling and value of the wool clip.

The tables included are -

In all tables figures have been rounded. Any discrepancies that occur between totals and the sums of components are due to the effects of this rounding procedure.

SOURCES

In Tables 1 to 7 most of the figures shown have been obtained from the following publications issued by the Commonwealth Bureau of Census and Statistics (C.B.C.S.) -

Livestock Numbers, No. 29, 31 March 1971 (Ref. 10.14)
Wool Production and Utilisation No. 18, 1969-70 (Ref. 10.38)
Overseas Trade, No. 65, 1967-68; No. 66, 1968-69; and No. 67, 1969-70 (Ref. 8.11)

Other details were extracted from the 1967-68, 1968-69 and 1969-70 issues of Wool Review, a publication of the National Council of Wool Selling Brokers (N.C.W.S.B.).

The estimates in Tables 8 and 9 are based on information obtained from a variety of sources. Details of the methods of estimation and sources are described below. The publications Wool Transport in Australia, a report of the Australian Wool Board published in August 1971, and Wool Handling (Sheep's Back to Store), issued in 1970 by the National Materials Handling Bureau of the Department of National Development provided useful data.

SOURCES OF FIGURES SHOWN IN TABLE 8

Table 8 shows the quantities of wool despatched from farms in each State during 1969-70 by various modes of transport. It has been assumed that the only wool being moved in 1969-70 was produced in that year and none of the 1969-70 clip was retained on farms.

Movements to brokers' stores, both in the State of production and interstate, have been separately identified based on information shown in Table 5. Production in excess of despatches to brokers' stores is assumed to have passed to private buyers or to have been exported directly by growers.

Further explanation of the figures in Table 8 is set out below :-

(i) Road/Rail/Road Movements

Figures included here refer to wool which used rail as line-haul transport from the farm. Road transport

was used to carry the wool from the farm to the rail siding and, where necessary, from the rail terminus to the wool store.

All figures shown were obtained from information made available by State railways. In States other than Western Australia it was assumed that all wool carried by rail was despatched to brokers' stores. In Western Australia it was assumed that wool carried to Fremantle by road was destined for brokers' stores; thus, all wool despatched to other destinations was considered as having been carried by rail.

(ii) Road Only Movements

Differences between total production in each State and the quantities transported on the line-haul by rail and sea were attributed to road transport. Wool carried from within New South Wales to Albury is classified under the heading "Interstate" - Albury is very closely involved in Victorian-orientated wool sales.

(iii) Road/Sea/Road Movements

Figures of number of bales shipped from Kangaroo Island to Adelaide, from Flinders Island to Launceston and Melbourne, and from King Island to Melbourne were obtained from the Australian Wool Board's publication Wool Transport in Australia.

SOURCES OF FIGURES SHOWN IN TABLE 9

In estimating the total cost of transporting Australian wool in 1969-70 two separate movements have been considered - the movement from farm to store and the movement overseas from store. Components of the total cost have been estimated as follows :-

(i) Internal Movement - Road/Rail/Road

Figures shown include published or estimated State railway revenues for the pre-sale carriage of wool, estimates for cartage of wool from farm to rail siding and, where applicable, estimates for cartage from rail terminal to store.

The figure for New South Wales includes estimated revenue for cartage from Goulburn to Sydney of wool which was carried from farm to Goulburn by road. Similarly, the Victorian figure includes estimates of revenue for wool consigned after sale from Albury and Ballarat to Melbourne.

(ii) Internal Movement - Road Only

Quantities moving to intrastate stores and to various interstate stores for sale were multiplied by average road freight charges per bale for each State. In Victoria an estimate for road transport charges on wool despatched from Albury to Melbourne after sale is also included.

(iii) Internal Movement - Road/Sea/Road

Estimates were made on the basis of known quantities carried over the various routes and the rates charged.

(iv) External Movement - Store to Dump

For each State, an estimate of costs was made by multiplying the number of bales of greasy slipe scoured and carbonised wool exported by $1.65. This charge of $1.65 per bale is an equalisation rate which applies throughout Australia and includes a number of selling expenses in addition to costs attributable to transport. These include bale assembly, waiting time at depots and receival docks, discounts, auction expenses and strike contingencies. Different sources have given varying estimates of the portion of this charge which is attributable to transport but as definitive information was not available to the Bureau of Transport Economics the total rate has been used although this is an overstatement of the purely transport cost. After sale rail movements between selling centres on the coast are not included in this item as they are covered by the centralisation charge which is included in the Gross Conventional Rate for overseas shipping - see item (v) following.

(v) External Movement - Dump to Wharf and Wharf to Overseas Ports

An estimate of the total cost of exporting wool from Australia in 1969-70 was made by multiplying the quantities of greasy, slipe, scoured and carbonised wool exported (see Table 7) by the Gross Conventional Rate which was applicable in that year for the various destinations. Amounts were attributed to each State on the basis of the total number of bales exported from each State (see Table 6).

TABLE 1 - FARMS WITH SHEEP FLOCKS AND NUMBER OF SHEEP, 31 MARCH 1970

	N.S.W. (a)	Vic.	Qld	S.A. (b)	W.A.	Tas.	Aust.
Number of sheep farms with-	'000	'000	'000	'000	'000	'000	'000
Fewer than 100 sheep	3.3	5.0	0.8	1.8	1.1	1.7	13.7
100 - 499 sheep	5.6	8.0	0.6	3.5	1.3	1.5	20.5
500 - 999 sheep	7.5	6.9	0.5	4.1	1.8	0.6	21.4
1,000 - 1,999 sheep	10.1	6.6	0.7	4.0	3.8	0.5	25.6
2,000 - 2,999 sheep	4.5	2.3	0.6	1.4	2.6	0.2	11.7
3,000 - 4,999 sheep	3.7	1.4	1.0	0.7	2.2	0.2	9.3
5,000 - 9,999 sheep	1.9	0.6	0.9	0.3	1.0	0.1	4.9
10,000 - and more sheep	0.4	0.1	0.2	0.1	0.3	0.1	1.3
Total farms	37.2	30.9	5.3	15.9	14.2	4.8	108.2
	mil.	mil.	mil.	mil.	mil.	mil.	mil.
Number of sheep	72.5	33.2	16.4	20.0	33.6	4.6	180.1

(a) Includes A.C.T. (b) Includes N.T.
Source: C.B.C.S., Livestock Numbers, 31 March 1971 (Ref 10.14).

TABLE 2 - SUMMARY STATISTICS OF WOOL PRODUCTION 1969-70

	N.S.W. (a)	Vic.	Qld	S.A. (b)	W.A.	Tas.	Aust.
Sheep shorn (million)	73.1	39.6	18.1	22.0	35.5	4.8	193.2
Average fleece weight (lb)	9.6	9.0	9.6	11.6	8.9	8.9	9.6
Shorn wool (incl. crutchings) (mil. lb)	705	356	174	255	316	43	1,850
Average bale weight (lb)	308	303	318	320	317	291	310
Estimated bales produced (c) ('000)	2,287	1,176	547	797	996	147	5,950

(a) Includes A.C.T. (b) Includes N.T. (c) Shorn wool divided by average bale weight.

Sources: C.B.C.S., Wool Production and Utilisation 1969-70 (Ref. 10.38);
N.C.W.S.B., Wool Review 1969-70.

TABLE 3 - SUPPLIES OF WOOL, AUSTRALIA

(Million lb greasy basis)

	1967-68	1968-69	1969-70
PRODUCTION OF WOOL			
Shorn wool (incl. crutchings)			
New South Wales (incl. A.C.T.)	606	625	705
Victoria	275	299	356
Queensland	202	225	174
South Australia (incl. N.T.)	202	223	255
Western Australia	286	359	316
Tasmania	34	42	43
Australia	1,605	1,773	1,850
Dead and fellmongered wool			
Australia	24	25	22
Wool exported on skins from-			
New South Wales	32	35	34
Victoria	54	60	67
Queensland	23	20	21
Western Australia	11	13	16
Other States	21	21	25
Australia	141	149	164
TOTAL PRODUCTION	1,770	1,948	2,036
IMPORTS OF WOOL			
Greasy, slipe, scoured and carbonised	15	25	28
Wool tops, woollen and worsted yarn (pure and mixed)	1	2	4
TOTAL IMPORTS	16	27	32
TOTAL SUPPLIES	1,786	1,975	2,067

Source: C.B.C.S., Wool Production and Utilisation 1969-70 (Ref 10.38).

TABLE 4 - UTILISATION OF WOOL, AUSTRALIA

(Million lb greasy basis)

	1967-68	1968-69	1969-70
EXPORTS OF WOOL			
Greasy wool exported from -			
New South Wales	390	387	427
Victoria	380	396	494
Queensland	197	214	186
South Australia	161	170	185
Western Australia	238	273	248
Tasmania	24	28	30
Australia	1,390	1468	1,570
Slipe	5	4	2
Scoured and carbonised	147	140	148
Wool on skins	141	149	164
Wool tops, woollen and worsted yarn	44	47	43
TOTAL EXPORTS	1,727	1,808	1,926
INCREASES IN STOCKS OF WOOL			
Raw	(-) 29	80	47
Processed and semi-processed	8	9	11
TOTAL INCREASES IN STOCKS	(-) 21	89	58
CONSUMPTION OF PROCESSED WOOL	80	78	83
TOTAL UTILISATION	1,786	1,975	2067

NOTE: Minus sign (-) indicates a reduction in stocks.

Sources: C.B.C.S., Wool Production and Utilisation, 1969-70 (Ref. 10.38);
C.B.C.S., Overseas Trade, 1967-68, 1968-69 and 1969-70 (Ref 8.11).

TABLE 5 - FIRST HAND WOOL RECEIVED INTO BROKERS' STORES

('000 bales)

Selling centres located in -	Wool produced in -						
	N.S.W. (a)	Vic.	Qld	S.A. (b)	W.A.	Tas.	Aust.
1967-68							
N.S.W. (c)	1413	-	8	-	-	-	1420
Vic (c)	359	892	-	99	-	3	1354
Qld	71	-	628	-	-	-	699
S.A.	55	2	-	488	3	-	547
W.A.	-	-	-	-	714	-	714
Tas.	-	-	-	-	-	108	108
Australia	1897	895	636	587	717	111	4843
1968-69							
N.S.W. (c)	1,419	-	7	-	-	-	1426
Vic (c)	377	963	-	109	-	5	1455
Qld	70	-	696	-	-	-	765
S.A.	73	2	-	521	5	-	601
W.A.	-	-	-	-	847	-	847
Tas.	-	-	-	-	-	128	128
Australia	1,939	966	703	631	852	133	5223
1969-70							
N.S.W. (c)	1,531	-	3	-	-	-	1,534
Vic (c)	471	1,134	-	123	-	4	1,732
Qld	62	-	541	-	-	-	602
S.A.	73	3	-	607	3	-	687
W.A.	-	-	-	-	745	-	745
Tas.	-	-	-	-	-	136	136
Australia	2137	1,137	544	731	748	139	5436

(a) Includes A.C.T. (b) Includes N.T. (c) Albury is included as a Victorian wool selling centre.

Source: N.C.W.S.B., Wool Review, 1967-68, 1968-69 and 1969-70.

TABLE 6 - RAW WOOL EXPORTS FROM AUSTRALIA

('000 bales)

State of Export	Greasy	Slipe	Scoured (a)	Carbonised	Total
		1967-68			
N.S.W.	1285	8	45	40	1378
Vic.	1,301	5	107	38	1452
Qld	623	-	38	3	665
S.A.	511	-	20	9	540
W.A.	749	1	112	-	862
Tas.	85	-	-	-	85
Australia	4554	15	323	90	4982
		1968-69			
N.S.W.	1,271	8	33	38	1350
Vic.	1,313	3	123	26	1464
Qld	673	-	29	4	706
S.A.	525	-	13	9	548
W.A.	862	1	117	-	980
Tas.	99	-	-	-	99
Australia	4,743	11	315	78	5147
		1969-70			
N.S.W.	1441	4	36	31	1,513
Vic.	1,626	1	135	34	1,797
Qld	584	-	21	5	610
S.A.	580	-	16	12	608
W.A.	785	-	114	-	900
Tas.	104	-	-	-	104
Australia	5,120	6	323	83	5531

(a) Includes an estimate of number of bales of boiled wool.

Source: C.B.C.S., Overseas Trade, 1967-68 1968-69 and 1969-70 (Ref. 8.11).

TABLE 7 - RAW WOOL (a) EXPORTED FROM AUSTRALIA
('000 lb)

Destination (b)	Actual weight of raw wool exported (a)		
	1967-68	1968-69	1969-70
Europe			
Belgium-Luxemburg	97,581	85,529	87,070
Czechoslovakia	15,851	15,971	18,906
France	123,083	133,101	134,551
Germany (West)	109,471	103,653	107 000
Italy	131,826	138 113	144 040
Netherlands	16,260	29,365	50,939
Poland	35,537	34 460	33,825
Spain	5,058	8,446	13 240
United Kingdom	162,522	129,364	151,401
U.S.S.R.	49,822	69,760	82,753
Yugoslavia	19,798	18,816	26,792
Other countries	17,181	16,846	17,612
Total	783,990	783,424	868,129
Asia			
China (Taiwan)	12,940	23,879	30 401
Japan	502 040	534,096	573,008
Korea (South)	8 729	13 176	12,723
Other countries	10 238	16,917	9,745
Total	533,947	588,068	625 877
America			
Mexico	24,279	24 911	15 091
U.S.A.	78,543	79,671	61 038
Other countries	6,276	3 749	3 992
Total	109,098	108 331	80,121
South-East Asia			
India	22,485	34,840	43 197
Other countries	1,640	2,287	3 997
Total	24,125	37 127	47,194
Near East			
Turkey	15 571	20 686	14,808
U.A.R.	5,377	5,747	11 667
Other countries	8,619	9,096	9,285
Total	29,567	35 529	35 760
Other Areas	3,699	3 943	4 [illegible]
TOTAL	1,484,426	1 556 422	1,661 716

(a) Greasy, slipe, scoured and carbonised wool. (b) All countries with total wool exports exceeding 10 million lb in 1969-70 are shown separately.

Source: C.B.C.S. Overseas Trade 1967-68 1968-69 and 1969-70 (Ref 8 11).

TABLE 8 - MOVEMENTS BY MODE OF TRANSPORT OF GREASY WOOL FROM FARMS, 1969-70

('000 bales)

	State of wool production						Aust.
	N.S.W. (a)	Vic.	Qld	S.A. (b)	W.A.	Tas.	
ROAD/RAIL/ROAD MOVEMENTS							
To brokers' stores -							
In same State	1,438	660	271	120	559	12	3,060
Interstate	5	-	-	11	3	-	19
To other destinations (c)	-	-	-	-	248	-	248
Total	1,443	660	271	131	810	12	3,327
ROAD ONLY MOVEMENTS							
To brokers' stores -							
In same State	93	474	270	454	186	120	1,597
Interstate	601	3	3	112	-	-	719
To other destinations (c)	150	39	3	67	-	7	266
Total	844	516	276	633	186	127	2,582
ROAD/SEA/ROAD MOVEMENTS							
To brokers' stores	-	-	-	33	-	8	41
TOTAL MOVEMENTS (d)	2,287	1,176	547	797	996	147	5,950

(a) Includes A.C.T. (b) Includes N.T. (c) Private buyers, growers' own exports, etc. (d) Equal to production.

TABLE 9 - COST OF TRANSPORTING WOOL, 1969-70

($'000)

	State (a)						Aust.
	N.S.W. (b)	Vic.	Qld	S.A (c)	W.A.	Tas.	
INTERNAL MOVEMENTS							
FARM TO STORE							
Road/Rail/Road	5,600	1,600	1,400	300	2 000	30	10 930
Road Only	1.000	1,000	1,400	900	600	120	5 020
Road/Sea/Road	-	-	-	100	-	50	150
Total	6,600	2,600	2,800	1.300	2.600	200	16 100
EXTERNAL MOVEMENTS							
TO OVERSEAS PORTS							
Store to dump (d)	2,500	3,000	1.000	1,000	1 500	170	9 170
Dump to wharf and to overseas ports (e)	18,000	21,300	7 300	7,200	10 700	1 200	65 700
Total	20,500	24,300	8.300	8.200	12 200	1.370	74 870
TOTAL COSTS	27,100	26.900	11.100	9 500	14 800	1 570	90 970

(a) For internal movements State of production, for external movements State of export. (b) Includes A.C.T. (c) Includes N.T. (d) Amounts based on an equalised negotiated rate of $1.65 per bale. This rate covers all costs of calling wool out of store including many administrative activities associated with delivering wool bales from the bulk stack to the dump. (An estimate that has been supplied is that the actual transport cost, excluding cost of delays and waiting time is about 30 cents per bale). (e) Based on Gross Conventional Rate which covers counter-marking, dumping container packing or unitising transport dump to wharf, centralisation as well as calculated ocean freight rate.

ANNEX B

CASE STUDY - WOOL FROM SHEEP'S BACK TO OVERSEAS MILL GATE

INTRODUCTION

Although there are large common elements in the way the bulk of the Australian wool clip flows from farm to market there is considerable diversity also. It is well known that wool progresses from farm to overseas markets in a large number of separate steps - however, it is difficult to describe these in detail when generalising about the total Australian wool clip. It may be useful therefore, in adding to understanding of what is involved in getting wool from farm to market, if the progress of a reasonably representative clip from farm to overseas market is depicted in realistic detail. That is the purpose of this paper.

The Model Clip

Our model is a typical, well-managed property located about 28 miles from Walgett in the pastoral zone of New South Wales. The property has approximately 6,300 sheep and is engaged in breeding and wool production. The 1969-70 season's output from the property has been put at 210 bales[1] with an average weight per bale of 322 lb. (Weaner wool output has been disregarded.) The clip is assumed to have been sold through a broker at Newcastle and shipped to Nagoya, Japan for use in a textile mill. In addition, certain assumptions are made about how the clip is handled in the broker's store during the preparation of the wool for sale. Specific details of the model property and clip are attached at Appendix 1.

Marketing Assumptions

The clip is assumed to be marketed through the auction system in the 1969-70 season.

The framework in which marketing operations are examined in the paper assumes that the Australian Wool Commission and the Price Averaging Pool (P.A.P.) were not part of the market situation

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(1) As indicated on page B11, repacking of the bales at the Broker's Store reduced the number to 209. All per bale costing in this Annex relates to the number of bales in existence at the time the relevant charges were raised. This results in an inconsistency between the per bale costs quoted at the various stages of the marketing process, however, the inconsistency is of negligible proportions (less than 1 cent in each $2) and is disregarded from here on.

and that the specified handling and transport operations, as well as broker, buyer, and mill actions, are reasonably representative. Individual growers, brokers, and buyers will have marketing operations which, due to their relative size, organisation, location, store structure, throughput and client requirements, differ in some respects from those postulated in the model. Nevertheless, the activities and expenses, together with the interrelationships between operations and parties involved in the marketing process realistically reflect the situation prevailing during the season 1969-70.

The data on which the paper is based take into account the normal economies of scale in marketing operations which influence the level of expenses and charges raised for the marketing of wool by transport operators, brokers, buyers, shipping companies, and mill clients. All of the expenses, charges and realisations raised by the Broker and subcontractors against the Grower for taking wool from the sheep and getting it to market are identified. In addition, a Buyer's Account and a Mill Purchase and Transport Account for the model clip are postulated.

The costing of the marketing operations takes into account delays and costs that arise in the wool shed itself, transport costs and insurance cover for movement from the shed to the Broker's store, the costs of warehousing and preparing the wool clip for sale, the selling expenses which are raised by the Broker on the Grower's Account, the purchasing and shipping expenses on Buyer's Account, and the handling and transport expenses that are charged directly against the Mill by those providing the service.

The Network Diagram

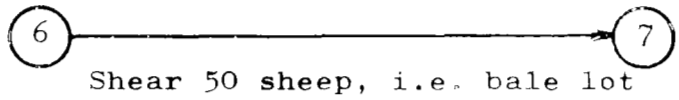
The key to this paper is the attached network diagram. Subsequent headings in the paper relate to each of the sections of the diagram in turn (i.e. D.1, D.2 ... D.8) and the main purpose of the text is to explain and comment on the network flow shown in the diagram.

The network diagram is explanatory rather than defining a critical path (e.g. as in a PERT diagram). However, the principle of its construction is similar to that involved in

PERT and other forms of network analysis - that is, it is a graphical representation of a network of activities and events required to attain a given end (in this case to market the model clip).

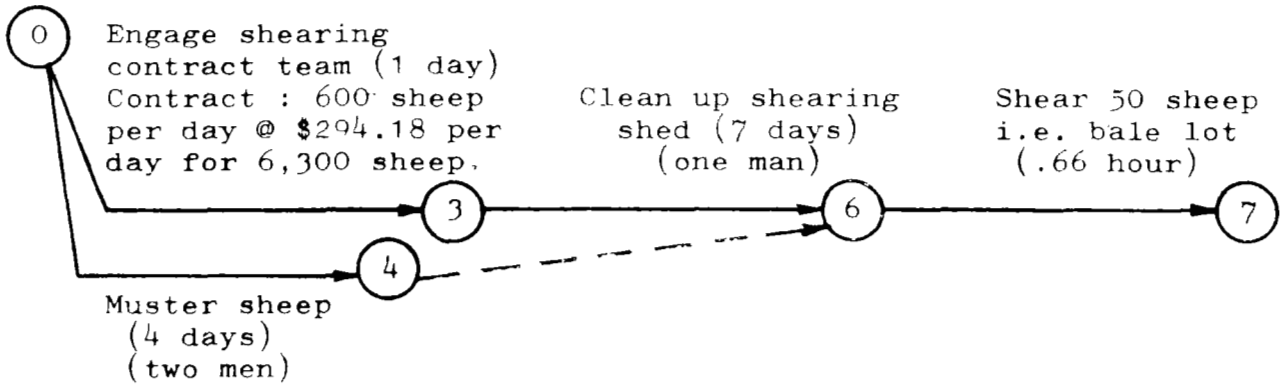
An EVENT represents a specific accomplishment of a task at a particular instant of time. Events are shown on the diagram at 'nodes', viz:

An ACTIVITY represents the passage of time, the consumption of resources or the raising of charges - one of which is necessary to progress from one event to the next. An activity is indicated in the network as an arrow between two events, e.g. from Diagram D.1 :-



Shear 50 sheep, i.e. bale lot
(.66 hour)

A DUMMY ACTIVITY on the diagram is an activity which requires no resources; it will usually require no time. It is used to ensure that each activity has a unique pair of preceding and succeeding events : it must be inserted between the original preceding event and the new event where there are parallel activities in order to complete the logic of the sequence of events, e.g. from Diagram D.1 :-



Thus, in Diagram D.1 activities 7:8, 7:9, 9:10, and the 'dummy' connection 8:9 constitute a purely diagramatic segregation of events that occur simultaneously once the cycle of shed operations commences. Activity 7:11 represents the continuity of the process of shearing for the balance of the flock.

While shearing is proceeding the complementary actions of throwing, skirting, sorting and classing the fleece and placing it in specific bins are taking place. Pressing and baling the wool however, can only begin when there are 30 homogeneous fleeces in a bin. Events 7, 8, 9 and 10 therefore show the essential processes by which one bale is made up. It is explicitly assumed in the model that it would take at least 50 fleeces to make up one bale of a particular line of wool. Events 12, 13 and 14 show the process, right up to baling and stacking, for the balance of the flock.

D.1 : WOOL SHED COSTS

The costs involved in taking the fleece from the 6,300 sheep on the model property, classing the wool and packing it in bales are estimated at $3,475 :-

WOOL GROWER'S PROPERTY ACCOUNT

	Dr	
. Wool Packs	$ 386	
. Shearing	$3,089	(1)
Sub-Total	$3,475	

The activities involved in getting the packed wool bales to the shearing shed door are depicted in Diagram D.1. The activities shown in the diagram include engaging a shearing contract team, cleaning up the shearing shed and mustering the sheep (all of which would take about a month), and then shearing 6,300 sheep over a period of 10½ days with a 14-man shearing contract team. The contract rate, based on 100 sheep per day for each of the six shearers in the team, covers not only shearing but also skirting, sorting, piece-picking, classing, pressing, weighing, marking and placing the bales in temporary storage. The shearing contract is taken to have cost $294.18 per day.

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(1) Incidental expenses such as day-to-day maintenance and repairs to plant and equipment, and fuel, light and power have been excluded. This cost is estimated at $2 per day, i.e. $22 for 11 days shearing.

The final bale make-up of the 210 bale clip is estimated to have been as follows :-

WOOL TYPE	NO. OF BALES	PER CENT	NO. OF LOTS
Fleece Wool	130	62	13
Broken Wool	30	14	3
Pieces	25	12	6
Bellies	13	6	2
Locks	4	2	
Crutchings	6	3	1
Other, (dags etc.)	2	1	
TOTAL	210	100	25

The average cost to the Grower of getting each of these bales to the shearing shed door is estimated to have been $16.54 per bale. The time frame involved is estimated to have been 42 days from 1st August 1969.

D.2 : TRANSPORT COSTS - SHED TO BROKER'S STORE

The traditional transport route used by our model property is road transport to the railhead at Walgett, rail transport to Honeysuckle Siding at Newcastle, then road transport the further 2 miles to the Broker's Store. This route is shown in Diagram D.2 as activities 14:15 to 27:28.

The first part of the journey involves loading the bales on a semi-trailer and transporting them from the farm to the railhead, a distance of 28 miles. The transport charges from farm to railhead cover the cost of loading and unloading 210 bales, with the loading activities being carried out by the road haulier, assisted by farm labour and a small jib crane running off a tractor. The bales are assumed to have been lifted from ground level to the truck table(1).

(1) The requirement to lift wool bales from ground level to truck table top is a feature of wool bale cartage in the North Western Division of N.S.W. Sheds are constructed at ground level and storage in the sheds is limited. Where sheds are elevated and/or loading ramps are provided, the local transport charges are much lower simply because of savings in time and labour required for loading a vehicle at the wool shed door.

This is a time consuming and obviously costly operation. Unloading at the railhead is facilitated by sophisticated handling equipment, as well as the assistance of the staff of a Rail Shipping Agent engaged by the N.S.W. Railway Department during the wool season.

Our model clip of 210 bales required two trips by a 15-ton semi-trailer over a distance of 28 miles between farm and railhead and the local carrier is assumed to charge $1.50 per bale for the task. This is a typical charge in the Walgett area for a task of the sort described.

The bales are loaded from the semi-trailer directly onto the rail wagon at Walgett. There is normally some waiting time for the wagons to be attached to a train - the period of wait selected for our model is 24 hours. The train service from Walgett to Newcastle is a regular service, departing from Walgett at 9.00 a.m. each day. Details of the journey are set down in the network diagram; it takes 24 hours for the goods train to travel the 322 mile route. The wagons are placed at the special wool siding at Honeysuckle by 9.00 a.m. of the day following the wagon pick-up at Walgett.

After the wagons are shunted to the wool siding there is usually a wait of about 1 hour for road transport to arrive. Arrangements are then made for the unloading, identification, sorting, and, finally, the loading of bales on an 8-ton table top truck for road transport to the Broker's Store. Rail staff assist in the transfer of bales from rail wagon to road vehicle. For 210 bales these operations would take about five hours, plus an additional waiting time of one hour at the loading bay of the Broker's Store. The road carrier engaged in the transfer from rail terminal to Broker's Store is under contract to the Railways Department during the wool season.

The all inclusive charge for railing the bales to Honeysuckle Siding and road transport to the Broker's store in 1969-70 was $3.48 per bale. These charges are raised on the Grower's Account by the Broker. The Broker also arranges for 'Sheep's Back to Broker's Store Insurance'. The charge made to the Grower's Account for this service is estimated to be 10 cents per bale - the charge is raised against the Grower's Account after the wool is sold.

The transport charges for moving the bales from the shed to the Broker's Store by road/rail/road are estimated as follows :-

WOOL GROWER'S PROPERTY ACCOUNT

	Dr
Local Carrier, Transport to Railhead	$315

NEWCASTLE BROKER'S
WALGETT GROWER'S ACCOUNT

		Dr
Insurance, 'Sheeps back to Broker's Store'	$ 21	
Rail and Road Transport to Broker's Store	731	
Sub-Total		$752

The total cost of transport from the Shearing Shed to the Broker's Store by road/rail/road is thus estimated at $1,067 or $5.08 per bale. The time frame for the journey from Shed to Store is assessed at 67 hours (including 2 hours unloading time at store's receival area, Activity 28:30 on D.3).

D.3 : WAREHOUSING AND PREPARATION FOR SALE COSTS

Upon receipt at the Broker's Store, the bales are unloaded, weighed, marked and stored temporarily. The Broker then commences action to prepare the wool for sale. Not all clips are subjected to the same amount of preparation. The actions required depend upon the condition of the stock at the time of shearing, the breed, the type of country where the wool was grown, the seasonal conditions prevailing during the growing season, and the manner in which the clip has been shorn, classed and packed.

Besides the normal warehousing procedures, for which a general charge of $2.90 per bale is raised on the Grower's Account by the Broker, a typical proportion of our Walgett clip

is assumed to have been subjected to reconditioning, reclassing, blending, bulk classing, repacking, reweighing and interlotting. The number of bales from the clip subjected to these actions are taken to have been as follows :-

. Reconditioning	10 bales
. Repacking and reweighing	9 bales
. Reclassing, blending	10 bales
. Interlotting as star lots	20 bales

For each of these particular services provided by the Broker in preparing the wool for sale substantial charges are raised[1]. The services seek to maximise the realisations from each individual bale or bale lot.

The Broker also arranges for fire insurance cover for storage of the clip from the time it is received into store until the time it is sold. This insurance cover depends on the relative fire risk of the store being used by the Broker and the estimated value of the wool in store. There is some evidence to suggest that the premiums charged by the insurers also take account of what the market will bear; the premium seems to vary considerably between brokers who have 'like' storage. The charge raised by the Broker in our model is $32 - that is, 15 cents per bale.

For wool coming into brokers' stores adequately classed and in sufficient quantity to permit the making up of saleable lots, the charges for services provided by the Broker in preparing the wool for sale are not large in the context of the total costs of marketing a clip similar to our model. There are, of course, economies of scale attainable in brokers' stores.

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(1) The Price Averaging Pool Scheme (P.A.P.), introduced in 1970-71, provides for the Commonwealth, through the Wool Commission, to meet half the costs involved in any actions required to prepare the clip for sale other than normal warehousing activities. The contribution by the Commonwealth does not cover reconditioning, repacking or reweighing, but it does include reclassing, mixing and blending and interlotting, where star lots sent by small growers lead to reclassing, resorting or blending.

Most of the activities are generally carried out in the same building, on different storage floors, perhaps with highly specialised and experienced staff handling the wool. However, because the units involved are very large numbers of separate bales with a maximum weight of 450 lb and an average weight of 310 lb., preparing wool for sale is very much a labour intensive activity.

When wool has to be reclassed the activities involved are highly labour intensive and charges for preparing it for sale rise significantly. Some indication of the large labour content involved in preparing wool that needs classing, reclassing or blending for sale is indicated in Diagram D.3(a) Sub-activities 0:1 to 52:53 have been developed from flow charts drawn up by the National Materials Handling Bureau, supplemented by information from the industry.

If a clip has not been classed in a shed, classing by a bulk classing organisation could cost up to $10 per bale. If wool needs to be reclassed and then blended the cost to the grower could be as much as $9 a bale. If the bales are to be interlotted as star class lots - i.e. grouping of small bale lots to produce larger lots - it could cost as much as $6 per bale. However, well-classed bales from good properties cost only $1.50 per bale for interlotting. In a clip of 210 bales only about 5 per cent of the clip could be expected to need reclassing and/or blending and thus incur very high sale preparation charges.

Hence, the charges raised on our clip for sale preparation provide for 10 bales of wool to be reclassed at $9.00 per bale. Other charges raised by the Broker for preparation of the clip are set down in Diagram D.3 under activity 33:53

The time frame for preparation of the wool for sale is taken to be three weeks. Individual operations for each bale in the model clip would not take so long but by the time all of the bales in the clip are put through the normal processes in the Broker's Store and then consolidated ready for show, a considerable period of time will have elapsed. In Diagram D.3 the inter-relationship between preparation activities of our model clip is illustrated by activities 32.34 and 32.35 through to 51:52.

The operations set down in Diagram D.3 exclude specific manhandling actions which occur in the Broker's Store when bales are moved for reclassing. The extent of these latter operations, however, is illustrated in Diagram D.3(a) which shows the multiplicity of activities involving the movement of bales for reclassing by hand truck, elevator and chute.

Following preparation, the wool must wait in store until buyers are notified that it is to be offered for sale. For wool prepared for sale at Newcastle that wait can be protracted because of the sale date arrangements made each year for individual selling centres. For our model the delay has been taken to be 8 weeks.

Following the preparation of the wool for sale the Broker sets out the bales for inspection and appraisal. This takes about two weeks. During this time the Broker prepares the sales sheet. The bales are then opened up for inspection by the Broker's valuation staff. Following inspection, a decision can be made by the Broker to reject some bales and submit them for reclassing or blending. A decision may also be taken at this stage to interlot certain lots. This is followed by removal of selected bales for show from the bulk stack to the display floor.

The show bales are then consolidated into their respective lots and the bales are either capped or half-capped and slashed. Barricades are erected to segregate individual show bale lots. Before finalising the sale details the Grower is invited to visit the Broker's Store and discuss the values and lotting arrangements made by the Broker.

The lotting arrangements are then checked to ensure that the bale display conforms with the requirements laid down in the Wool Selling Regulations[1]. The sales staff prepare a catalogue for the sale and the Broker advertises the auction date

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(1) The Wool Selling Regulations are a comprehensive set of rules applying to the sale of wool in recognised selling centres which have been adopted by members of the Australian Council of Wool Buyers and the National Council of Wool Selling Brokers of Australia when participating in recognised auction sales of wool. By mutual agreement between the respective members these rules of procedure are regarded as an extension to the basic conditions of sale applying to lots on offer. Application of the Regulations to the whole of the industry has been given added force because of the role of the Joint Wool Selling Organisation and the Australian Wool Commission in arranging and conducting auction sales of wool within the ambit of the Regulations.

and circulates a description of the lots available for purchase. The bulk stack is also checked and rearranged. These operations are shown in Diagram D.3 as activities 32:35 to 50:51.

Part of the preparation for sale includes repacking and reweighing of bales which are under or overweight. This requirement can arise due to poor pressing in the shed bales of crutchings and dag wools exceeding the weight limit of 450 lb (set down in the Registered Agreement between the Storemen and Packers Union and the Growers and Brokers), and presence of soft bales just over the minimum weight for bales of 250 lb. Bales weighing less than 250 lb are sold as butts. Repacking and reweighing of 9 bales from our model clip is taken to be necessary. The repacked bales number only 8 resulting in the total number of bales in the clip being reduced to 209.

The warehousing and preparation for sale costs charged against Grower's Account are estimated as follows :

NEWCASTLE BROKER'S

WALGETT GROWER'S ACCOUNT

	Dr
. Wool Store Insurance	$ 32
. Reconditioning	40
. General Warehousing	606
. Repacking, reweighing	14
. Reclassing	90
. Interlotting	30
Sub-Total	$812

These costs are equivalent to $3.87 per bale.

D.4 : SELLING EXPENSES ON GROWER'S ACCOUNT

With the activities involved in preparing the model clip for sale as a background consideration the Buyer's actions may now be examined to assess their effect on the Grower's gross realisations.

The Broker, having set out the wool for show and advised buying organisations of the lots available invites the buyers to examine the wool and appraise it. The buyers appraise the lots in the light of orders and specifications placed by overseas mills. Under the Wool Selling Regulations a Buyer is

SHOW BALES AT YENNORA

(Photographs by courtesy of the Sydney Morning Herald)

entitled to remove all of the wool from the show bales in order to be assured that the classing and the yield of the lot are acceptable in terms of mill specifications and mill price ceilings as well as to ensure that he correctly assesses the wool contained in the lot. Some indication of the way the bales are pulled about and wool from the bales strewn on the show floor in the process of subjective appraisal may be gleaned from the photographs on page B12 showing the new show floor at Yennora.

Buyers are permitted to inspect the wool as many times as they wish up to the morning of the sale day. In each selling season there are usually 18 sale series. The National Council of Wool Selling Brokers determines which brokers are to sell on each day of the various sale series. Representatives of each broker arrange all the details for the auction sale. During the wool auction (in which events move rapidly) a Buyer may make an error in his bid for a particular lot In this event he must accept the lot unless he re-offers it before the five succeeding lots have been sold. In other circumstances, the buyer may offer the lot at a following auction because his subjective appraisement failed to coincide with the results of more objective measurements, taken after the sale, of the yield and fibre diameter content of the wool in the lot. In other words wool may be resold several times after the initial sales offer by the broker.

Following the sale the show bales are repacked and returned to the bulk stack. These procedures are shown in Diagram D.4, activities 54:56 to 57:61. The activities are estimated to take over 5 days. The Broker then raises charges against the Grower for research and promotion and selling commission on the basis of the gross realisations on the sale. These activities are shown in Diagram D.4 as 57:58 to 57:59. Selling Expenses for the 209 bales are estimated at $771, equivalent to $3.67 per bale. Details are as follows :-

NEWCASTLE BROKER S

WALGETT GROWER S ACCOUNT

	Dr
. Selling Commission	$342
. Promotion and Research Levy	$429
Sub-Total	$771

The details of realisations for our model 210 bale clip are estimated as follows:-

NEWCASTLE BROKER'S STATEMENT

HYPOTHETICAL WALGETT GROWER'S REALISATION ACCOUNT

SEASON 1969-70

	Debit		Credit
. Transport, Rail, Road	$731	Sale Receipts made up of proceeds from :-	
. Insurance, 'Sheeps Back to Store'	21		
. Insurance, Fire	32		
. Reconditioning, 10 bales	40		
. Warehousing, 209 bales	606		
. Repacking and Reweighing, 9 bales	14		
. Reclassing, 10 bales	90		
. Interlotting, 10 bales	30		
. Selling Commission	342		
. Promotion and Research Levy	429		
. Balance due to Grower	19,123		
. Fleeces		$16,372	
. Broken Wool		2,576	
. Pieces		1,526	
. Locks		189	
. Bellies		514	
. Crutchings		226	
. Other		55	$21,458
. TOTAL	$21,458		$21,458

The Grower's realisation from his Broker for the model clip averaged $91 per bale. Deductions for wool packs, shearing and transport from the shed to the railhead bring the average realisation down to $73 per bale ($15,333 for the clip)

Further details on estimated realisations from our model clip are set down at Appendix 2.

D.5: PURCHASING EXPENSES ON BUYER'S ACCOUNTS

Immediately following the sale the Broker raises charges for the wool on the Buyer's Account (Activity 61:62 in Diagram D.5). The Buyer is allowed 16 days in which to settle the account (the Prompt Period). If the Buyer settles earlier he

receives a prompt discount at the rate of $6\frac{3}{4}$ per cent per annum(1) For the purpose of this paper it is assumed that the Buyer pays on the 16th day after the sale date.

Soon after the purchase is settled the Buyer or his agent is able to take samples of as much as 2 lb of wool from his bulk lots purchased. The Broker is required to arrange for slashing of the butts and removal of the caps from the bales selected from the bulk stack by the Buyer's testing agents. In making the selection from the bulk stack the Testing Authority may cause considerable bale movement, both within the stack and from hand-trucking of bales away from the stack. The Broker charges the Testing Authority up to 85 cents per bale for access, removal, weighing and rearrangement of bales selected for core testing from the bulk stack.

After access is arranged the bales are weighed by the staff of the Testing Authority and six core samples are taken from each bale. The Testing Authority then examines the samples for yield and fibre diameter and reports the findings to the Buyer. The charge for coreing is about 49 cents per bale. Testing for yield costs about $10.70 per lot and tests for fibre diameter about $5.00 per lot. Our model clip consists of 21 large and 4 small lots. The testing procedures require that a sample be taken from each bale in every lot. The charges raised by the Testing Authority on the Buyer, including the breaking out and movement charges raised by the Broker for the model clip are assessed as follows:-

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(1) When payments are made prior to the 'prompt day (16 days from the Wednesday following the 'sale day) buyers are allowed discount at a rate agreed upon from time to time ($6\frac{3}{4}$ per cent at the time of sale in the case of our model clip), but the maximum period that the discount is allowed in the case of any payment is 14 days. The first day is the sale day and the last day is the prompt day The Tuesday after the sale day the buyer gets 14 days discount. Payment on the Tuesday before the prompt day gives him only one day's discount.

CHARGES RAISED BY A WOOL TESTING AUTHORITY FOR YIELD AND FIBRE DIAMETER OF 209 BALES - PURCHASE OF HYPOTHETICAL WALGETT CLIP

	Charge Per Lot	Cost	Total
	$	$	$
21 Large Lots			
. Fleeces 13 lots with 10 bales in each	26.84	348.92	
. Broken Wools 2 " " 8 " " "	24.82	49.64	
. Broken Wools 1 " " 9 " " "	25.96	25.96	
. Pieces 3 " " 8 " " "	24.82	74 46	
. Bellies 2 " " 5 " " "	21.40	42.80	541.78
4 Small Interlotted Stars			
- 20 bales aggregated into 4 lots			
. Pieces 3 lots with 6 bales in each	22.54	67 62	
. Bellies 1/3 " " 6 " " "	22.54	7.51	75.13
TOTAL TESTING CHARGES			$616.91

The charge for testing and report for our 209 bale clip is thus $617. The account is rendered direct on the Buyer by the Testing Authority. The cost of arranging these tests, after the sale, are substantial, but the penalties likely to accrue to the Buyer from failure to purchase to firm mill specifications require that such tests be carried out otherwise the mill may claim against the Buyer for the failure of any lots purchased to meet yield and fibre diameter requirements. A note on wool testing arrangements is attached as Appendix 3.

The results of the test may indicate that the lot will not meet mill specifications. In such circumstances the lot may be re-offered by the Buyer at the next auction. The re-offer is on the Buyer's Account. In some instances the report from the Testing Authority may indicate to the Buyer that the show bales were not representative of the lot offered at the sale. In such circumstances the Buyer is permitted under the Wool Selling Regulations to make a claim against the Broker for misrepresentation. When this occurs the sale may be arbitrated and, if the findings are in favour of the Buyer, the Broker is required to credit the Buyer's account and re-offer the wool at his own expense. These activities are illustrated in Diagram D.5 for the model clip at 67:68 and 68:69.

When the report of the Testing Authority indicates that the lot purchased by the Buyer meets the mill specifications the Broker takes action on the Buyer's Account to prepare the wool bales for delivery to the dumper. The Buyer, following the verification of his purchase, forwards delivery instructions to the Broker, the dump organisation and the shipping agents. The acceptance and delivery operations are illustrated in Diagram D.5 by activities 67:71 to 74:76.

The Buyer incurs certain out-of-pocket expenses and overhead costs when purchasing wool for a client. The estimated level of charges for those activities, for which direct charges are raised within the Buyer's organisation against the Mill Account, is $1 30 per bale for our model purchase of 209 bales.

This cost estimate is based on the assumption that the Buyer has an annual purchase throughput of more than 60,000 bales. The figure of 60,000 bales was selected by J.P. Fourlinnie and R.B. Whan as a close approximation to the average size of viable wool buying firms[1]. The figure of $1.30 per bale is estimated for our model on the basis that economies of scale would be evident

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(1) J.P. Fourlinnie and R.B. Whan, 'The Influence of the Size of Sale Lots of Wool on Wool-Buyer's Costs', Quarterly Review of Agricultural Economics, Vol. 20, No. 3, July 1967, pp. 154-9.

in a business with a substantial throughput and that arrangements would normally be made in a contract for wool purchases to cover such specific, assignable contract expenses as telex messages, renumbering of bales and stamp duty.

Telex and other communication costs identified with specific purchases form a significant portion of the Buyer's out-of-pocket expenses because buyers need to seek revised instructions from the mill when, because price limits in the contract are set low, the buyer is unable to make any or sufficient purchases to fill the order. In addition, where a number of buyers are making purchases in several centres simultaneously to meet a specific order, the need arises for daily after sale telephone communications between them to determine what part of the order is outstanding at the end of the day.

Other activities involved in meeting detailed specifications within a contract price range must be covered by the buyer's commission. These activities include the following:-

(i) Administration and office expenses involved in processing the mill's purchase order;

(ii) Travelling expenses of wool valuers examining lots at various selling centres;

(iii) Pay and allowances of wool valuers;

(iv) Cost of finance to cover wool purchased on firm order from mills (end of Prompt Period to payment by mill);

(v) Contingencies for claims by the mill for failure on the part of the buyer to forward lots which meet mill specifications;

(vi) Expenses involved in verification of purchases (cost of examination of core testing samples from lots purchases for crimp x diameter x yield);

(vii) Contingencies (risk of loss) involved in wool re-offered at subsequent auction.

The commission charged by the buyer against the client varies with the contract - it depends on the range set down in the mill specifications and the size of the order. If the mill order directed the buyer to purchase large quantities of wool within a a wide specification range the buyer's commission might be 1 per cent of the purchase value of the 'clean' equivalent of the greasy wool. With small orders and tight order specifications the commission might be as high as 3½ per cent. In general, the buyer's commission on wool purchased for large Japanese mills is about 1.25 per cent of the purchase value of clean wool equivalent(1)

In our model clip the Buyer's Commission at 1.25 per cent, was $277. This is calculated on the realised clean value of the wool. If the Buyer correctly estimates the yield of the wool, and if he bids to his limit, then it would not matter whether he calculated his commission on either a greasy or clean basis(2)

Buyer's expenses and overhead covered by commission charges and standard out-of-pocket charges are estimated at $2.63 per bale for our model.

The financial cover for wool purchases on prompt order presents particular difficulties for buyers. Mills are aware that during the prompt period buyers are able to store the wool free of charge (for 28 days following the sale). The Buyer, however, is required to pay the Broker within 16 days of the Wednesday following the sale date. The Buyer, of course, cannot obtain the release of bales for transport to the dump until he has paid for the wool.

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(1) Other buying operations (i.e. private buying) are also being conducted on a moderate scale. The basis of private buying is shed purchase, consolidation and repacking and some reclassing in a country location, thence interstate shipment to a reclassing, blending and repacking organisation. These private buyer operations are essentially based on small scale but nonetheless cost minimising operations and a strong and loyal clientele of buyers for the wool built up over the years. The objective in repacking, sorting, culling, reclassing and blending, is always to offer a product to mills that is not overclassed or deficient in yield potential.

(2) It should be noted that not all buying is done on a commission basis. Many of the big mills, especially the Japanese, have their own buying firms and these do not formally charge a commission on their own purchases. Buying to honour forward contracts would also not require that a commission be paid.

Sea transport is covered by a Bill of Lading, with the Ship's Manifest based on the Buyer's delivery instructions and the Bill of Lading. Ownership of the wool is exchanged when the Bill of Lading is passed over by the Buyer to the shipping agents. Payment by mills is generally effected against Letters of Credit on Australian Banks on presentation of documents. In practice, there is generally a considerable period of time during which the Buyer must carry the Mill Account. But there is, nonetheless, pressure on the Buyer to pay within the Prompt Period coming from the Broker's desire to settle the Grower's Account.

The storage activity in our model is set down at activity 61:72 in Diagram D.5. It is assumed that the Buyer pays at the end of the Prompt Period and then develops and forwards his delivery instructions after the receipt of reports from the Testing Authority (Activities 61:62 and 71:72).

Where the wool is stored for more than the 28 days in the Broker's Store the charges for storage are raised progressively - for the first four weeks after free storage the charge is 5 cents per bale per week, for the next 8 weeks the charge is 20 cents per bale per week, then 50 cents per bale per week. When wool is purchased by Japanese mills the bales are often stored longer than 28 days, simply because mills in Japan have adopted the practice of either storing wool in Australia on Buyer's Account or buying the wool at auction through a principal located in Australia. Wool storage charges are apparently comparatively low in Australia. However, the Buyer is keen to arrange for delivery out of store to the dumpers as quickly as possible.

Our model assumes the wool is stored for 28 days and that, because of flow considerations at the height of the season, it takes at least 1 day to assemble the bales at the despatch area following the receipt of instructions and a further day waiting for road transport facilities to move the bales to the dump. The truck loading time has been taken to be 3 hours.

The activities are set down in Diagram D.5 at 72:73 to 74:76. Transport is affected by the use of six 8-ton table top trucks capable of carrying 36 bales per load. Transport of the

bales to the dumper organisation is on Buyer's Account as the consignor The charges form part of the shipping costs raised by the Buyer against the Mill Account.

Buyers at present value wool on the basis of subjective estimates of fleece characteristics. Where there is greater risk involved the Buyer often uses guidance test results (see Appendix 3) to make his valuation. Subjective appraisals, by their nature, will vary from buyer to buyer and selling costs are increased where the buyer, unsure of his judgment on the show bales, calls up the remaining bales for inspection before the sale. These valuation procedures are the basis on which present handling and transport operations have developed.

Purchase expenses on Buyer's Account for the Walgett Clip are estimated at $889, equivalent to an average cost of $4.25 per bale. Details are as follows:-

NEWCASTLE BUYER'S ACCOUNT
PURCHASE EXPENSES, 209 BALES

	Dr
. Core Test Certification	$617
. Administration Expenses	272
Sub-Total	$889

These expenses are incorporated in the price offered by the Buyer for wool purchased at auction on Mill Account (other than these expenses for which the contract provides for direct reimbursement). The purchase expenses form part of the costs of meeting mill specifications laid down in the order placed on the Buyer.

In respect to our model the amount of wool purchased is 67,334 lb (see Appendix 1). The gross return to the Walgett Grower from the sale is $21,458, i e. 32 cents per lb. The Broker received $2,335 for services provided to the Grower, including $342 commission. The Buyer is assumed to work on a Mill contract ceiling price of 33 cents per lb greasy, or 61 cents per lb clean (i.e. a yield of 55 per cent). The account rendered on the Mill in these circumstances is estimated at $22,220 (i.e. 67,334 lb @ 33

cents per lb greasy) The difference of $722 between the auction price and the price to the Mill covers the costs of verifying the purchases with mill specifications and helps to cover contingencies. The Buyer's commission on these purchases is assessed at $277, i e. 1.25 per cent of $22,220, equivalent to $1.33 per bale. These charges are rendered on the Mill Purchase and Handling Account considered later in this paper.

D.6 : SHIPPING EXPENSES ON BUYER'S ACCOUNT - DUMPING AND DELIVERY TO WHARF

The dump organisation uses the delivery instructions as an authority to call the wool out of the Broker's Store. The bales, of course, cannot be moved from store until the Buyer pays the account. The practice has therefore developed of forwarding delivery instructions with the wool cheque.

Movement to and from the dump is costly and time consuming. The agreed charge for delivery expenses[1] from the store to the dump is $1.65 per bale. Charges of a further 18 cents per bale are raised for centralising and co-ordinating the movement of bales and another 35 cents per bale is charged to transport the dumped bales to the wharf apron. (This latter charge is actually brought into account on Diagram D 7). The delivery charges to and from the dump are negotiated on an equalisation basis between the buyer/consignor, individual dump organisations (most of the dumps are owned by the shipping companies), and the transport contractors. The charges for dumping, centralising and delivery of dumped bales to the wharf form part of the negotiated freight rate, generally referred to as the Gross Conventional Rate.

In general, the mill will specify to the buyer how the wool should arrive at the mill - that is, high density or medium density packed. Shipping companies seek to have all bales dumped unless they are to be carried as bulk cargo to 'top up' a heavy bulk shipment such as wheat or iron ore. Heavier wool bales produce substantial transport savings simply because low density bales do not permit maximum payloads to be carried. A difficulty arises when high density bales are stored for long periods at low temperatures at overseas ports before delivery to textile mills.

(1) The delivery charge covers a number of selling expenses incurred by the Broker; the actual cartage charge is about 30 cents per bale; delivery includes bale assembly, waiting time at despatch and receival docks, discount, auction expenses and strike contingencies.

In these circumstances the wool fibres can be damaged with the result that they are unsatisfactory for shaping, combing and top making.

The bale volume is generally 26 cubic feet when moving on internal transport facilities and 17½ cubic feet (after dumping) when moving overseas. These procedures are being followed at a time when it is technically possible to high density dump and band bales to a size of only 10-12 cubic feet.

The forwarding instructions also specify the counter-marks required; the dump organisation marks Port x Ship x Mill on the bales before placing the bales in the dump press. The charges raised by the dumper for counter-marking vary between a minimum of 10 cents per bale to 12 cents per bale for a maximum of 17 characters. An additional marking change is also made for portmarks identifying the overseas destination.

The charge for dumping bales and tying with 3 steel bands is $1.28 per bale in Newcastle. An additional charge is raised to unitise the dumped bales. Our model assumes that six dumped bales make up a unit - thus the 209 bales are tied into 35 units. The cost per unit is $3.30, equivalent to 55 cents per bale. The units may or may not be containerised for delivery to the wharf and shipment overseas; in the case of our model the bales are not placed in containers.

Co-ordination and centralisation of bales for movement from the dump to the wharf is carried out by the shipping agent in co-operation with the dump, the buyer, the stevedoring authority and the road transport contractor. The charge for this service is taken to be 18 cents per bale; the charge itself is included in the Gross Conventional Rate and applies whether centralising is required or not.

Delivery by road to the wharf apron, waiting for access to the wharf, unloading and storage in the transit shed in ship-loading order involves further delay, extensive manhandling and substantial expense per bale unit

Transport of the 209 bales in our model to the dump and unloading is estimated at 3 hours (Activities 76:77 and 77:79 on Diagram D.6). The estimated charge for delivery out of stores to the dump for the 209 bales is $345. The cost of counter-marking pressing in the dump press, banding, unitising, transport to the wharf apron and unloading are estimated at $517, the time frame has been assessed as 2 days for delivery ex-Stores to the Dump and thence to the Wharf apron and one day for movement, storing and arranging in shiploading order in the wharf shed. These operations are shown in Diagram D.6 as activities 76:77 to 88:89.

The Shipping Agent co-ordinates sea transport in association with the Consignor/Buyer. This activity covers such aspects as drawing wool from Broker s Stores to meet stowages. movement to and from the dump, unitising and stevedoring services.

Insurance cover for the wool after purchase (Fall of Hammer to Mill Door Insurance) is generally arranged by the Mill to cover additional storage time, movement to the dump and transhipment overseas. For our model it is assumed that the insurance cover for this period is covered by the Mill payment direct for Marine Insurance. This cover is shown in Diagram D.6 as activity 76:109. The charges are raised against the Mill Transport and Handling Account in Diagram D.8.

D.7 : SHIPPING EXPENSES ON BUYER'S ACCOUNT - DELIVERY TO OVERSEAS PORT

Before loading begins the bales may be subjected to delay due to the unavailability of a ship a berth at the wharf or stevedoring manpower. In such circumstances demurrage charges are raised in addition to charges for stevedoring services and wharf dues. It is estimated that charges raised against our consignment of 209 bales for wharf dues are 28 cents per bale, receival storage and movement to the ships side are 28 cents per bale, and loading and stowing the bales on board are $1.05 per bale. These charges are also included in the Gross Conventional Rate. The Bill of Lading and Ship's Manifest are exchanged between the Consignor (the Wool Buyer) and the Shipping Agent. The Buyer renders his account on the Mill Client against a Letter of Credit. The operations and charges involved in delivery of the 209 bales to the

Japanese Port of Nagoya are shown in Diagram D.8 as activities 90:92 to 101:103.

As noted earlier the Mill Account includes the Buyer's Commission which for our model has been taken to be 1.25 per cent of the clean value of the wool purchased. The Buyer guarantees that the wool shipped meets the mill specifications in respect of yield and fibre diameter. He may base his charge for purchases on the wool yielding 54 per cent when in fact, due to variability of fleeces in the bale, the actual yield may only be 54 per cent. In such circumstances the mill may seek redress from the Buyer for failure to fulfil the terms of the contract in respect to yield. This is a contingency that the Buyer must build into his rate of commission. Curiously, the yield variation adjustment does not seem to apply in reverse; the Buyer is rarely advised that his estimate of yield was conservative.

Rates for wool carried to Japan are fixed by agreement between the shipowners and the Japanese importers for whom the wool is shipped, although a number of Japanese shipowners are not parties to the Conference Rates, negotiated from time to time for wool shipments from Australia. Our model clip is assumed to have been shipped from Newcastle to Nagoya in Japan at a Gross Conventional Rate of $9.87 per bale. The rate is made up and charged against the Consignor, as follows :-

GROSS CONVENTIONAL RATE FOR WOOL SHIPMENT
FROM NEWCASTLE TO NAGOYA, JAPAN
SEASON 1969-70

Service	For 322 lb Bale $	Proportions of Freight Rate %
. Counter-marking	0.10	1.01
. Dumping (3 Band)	1.28	12.97
. Unitising (6 Bale Units)	0.55	5.57
. Cartage to Wharf	0.35	3.55
. Co-ordination/Centralising	0.18	1.82
. Wharf Receival	0.28	2.84
. Wharf Dues	0.28	2.84
. Loading and Stowing	1.05	10.64
. Bill of Lading	0.20	2.03
. Sea Freight	5.20	52.68
. Unloading at Overseas Port	0.40	4.05
TOTAL	$9.87	100.00

The Gross Conventional Rate is made up of a 'free in and out' sea freight rate of $5.20 and the numerous miscellaneous service charges shown in the above table, which add to just over 47 per cent of the rate for shipment overseas to Nagoya, Japan.

The shipping expenses on Buyer's Account for dumping and delivery to the wharf and shipment to Nagoya are estimated as follows :-

NEWCASTLE BUYER'S ACCOUNT
CONSIGNMENT EXPENSES

	Dr
. Charge for Transport to Dump	$ 345
. Shipping Charges	2,067
Sub-Total	$2,412

The shipping expenses on Buyer's Account are equivalent to $11.52 per bale. This estimate includes $9.87 per bale freight rate and $1.65 per bale delivery charge to the dump.

A Buyer's Realisation Account for the model clip is shown in detail in Appendix 4. Suffice it to say that for very low commission rates and high risk elements the Buyer as a middleman provides a great deal of service to the wool industry.

D.8 : HANDLING AND TRANSPORT EXPENSES ON MILL ACCOUNT

Following discharge at Nagoya the bales are assumed to be sorted and stored temporarily before transport by road to the Mill. The Mill itself carries the charges for these handling and transport costs. The Mill is also responsible for arranging insurance cover for wool purchases from the 'fall of the hammer to the mill door'. This is estimated at 35 cents per bale, i.e. $73 for the 209 bales in our model.

The handling and transport expenses on the Mill Account are estimated as follows :-

NAGOYA MILL HANDLING AND TRANSPORT ACCOUNT

	Dr
. Buyer's Commission	$277
. Stevedoring Charges	38
. Road Transport to Mill Door	94
. Marine Insurance	73
. Store Insurance	4
Sub-Total	$486

The direct expenses on the Mill Account for the model are estimated at $209, plus Buyer's Commission of $277, equivalent to $2.33 per bale. Diagram D.8 illustrates the activities involved in these handling and transport expenses, beginning at Node 103, with the network being finalised at Node 111.

SUMMARY

The Grower's own payments for transport services form only a moderate proportion of his total direct payments :-

WALGETT GROWER'S SHEARING AND MARKETING ACCOUNT

	Average Per Bale	Per cent
	$	
. Wool Shed Expenses	16.54	56.7
. Transport - Shed to Store	5.08	17.4
. Warehousing Expenses	3.87	13 3
. Selling Expenses	3.67	12.6
TOTAL	$29.16	100 0

Some part of the other charges identified relate, of course, to handling costs.

When the entire cost of removing the wool from the sheep's back and delivering it to the Mill is considered, transport and handling charges loom proportionately and absolutely much larger:-

TOTAL EXPENSES

HYPOTHETICAL WALGETT CLIP

1969-70 SEASON

	Average Per Bale $		Per Cent
. Wool Shed Costs	16.54		34.99
. Transport-Shed to Store	5.08		10.75
. Warehousing Expenses	3.87	Growers A/c	8.19
. Selling Expenses	3.67		7.77
. Purchase Expenses	4.25	Buyers A/c	8.99
. Shipping Expenses	11.52	Charged to Mill	24.38
. Mill Handling Expenses	2.33	Mill A/c	4.93
TOTAL	$47.26		100.00

The table shows that just on 35 per cent of total marketing expenses arise from shearing costs. Transport, insurance and handling costs amount to just over 40 per cent of total expenses, with shipping expenses the largest component of transport costs. Warehousing, selling and purchase expenses (which have a handling component) make up the remaining 25 per cent of total costs.

Strictly measured in terms of man-days the time required for the activities described in the model occupies 193 days or nearly 28 weeks. If we allow for weekends and public holidays the actual time involved for marketing of the clip would be closer to 30 weeks. If the Grower engages a shearing team on 1st August and shearing takes place in the first week of September the proceeds would be received in December/January (this is in accord with Australian experience in general). The wool would then be received into store at the Mill towards the end of March.

ANNEX B

Appendix 1.

DETAILS OF HYPOTHETICAL WALGETT GROWER'S PROPERTY AND WOOL CLIP SEASON 1969-70

Property Details

Total Acres	12,000
Number of Sheep	6,300
Breed of Sheep	Merino, Haddon Rigg Blood
Shed Type	Side Board
Holding Pens Capacity	3, each of 20 sheep per pen
Counting Out Pens	6, each of 40 sheep per pen
Number of Stands	6
Overhead Gear	Cooper
Hand Pieces and Power	Lister, petrol 5 h.p.
Number of Rolling Tables	1
Number of Sorting Tables	2
Number of Bins	9
Press Type	Koerstz-Squatters No. 1
Bale Storage	100
Loading Facilities	Jib crane, tractor-operated
Distance to Railhead	28 miles to Walgett
Distance, Railhead to Terminal	322 miles to Newcastle

Clip Details

Description & Proportions (210 bales = 100%)	Number of Bales	Average Bale Weight	Average Return per Bale	Total Returns	Average Returns per lb
		lb	$	$	cents
Fleeces (62%)	130	314	125.94	16,372	40
Broken Wool (14%)	29	299	88.83	2,576	30
Pieces (12%)	25	339	61.03	1,526	18
Locks (2%)	4	357	47.18	189	13
Bellies (6%)	13	372	39.51	514	11
Crutchings (3%)	6	384	37.68	226	10
Other (Dags, etc.) (1%)	2	400	27.90	55	7
TOTAL	209*	322	102.67	21,458	32

* One bale lost through repacking and reweighing in Broker's Store

Gross Output = 67,334 lb

Gross Proceeds = $21,458

GROWER'S REALISATION ACCOUNT (EXCLUDING PRODUCTION COSTS)

HYPOTHETICAL WALGETT CLIP

SEASON 1969-70

RECEIPTS	Average Per Bale	TOTAL
	$	$
Fleeces (130 bales)	125.94	16,372
Broken Wool (29)	88.83	2,576
Pieces (25)	61.03	1,526
Locks (4)	47.18	189
Bellies (13)	39.51	514
Crutchings (6)	37.68	226
Other (2)	27.90	55
	$102.67	$21,458
EXPENDITURE	**$**	**$**
Wool Shed Costs		
. Wool Packs	1.84	386
. Shearing	14.70	3,089
Sub-Total	16.54	3,475
Transport - Shed to Store		
. Shed to Rail Head	1.50	315
. Rail Head to Store	3.48	731
. Insurance	0.10	21
Sub-Total	5.08	1,067
Warehousing, Preparation for Sale		
. Wool Store Insurance	0.15	32
. Reconditioning	0.18	40
. General Warehousing	2.90	606
. Repacking, Reweighing	0.07	14
. Reclassing	0.43	90
. Interlotting	0.14	30
Sub-Total	3.87	812
Selling Expenses		
. Commission (Broker's)	1.63	342
. Promotion and Research Levy	2.04	429
Sub-Total	3.67	771
Total Expenditure	$29.16	$6.125
NET REALISATION TO GROWER	$73.51(a)	$15.333

(a) As indicated in the footnote on page B1 of the Annex, all per bale figures are not exactly consistent with each other. This figure is therefore an approximation - but the possible error introduced by the inconsistency is less than $\frac{1}{4}$ of 1 per cent.

ANNEX B

Appendix 3

AUSTRALIAN WOOL TESTING CHARGES

Under the present International Wool Testing Authority requirements a minimum sample of 1 kilo must be taken from each lot when tested for yield and fibre diameter. This is about 2.2 lb per lot. Lot size is irrelevant i.e. it could be 1 bale or 100 bales. Therefore, the cost per pound of wool tested is lower for larger lots.

There are two types of test, a guidance test and a full certificate, viz :

(i) Guidance Tests :

These are not acceptable as a basis for settlement by the mill but they are cheaper and much quicker than the full certificate tests. Buyers often get guidance tests during a sale series so that they can get a rough idea of yield and fibre diameter for similar wools before they calculate their greasy price limits. Guidance tests cost about $9 per lot.

(ii) Full Certificate Tests :

This is generally accepted by the trade (mill and buyer) as being an accurate assessment of the yield and fibre diameter of wool samples. It costs roughly twice as much as the guidance test but takes longer to carry out. Certificate test results are used by buyers to certify their purchases after the sale. They are sent to the buying mill after the sale has been completed and they are the basis on which payment to the buyer is made.

ANNEX B

Appendix 4

A NEWCASTLE BUYER'S REALISATION ACCOUNT ON PURCHASE OF 209 BALES OF WALGETT WOOLS SEASON 1969-70

RECEIPTS	Average Per Bale $	Total $
- Wool Sales (209 bales as per contract)	106.32	22,220
- Purchase Charges (telex, etc.)	1.30	272
- Consignment Charges	11.52	2,412
- Commission	1.33	277
Total Receipts	$120.47	$25,181
EXPENDITURE	$	$
- Wool Purchases (209 bales)	102.67	21,458
- Purchase Expenses		
. Core Testing A/c	2.95	617
. Set Charge Expenses (telex, etc.)	1.30	272
Sub-Total	4.25	889
- Shipping Expenses		
. Charge for Transport to Dump	1.65	345
. Counter-marking	0.10	21
. Dumping	1.28	269
. Unitising	0.55	116
. Cartage to Wharf	0.35	73
. Co-ordination / Centralising	0.18	38
. Wharf Receival	0.28	59
. Wharf Dues	0.28	59
. Loading and Stowing	1.05	219
. Bill of Lading	0.20	42
. Sea Freight	5.20	1,087
. Unloading at Overseas Port	0.40	84
Sub-Total	$ 11.52	$ 2,412
Total Expenditure	$118.44	$24,759
NET REALISATION TO BUYER	$2.03	$422

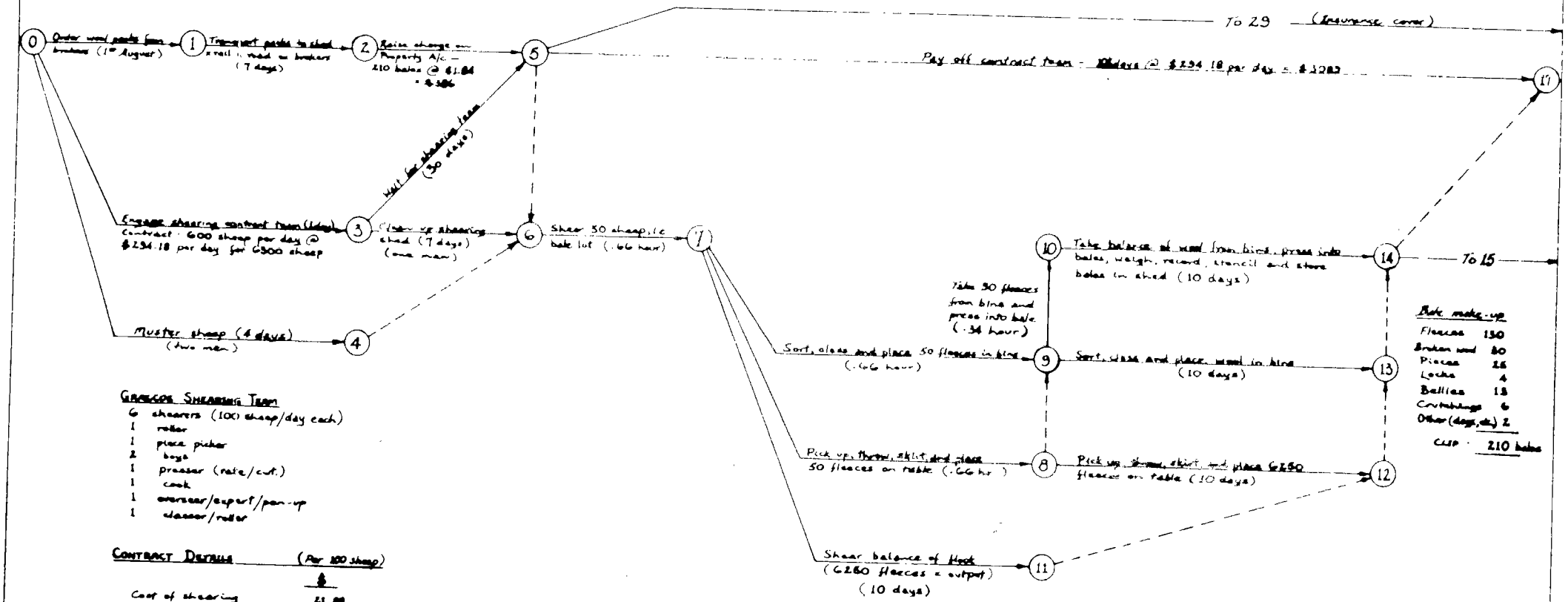
~ Wool Transport Study ~

Network diagram of transport and handling activities for hypothetical Walgett wool clip of 210 bales for 1969-70 season.

D.1

Wool Shed Costs

Property A/c	Dr.
Wool packs	$ 386
Shearing team	3089
Sub-total	$ 3475



Gregson Shearing Team

6	shearers (100 sheep/day each)
1	roller
1	place picker
2	boys
1	presser (rate/cut.)
1	cook
1	oversear/expert/pen-up
1	classer/roller

Contract Details (Per 100 sheep)

	$
Cost of shearing	21.00
Staff & shed hands	10.33
Presser - pressing	3.31
- weigh & brand	0.12
Classer to wool rail	3.01
Mess & Cook	3.31
Travelling expenses	0.86
Bank charges	0.03
Workers' compensation	0.86
Payroll tax	1.02
Company levy	6.00
	49.05

J.C.R 15.9.71 B.T.C.

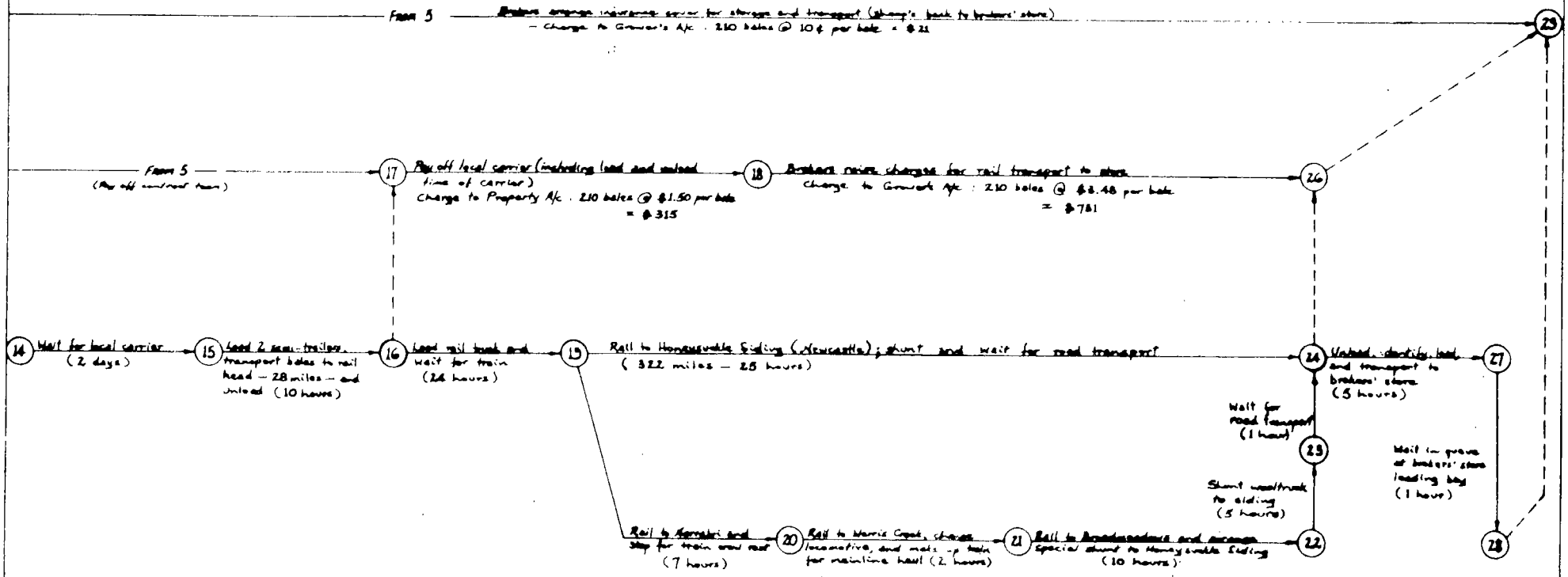
Wool Shed Costs per Bale = $16.54

D.2

Transport Costs – Shed to Brokers' Store

Property A/c	$
Transport to rail	$ 315

Growers A/c	$
Transport to store	$ 731
Insurance – shed back to brokers' store	21
Sub-total	$ 752



T.C.R. D.S.R. A.T.C.

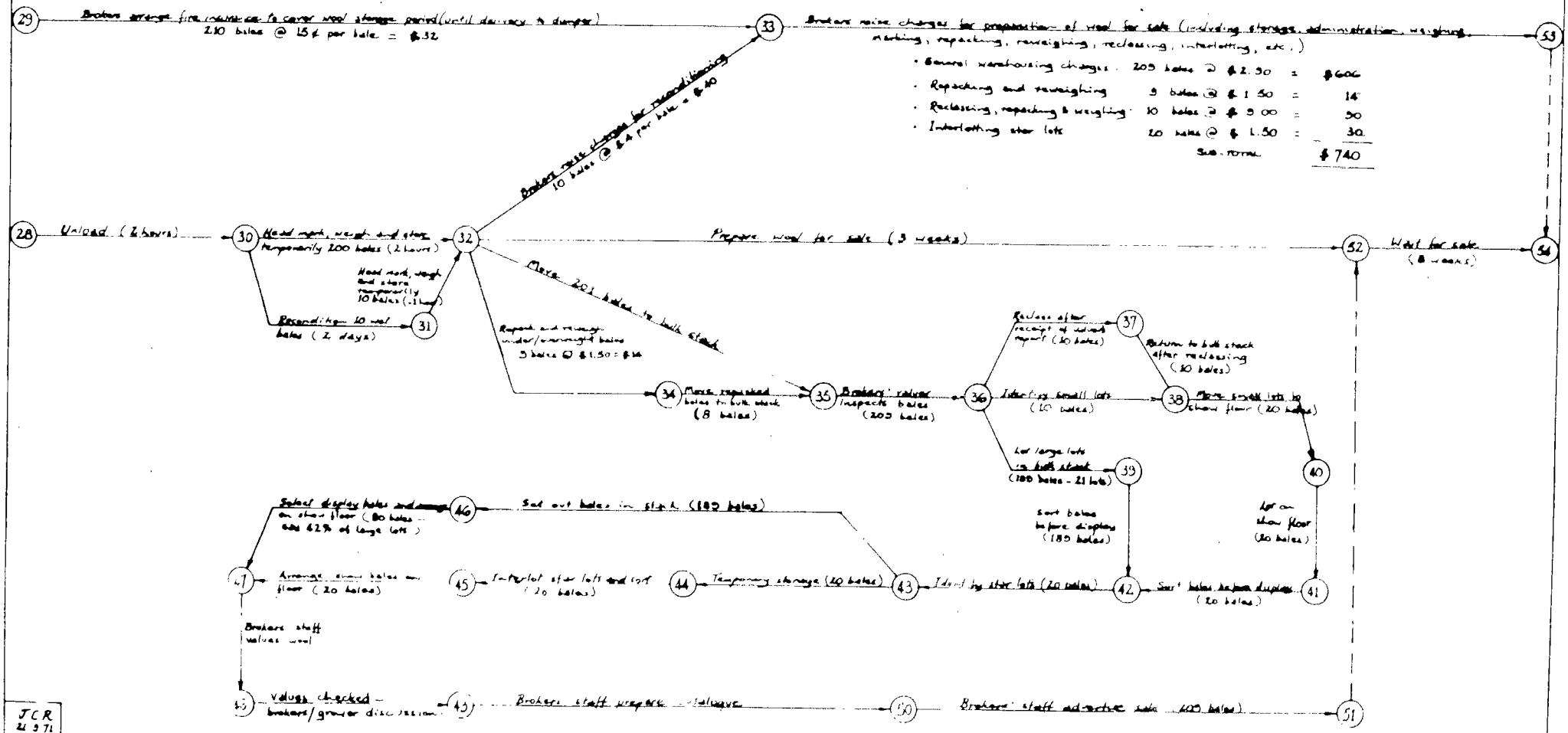
NOTE Segments of the rail journey are detailed in activities 19 20 to 23 24

Transport Costs – Shed to Brokers' Store = $ 3.08 per Bale

WAREHOUSING & PREPARATION FOR SALE COSTS

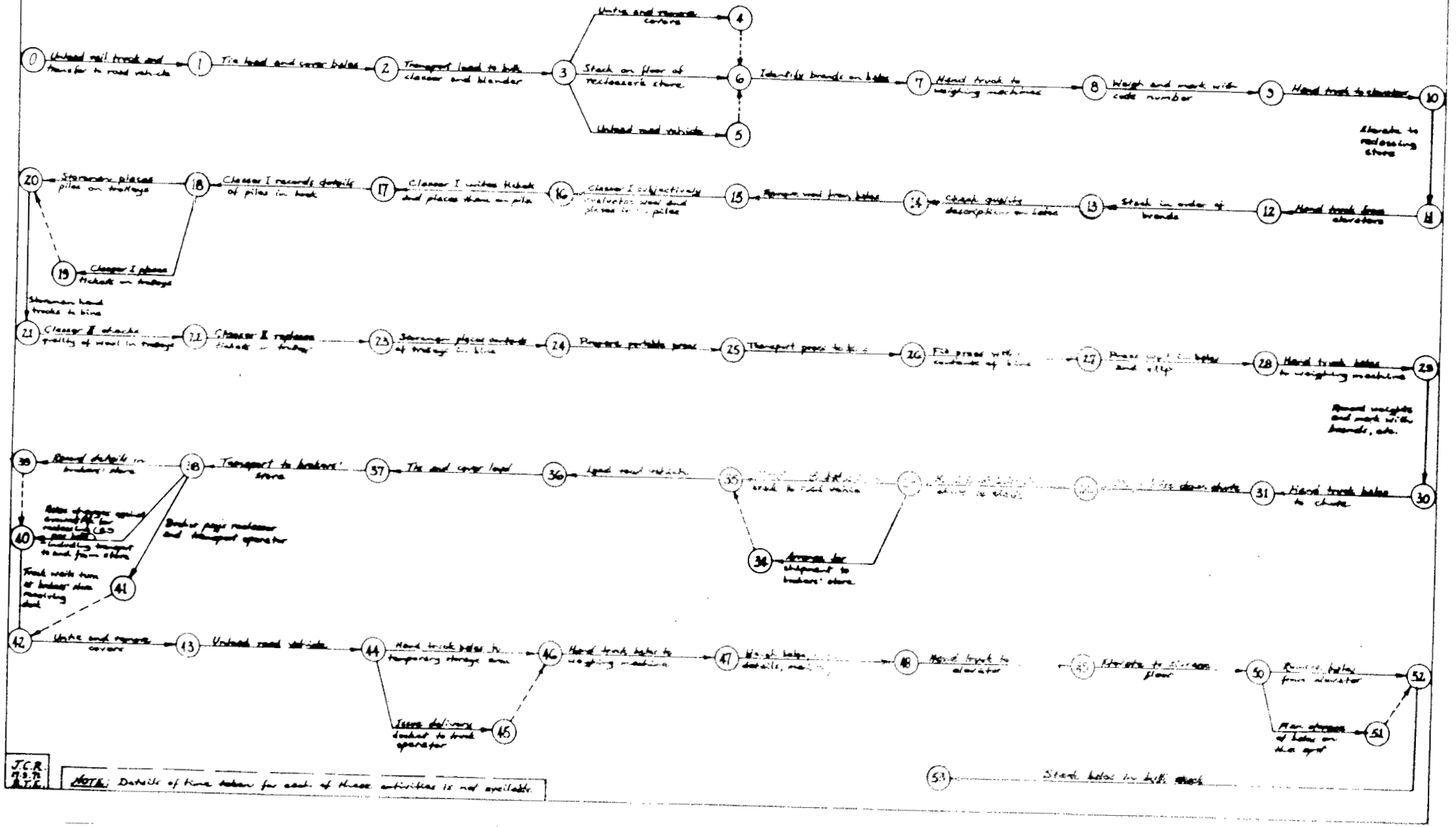
GROWER'S A/c

	$
Wool store insurance	$ 32
Reconditioning	40
General warehousing	600
Repacking / reweighing	14
Reclassing	50
Interlotting	30
sub-total	$812



Sub-Diagram D.3(a)

Wool Classing, Blending & Mixing
Activities in Bulk Classing Organisation



J.C.R. 7.5.71 R.T.E.

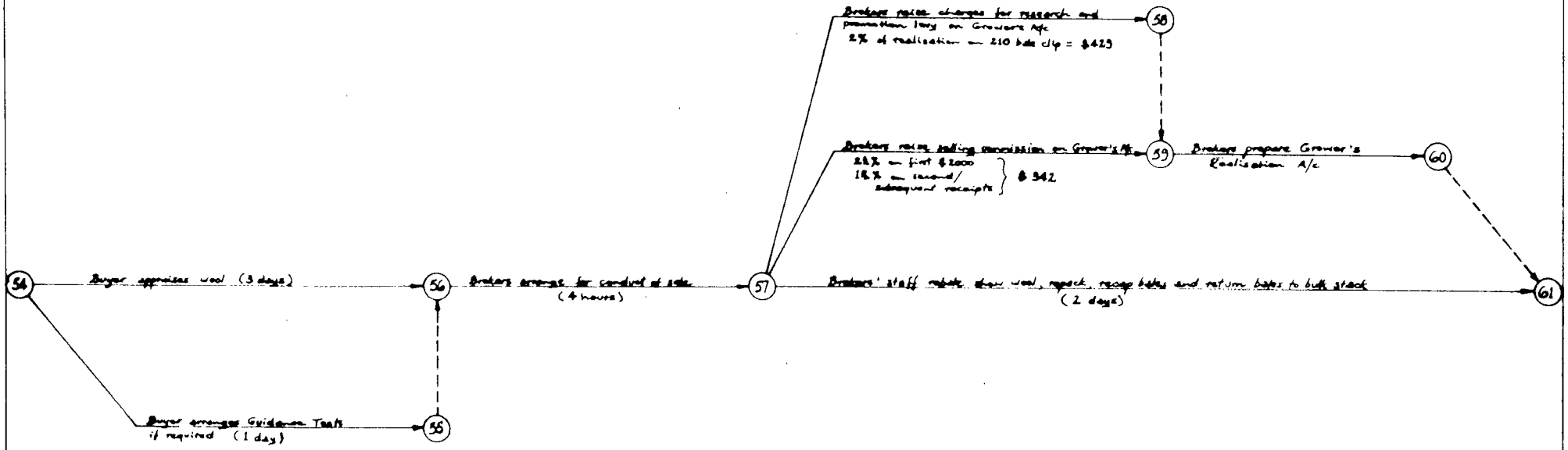
NOTE: Details of time taken for each of these activities is not available.

D.4

SELLING EXPENSES ON GROWER'S A/c
GROSS REALISATION ON 210 BALE WOOL CLIP

GROWER'S A/c

	Dr
Selling commission	$342
Promotion and research levy	429
Sub-total	$771



GROWER'S REALISATION A/c — 210 BALE CLIP

	Cr		Cr
Fleeces	$ 16,372	Wool shed costs	$ 3478
Broken wool	2,876	Transport – shed to store	1,067
Pieces	1,526	Warehousing and sale preparation	812
Locks	189	Selling expenses	771
Bellies	514		
Crutchings	226	Net Realisation	15,333
Other	55		
	$ 21,458		$ 21,458

J.C.B. 26.3.71 B.T.C.

SELLING EXPENSES = $ 2.67 PER BALE

PURCHASE EXPENSES ON BUYER'S A/c.

BUYER'S A/c.

	£
Removal from stock, core testing, weighing	617
Buyer's administration expenses at set charges (telex, etc.)	272
SUB-TOTAL	$889

61 Brokers store 209 bales on Buyer's A/c — 28 days free storage
- for next 4 weeks : 5¢ per bale per week
- for next 8 weeks : 10¢ per bale per week
- for remainder of storage period : 50¢ per bale per week

Brokers raise charges for wool purchases on Buyer's A/c
209 bales — $21,438
(14 days — prompt period)

62 Buyer pays brokers $21,438 at end of prompt period (1 hour)

63 Brokers settle Grower's A/c (see Realisation A/c on D.5 for details)

70

Brokers' staff break bales from bulk stock for core testing and hand truck to scales
(209 bales — 1 hour)

64

Testing authority staff weigh bales and take core samples
(209 bales — 1 day)

65 Testing authority reports results to Buyer (3 days)

68 Brokers accept Buyer's claim of misrepresentation and credit Buyer's A/c.

69

Buyer rejects lots purchased and makes claim against brokers

67 Buyer accepts verification of purchases (1 hour)

71

Buyer forwards delivery instructions to brokers, dump, and shipping agents (1 hour)

72 Brokers move bales to dispatch area and store — 209 bales (1 day)

73 Wait for transport to dump (1 day)

74 Load bales on truck for delivery to dump (4 hours)

76

Buyer raises charges on Mill for out-of-pocket expenses (administration, overhead, including telex, stamp duty, renumbering, etc.)
209 bales @ $1.30 per bale = $272

75

66 Testing authority raises charges on Buyer's A/c
$616.91

Charges raised by testing authority (for yield and fibre diameter)

- **Loose Lots**

				$
Fleeces :	18 lots	with 10 bales in each	@ $ 26.84 per lot =	348.92
Broken wool	2 "	" 8 " " "	@ $ 24.82 per lot =	49.64
" " :	1 "	" 9 " " "	@ $ 25.96 per lot =	25.96
Pieces	3 "	" 8 " " "	@ $ 24.82 per lot =	74.46
Bellies	2 "	" 5 " " "	@ $ 21.40 per lot =	42.80
				$ 541.78

- **Interlotted Steers**
  - 20 bales aggregated into 4 lots

Pieces	3 lots	with 6 bales in each	@ $ 22.54 per lot	67.62
Bellies	⅓ "	" 6 " " "	@ $ 22.54 per lot	7.51
				$ 75.13

TOTAL TESTING CHARGES $616.91

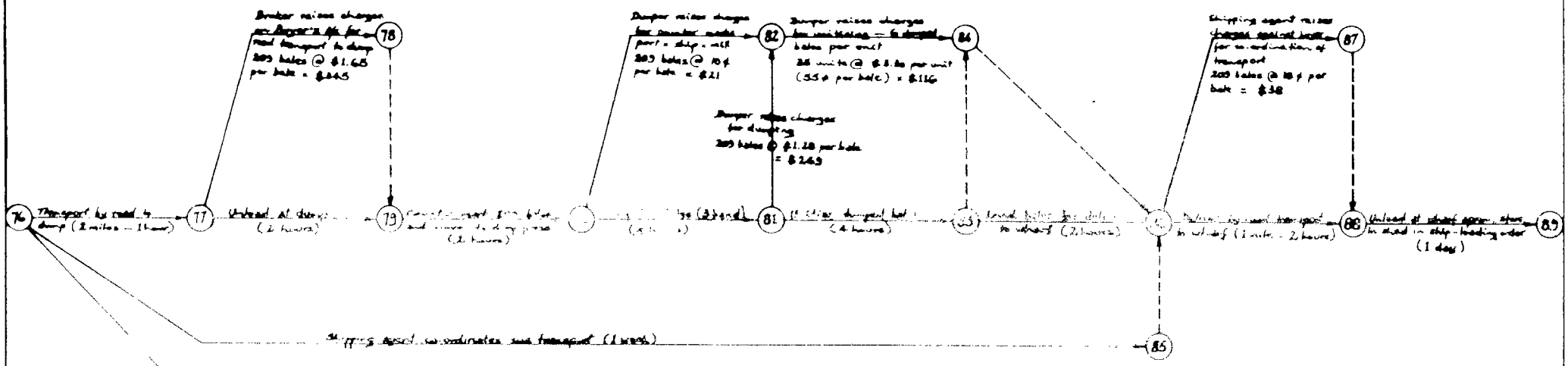
J.C.R. 28.9.71 B.T.C.

NOTE: Buyer's purchase expenses are included in the price offered by the Buyer for the purchase at auction of wool on Mill A/c : the expenses form part of the costs of meeting mill specifications.

PURCHASE EXPENSES ON BUYER'S A/c = $4.25 P.B.

D.6

SHIPPING EXPENSES ON BUYER'S A/C
DUMPING & DELIVERY TO WHARF



NOTE Shipping agent charges on Buyer included in negotiated freight rate, as follows:-

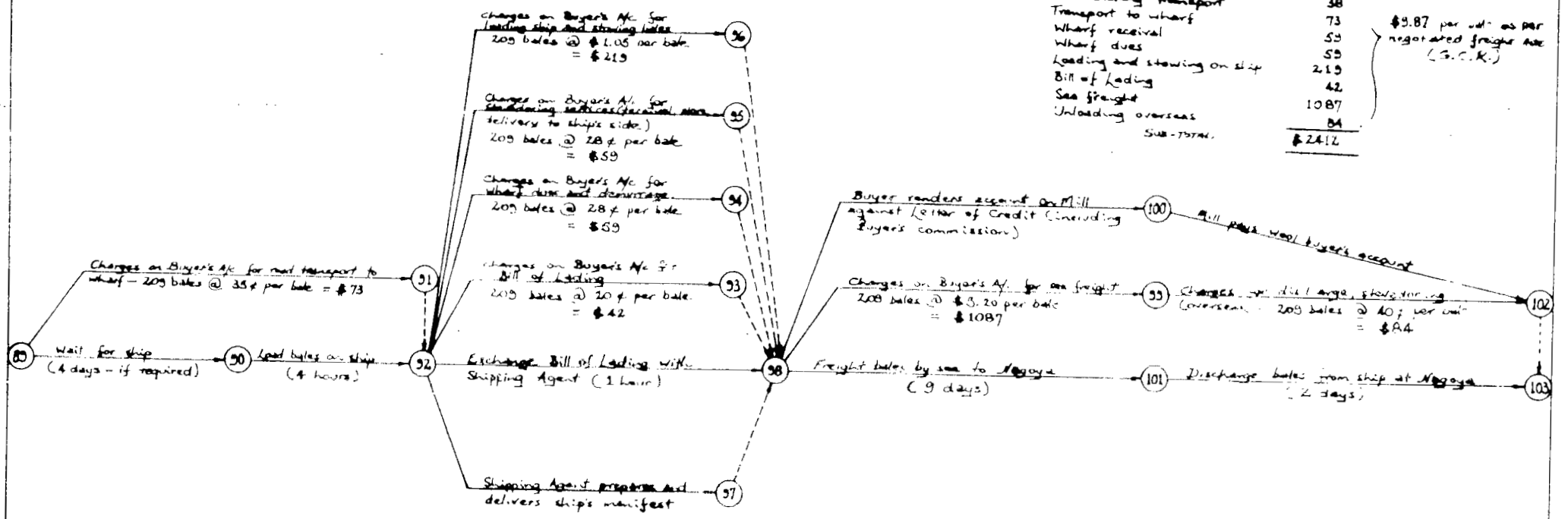
- Co-ordination of road carriers to draw wool from brokers' stores/outstores to dump to meet stowages (i.e. mill and / or port x ship).
- Co-ordination of movement of bales from dump to wharf apron (centralisation costs are spread over all bales, whether or not they have to be centralised).
- Arranging for space on wharf, in transit shed.
- Arranging for stevedoring, stacking in ship-loading order by destination, movement from wharf to ship's side, taking in and stowing in ship.

JC.R.
24.3.71
B.T.E.

SHIPPING EXPENSES ON BUYER'S A/C – DELIVERY TO OVERSEAS PORT

BUYER'S A/C:

Transport to dump	$ 345	– not included in negotiated freight rate
Counter marking	41	
Dumping	449	
Unitising	116	
Co-ordinating transport	38	
Transport to wharf	73	$9.87 per unit as per negotiated freight rate (C.I.F.)
Wharf receival	59	
Wharf dues	59	
Loading and stowing on ship	219	
Bill of Lading	42	
Sea freight	1087	
Unloading overseas	84	
SUB-TOTAL	$ 2412	



FROM 76 — MARINE INSURANCE COVER — TO 109 (To show at M.I.)

WOOL BUYER'S REALISATION A/C

	DR $		CR $
Wool purchases (209 bales of Walgett wools)	21,458	Wool sales (209 bales as per contract)	22,220
Purchase expenses	888	Buying commission	277
Transport to dump	345	Transport expenses	2,412
Overseas freight, consignment of 209 bales to Nagoya	2,007	Buyer's out of pocket expenses	273
Net balance	422		
TOTAL	$ 25,181	TOTAL	$ 25,181

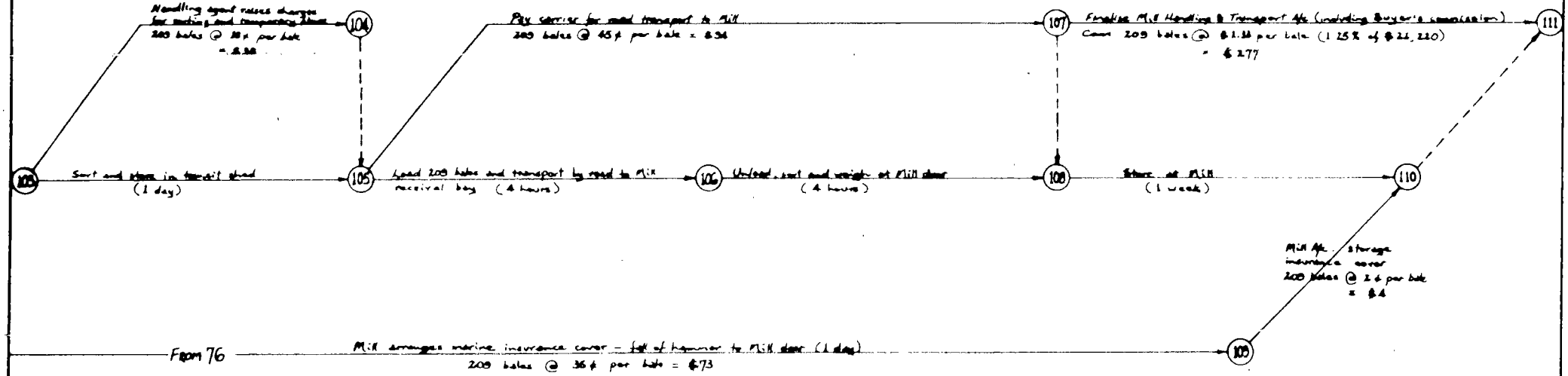
J.C.R. 28.3.71 B.T.L.

SHIPPING EXPENSES ON BUYER'S A/C = $ 11.52 PER BALE

Handling & Transport Expenses on Mill A/c

Mill Handling & Transport A/c (Overseas)

Buyer's commission	$ 277
Sorting and storing in transit shed	38
Road transport to mill door	34
Marine insurance	73
Store insurance	4
Sub-Total	$ 486



Mill Purchase & Handling A/c

	$
Purchase	$ 22,220
Buyer's direct expenses	2,684
Buyer's commission	277
Handling & transport	132
Insurance	77
Total	$ 25,390

TOTAL MARKETING EXPENSES PER BALE FOR 210 BALE CLIP

	$
• Wool shed costs	16.54
• Transport – shed to store	5.08
• Warehousing expenses	3.87
• Selling expenses	3.67
• Purchasing expenses	4.25
• Shipping expenses	11.52
• Mill handling expenses	2.33
TOTAL	$ 47.26

J.C.R. 23.2.71 B.T.E.

MILL HANDLING & TRANSPORT - $ 2.33 PER BALE

ANNEX C

WOOL SHED OPERATIONS

Introduction : This annex deals with operations in the wool shed in so far as they affect handling costs or subsequent transport costs. Comments are made on innovations and technological developments[1] having a bearing on wool shed operations.

The Wool Shed activities and costs in our Case Study are depicted in detail in Diagram D.1 attached to Annex B.

In Annex B, pages B4 and B5, the principal cost components in wool shed operations were identified as the cost of shearing (21 cents per sheep), the cost of hiring shed hands (10.33 cents per sheep), and the cost of pressing and weighing (3.43 cents per sheep). Classing costs the Grower a further 3 cents per sheep. The Grower paid $294.18 per day to the contractor to shear 6,300 sheep and skirt, class and pack the wool output into 210 bales. Added to the cost of the wool packs, the wool shed operations in our Case Study accounted for 55.5 per cent of the total costs directly incurred by the Grower. Specific details of the wool shed costs for the model clip are set down in Appendix 2 of Annex B.

These operative and costs details, when considered in the total marketing context, show that wool shed operations in respect to skirting, classing and pressing have total marketing cost consequences which may not be appreciated by many growers.

The following discussion examines wool shed operations in the context of possibilities for effecting changes within the existing marketing arrangements which would reduce the costs of wool bale transport to brokers' stores, warehousing, selling and purchase expenses and shipment to overseas ports.

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(1) The term innovation is used to cover the entire range of processes by which 'new things' emerge in the area of science, technology or art. The term technological development is used to describe change in the functional sense; that is, to designate changes in the coefficients of a function relating inputs to outputs resulting from the practical application of innovations in technology and in economic organisation. See, for instance, V. Ruttan, 'Usher and Schumpeter on Invention, Innovation and Technological Change', Chapter 3 in The Economics of Technological Change, edited by N. Rosenberg, Penguin, 1971.

General : A C S.I.R O. Shearing Study Group has been examining wool 'harvesting'(1) in Australia, with a view to the development of improved methods and operations which could lower the growers' costs. The Study Group expects to provide a full report to the Executive of the C.S I.R.O. on its investigations and studies in the near future.

The style of the report being developed by the C S I R O is expected to cover the following aspects of wool harvesting in Australia :

- Present Practice
- Costs of Shearing and Other Operations
- Labour Relations
- A Summary of Innovations, Current Investigations and Development Work
- Detailed Discussion of Industry Problems
- Recommendations

The work of the Study Group suggests that, within the existing institutional framework. there is a limited scope for increased productivity in the shed. The scope is limited to better shed layout. more flexible shearing machinery, classing of wool into fewer lines, streamlined and possibly mechanised handling of wool and faster and more dense packing of wool in bales.

The effect of improvements in some of these areas of shed operations, however would only be marginal and, for most properties, the capital investment required would not be a practical or economic proposition at the present time. Labour costs could possibly be reduced, however, by using sheep-holding devices to minimise the physical labour and skill of shearing and allow at least a small grower's farm hands and family to replace a hired shearing team.

Studies of shearing shed designs and operations made by the National Materials Handling Bureau in 1951 1952 and 1970 showed that sheep and shearer movements, wool handling. and bale pressing operations in the shearing shed could be reduced by approximately half

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(1) The term 'wool harvesting' has been adopted by the C.S.I R.O. Study Group to encompass sheep handling and shearing, wool handling in the shed, clip preparation and baling operations and the associated costs.

Inefficiencies in the shed were identified with poor work flow arrangements as between the sheep and the shearer, poorly designed mechanised shearing equipment, variability in standards of shearing practice, illogical locations of holding pens, catching pens, tables, bins, presses and scales. Poor maintenance standards for equipment were also referred to as being reflected in numerous interruptions to work flows in the shed due to break-downs. In addition, press designs were considered to be poor, with the result that press operations are laborious, cumbersome and time-wasting. It follows therefore that in many sheds a great deal of effort is unproductive. The National Materials Handling Bureau, at the direction of its Advisory Committee, is currently collecting information on shed designs, layouts, flow charts, equipment techniques and methods with the object of publishing desirable wool shed standards and practices.

Research and investigations carried out to date by various organisations and individuals suggest that real productivity gains in wool harvesting can only be achieved through increased throughputs using larger bale units the use of large fixed or mobile depot or central shearing and packing sheds,(1) in association with highly skilled and integrated shearing teams and through changes in wool preparation procedures which would eliminate or modify classing in the shed.

Adoption of central shearing and packing complexes for small and medium-sized clips (small clips 30 to 80 bales medium clips 90 to 300 bales) could see the wool being taken from the sheep, sorted into 10 to 15 lines and being packed in bale units as large as 3,000 lb. Alternatively, the wool could be delivered from shearing sheds to a grading and packing complex in a cotton trailer-type unit of 10-ton

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(1) A depot shed or central shed is a shearing shed complex which has been built for use by a number of growers located in close proximity to the shed. The shearing is arranged on a tight roster system, with the management of the shed being conducted on a co-operative basis. There are depot sheds still in existence in areas of Queensland and Western Australia dating back to the pre-soldier settlement sub-division days. The Depot shed concept was abandoned because of the problem of setting a tight shearing roster, not always convenient for individual growers and in some areas of footrot. The history of the wool industry shows that as small selections gained in viability the grower constructed a shearing shed to gain independence from the roster system of shearing and also to add some prestige to his holding.

carrying capacity attached to a semi-trailer of 12-ton capacity, carrying loosely packed wool. Bulk classing could then be carried out at the handling and packing complex in a decentralised location no more than, say, 200 miles by road or rail from an individual farm location.

For larger clips, of 400 to 1,000 bales, many of the innovations relating to shearing and packing identified by the C.S.I.R.O. Study Group, the National Materials Handling Bureau and the Australian Wool Board could be applied in the shed itself because of the opportunities in large sheds for taking advantage of economies of scale to reduce unit costs.

Shearing : Innovations in the shearing shed may come in the future from further experimental work on chain shearing systems, chemical shearing, or even automated shearing. At present, according to the C.S.I.R.O. Study Group, innovations in these areas wait on the completion of developments in equipment and methods. The motivation for seeking increased productivity in shearing is that shearing operations are essentially labour intensive hence have been rising steadily in cost.

The B.T.E. is not in a position to comment on likely developments in shearing itself. However, the problems of successful innovation are obvious. Moreover, even if there were to be commercially practical developments in shearing using chain systems or chemicals for instance, this would still leave the problem of handling and transporting the shorn wool.

Work is being carried out by a Melbourne inventor and others on chain shearing systems. It was the C.S.I.R.O. Study Group's view, however, that while some of the equipment proposed may be suitable for use by small growers, a complete chain system would only suit co-operative use or very large sheds. In consequence it might well be that in the face of rising costs of labour there could be a move to return to the use of depot sheds. This approach would undoubtedly increase the economic viability of suitably located growers

One reason for abandonment of depot sheds was footrot. As this problem appears to have been largely resolved[1] the C.S.I.R.O. Study Group has suggested that it may now be possible and economical to move sheep by road transport (or by droving) to a large depot or central shed for shearing, where an appropriate chain shearing system has been installed.

What has to be considered here is the economics of moving the sheep vis-a-vis the use of mobile shearing sheds. At least one shearing contractor (in Western Australia) has a team which travels with all its equipment mounted in a caravan train. The C.S.I.R.O. Study Group envisages the extension of this concept to the idea of a mobile factory. Extension of the practice would involve moving the mobile shed from district to district on a carefully arranged schedule, shearing each flock and packing the wool for transport direct to holding stores.

Classing : In the wool industry the term 'classing' is taken to mean the operations of grading skirted fleece wools into the most attractive parcels for sale. The basic objective is to prepare wool for market in the hope that it meets the requirements of the manufacturing sector as seen through the eyes of the grower's agent (the broker) and the buyer. Classing, as practised in the shearing shed is generally limited to the grouping of the wool clip on each property into types or lines subjectively determined in the shed by the classer. As these determinations can differ considerably from classer to classer the industry has been concerned to set standards and guidelines for classers to follow.

An earlier analysis of wool classing and coding suggested that deficiencies in classing standards, and the tendency on the part of growers and classers to overclass the clip, resulted in the need to

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(1) Footrot usually only occurs in the higher rainfall areas - some graziers in these areas still have trouble with it. The problem is expected to be resolved with the introduction of a new footrot vaccine expected to be available commercially in 1972. In some areas lice could be a problem, in consequence some growers may reject proposals for a return to the depot shed concept. The C.S.I.R.O. Study Group, in examining the proposition would expect certain quarantine rules to be applied to the movement of stock in association with the use of depot sheds.

display a high percentage of wool on brokers' show floors.(1) This need adds significantly to warehousing and sale preparation costs.

In classifying the fleece wools the classer is expected to take into account quality, number, strength, length, condition, colour and vegetable and other faults. The physical characteristics of the wools are assessed by hand and eye methods, but without a real knowledge of buyers and manufacturers' actual requirements in respect to these characteristics.

The Australian Wool Board, the Bureau of Agricultural Economics and the Australian Wool Commission, in close association with brokers and buyers, have made efforts in recent years to lift classing and wool preparation standards.(2) However, an interesting innovation in wool classing has come from the work of the new grower organisation, Economic Wool Producers Limited.

The clip preparation standards set by this company seek to take advantage of facilities available for scientific measurement of the physical characteristics of wool. By such means it is hoped that the needs of the mill client will be met more exactly and yet more easily. By extending these standards it is hoped that the industry will be enabled to take advantage of bulk classing of wool into large sale lots in the shed itself.

Economic Wool Producers Limited requires growers located in clean country to divide their clip into five lines only - fleece wool, weaner wool, lambs' wool, bellies and pieces. Classers are directed to skirt very lightly, culling out only stained pieces, black fibres and skin pieces. All other wools go directly into one line for the fleece wools. Cotted (i.e. heavily matted and tangled) wools and heavily burred pieces are also expected to be separated out. Where the fleece itself is heavily burred the standards of preparation for sale

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(1) Ministry of National Development, Division of Industrial Development, Materials Handling in the Wool Industry 1951. (Basic Working Document for the Materials Handling Testing Station).

(2) See in particular the Australian Wool Board's Report on Wool Marketing, Vol. 3, October 1967, presented to the Australian Wool Industry Conference.

set by the Company suggest that the fleece simply be sold on its merits, burr and all (with stains removed). It is the Economic Wool Producers Limited's view that there is little to be achieved by seeking to separate out burry pieces in the middle of a fleece; the whole fleece can be damaged by such action. It is agreed that modern textile machinery in the woollen industry can be set to take burred fleeces after carbonising and combing.

Pressing : Some years ago the C.S.I.R.O. carried out a considerable amount of experimental work on the achievement of smaller bales of higher density by the use of liners to reduce woolshed press box cross-sections and by experiments with rigid bale ends, steel ties, packless bales, etc.(1) The most promising possibility at that time was the use of press-box liners ('slack pack' and 'narrow bales'), but a hydraulic power press with increased pressure and stroke was desirable for the best results. The C.S.I.R.O. also developed the 'vacuum-pressing' method of baling which uses a milking machine vacuum pump and a simple packing box instead of a conventional wool press. This method can produce improvements in bale density but was not adopted commercially, except by a handful of growers, because of difficulties in dumping bales for export. (The plastic-film liners used in the bales caused bales to burst in ordinary dump presses. This might be overcome by the use of a box-type dump press, or in many cases by fitting spikes on the press platen to pierce the plastic liner and so allow the escape of air during bale compression.)

In view of the fact, that of the 79,000 wool presses in Australia, only 9,000 are power-operated(2), the overall capacity to achieve large increases in bale weights and density appears to be limited(3).

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(1) 'New Approaches to Wool Baling,' Rural Research in C.S.I.R.O., No. 58, March 1967; Pastoral Review, December 1969.

(2) Commonwealth Bureau of Census and Statistics. Wool Production and Utilisation, 1969-70, p.19, (Ref. 10.38)

(3) Filled bales vary considerable in compression, weight and length. The minimum bale weight is 250 lb (soft bale resulting from light pressing or trampling without a press) but a bale of locks could weigh as much as 650 lbs. The average weight per bale is close to 300 lb. These variations create difficulties in transport, storage and handling right from the shed to the mill gate.

The Federal Advisory Committee on Materials Handling has recently directed the National Materials Handling Bureau to investigate ways to develop a simple device for 'in press' weighing. Development of such a device would ensure that bales were pressed to their maximum capacity but never exceeded the maximum of 450 lb[1].

The problems of improving shed pressing can be illustrated by considering a large property with 35,000 sheep which could expect to produce 1,000 bales of wool per season if packed in a manual press. Use of an hydraulic machine could give the same weight of wool packed in 800 bales. The cost of the hydraulic press would be about $1,300.

The savings in the first year using the hydraulic press could be as much as $1,400 to $1,600. The grower could also save 200 wool packs costing $1.84 each and the cost of transport and handling from farm to the broker's store on 200 bales, at something like $3.20 per bale. A practical difficulty in general adoption of power pressing (apart from the initial capital cost of the press) is the fact that shearing teams and pressers stand by each other[2] and there would probably need to be a change in the relevant industrial awards to take account of increased productivity of pressers using an hydraulic power machine.

It is obvious that it would take a long time to get power presses into most sheds because of the capital cost involved. The wool marketing system therefore would need to provide a substantial bonus, in terms of reduced transport and handling charges, to the

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(1) The maximum weight of 450 lb is set down in a Registered Agreement under the Commonwealth Conciliation and Arbitration Act between the industry and the Storemen and Packers' Union.

(2) In general, shearing teams do not like sheds with hydraulic presses because the presser in the team gets paid at a lower rate per bale and less bales are pressed by him. Under the Federal Pastoral Industry Award the presser would be working on piece rates and these rates are lower where power presses are used - 84 cents per bale vis-a-vis $1.26 per bale or 42 cents per cwt. In Queensland there is a separate State award covering workers engaged in the pastoral industry. Both Awards are geared to the existing labour situation and recognise the limitations that exist for increased productivity in small shearing sheds.

industry to get it to press wool in heavier bales[1]. The use of heavier bales, however, would present opportunities to reduce costs through making better use of existing mechanical handling equipment at important stages of the marketing and handling process.

Some criticism has been levelled at heavier bales from those involved with them on the show floor. There has also been criticism from the mill end where difficulties have sometimes been experienced in cold climates in opening up wool for sorting from heavily dumped bales. However, the C.S.I.R.O. and the Australian Wool Board do not accept these as major points against heavier bales.

Bale Density : The National Materials Handling Bureau, in its recent Report on wool handling[2], suggested that wool press designs should be studied with the object of supplying technical information for manufacturers and growers in order to increase the density of each bale. This research could result in the use of fewer wool bales, with subsequent savings in transport and handling costs.

There is no question that heavier wool bales will reduce the cost of transporting wool. The density of loads moved by road and rail vehicles at present does not permit a maximum vehicle/wagon payload to be carried. Research by the National Materials Handling Bureau suggests that road vehicles at present only carry approximately 69 per cent of their capacity when moving wool bales and the average for rail wagons is much less at 40 per cent of carrying capacity[3]. It may be that the reduced costs of transporting heavier bales would not wholly accrue to the grower but would in part be to the benefit of the transport operator. This possibility does not, however, weaken the desirability of reducing the real resource cost of transporting wool.

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(1) Heavier bales could present some problems on farms where the bales are stored on the ground and the handling equipment available to load vehicles is a simple gin pole or underbraced jib without power assistance.

(2) Department of National Development, National Materials Handling Bureau, Wool Handling (Sheep's Back to Store). 1970.

(3) If the same amount of wool as baled and pressed at present were packed in a form occupying only half the volume, rail trucks at present in use in the State systems could be loaded at close to weight capacity. Substantial savings would accrue because only half of the present rolling stock used for wool transport by rail would be required.

The National Materials Handling Bureau reported also that a considerable number of advantages could be gained from the movement, handling and transport of wool bales if the density of the shed pressed bale was increased by reducing the bale size for the present weight, or by changing both the weight and the size of the wool bale - in other words development of a small wool bale.

The 'narrow bale', developed by the C.S.I.R.O. and referred to above, has overall dimensions of 24½ inches by 24 inches by 49 inches. It has a volume close to that of the present 'conventionally' dumped bale of 17-18 cubic feet.(1) The C.S.I.R.O. work included examination of feasible and inexpensive modifications to existing mechanical and hydraulic presses. Modifications suggested involve the use of packing sleeves made from hardboard set into the bale press, at a cost of $100 per press. The main points in respect of the use of 'narrow bales' put forward by the C.S.I.R.O. were :-

(a) no advantage would occur where rail transport was used because the existing freight charge on rail for wool bales was based on the bale unit rather than the bale dimension or weight;(2)

(b) some advantage from the use of 'narrow bales' would accrue to the broker, mainly through reduced storage costs per bale, any savings in storage costs could be passed on to the grower in lower broker's charges;

(c) if the grower normally moved his bales from the wool shed to the broker's store by road transport the use of 'narrow bales' could mean a possible reduction in road freight charges where the rate per bale was set by the contractor on a volume basis - the capacity of a 15-ton semi-trailer would probably increase from 80 to 100 bales (depending on the stacking pattern used) to 140 bales.

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(1) Cf. 'high' density dumped bales . 9 cu ft , 'medium' density dumped bales : 12 cu ft , normal' density dumped bales : 15 cu ft.

(2) Rail freight charges set on a weight basis apparently involve a substantial amount of administrative effort and cause delays in issuing freight accounts. The use of a per bale rate from railhead to store reduces clerical efforts and delays and discourages soft bales; soft bales have been the cause of many road and rail accidents due to the tendency of the wool load to settle and then shift as the centre of gravity of the load changes during the course of the journey.

Although it has very obvious stowage advantages, under the existing marketing arrangements which provide for the bale to be opened, appraised, repacked, re-pressed, core sampled and re-weighed and then dumped, it appears there is little if any advantage to be gained in using the smaller bale. In addition, the use of small bales would increase the work load involved in manhandling for repacking and re-pressing after the sale.

The argument is advanced in Chapter 5 of this report to the effect that the industry would be better served by moving towards the development of acceptable methods of assessing wool scientifically, in association with changes in selling procedures which leave the wool stored in the hinterland, the desired tendency in these circumstances would be to increase the bale size rather than decrease it.

Other Developments : The National Materials Handling Bureau expressed the view in its 1970 report on Wool Handling that there should be a continuing programme of dissemination of technical information, education and extension services to ensure that information arising from studies on wool handling efficiencies does reach the grower. The National Materials Handling Bureau has suggested in this report that many developments previously brought to the attention of the industry are still valid under current institutional arrangements and could still be used to lower costs and increase efficiency in the shearing shed. These developments include the following :

- strainers for tightening flaps on wool bales
- bale fastener removers
- pawl release for wool presses
- self-supporting wool press monkey
- capless pack system

No effective action has been taken to implement the use of the capless pack system (reported on in 1956 by the National Materials Handling Bureau as likely to save the industry over $1m per annum in lower jute material usage) apparently as a result of differences of opinion on its merits and the fact that some sectors of the wool handling industry would be 'disadvantaged'. More recently light weight synthetic fibre packs (weighing 3 lb as compared with 10½ lb for a jute pack) have been introduced but capless packs would still result in a saving.

Other areas of study undertaken by the National Materials Handling Bureau in association with the Australian Wool Board, include examination of the suitability for handling and transport of traditional and treated jute pack materials compared with woven synthetic material[1], and development of an improved device to increase accuracy and legibility of bale marking in the shed (as well as other stages in the handling process where the bales are marked).

The National Materials Handling Bureau has also suggested that, apart from updating of cost factors and some statistics, the 'information' in the Basic Working Document was still valid. The National Materials Handling Bureau, in referring to these earlier investigations into the wool industry pointed out that 'the report was issued (in 1951) at a time when wool prices were at their peak and when few seriously considered that there was a need to improve inefficient materials handling activities'.

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(1) The industry seems now to have discarded the jute pack almost completely in favour of the synthetic pack.

ANNEX D

TRANSPORT - SHED TO STORE

Introduction: All wool bales are moved by road for some part of the journey from wool shed to broker's store. Movement direct into the broker's store is generally over long distances by 15 to 20-ton capacity semi-trailer units. A substantial part of the Victorian wool clip is moved by grower's own transport, while in New South Wales increasing quantities of wool bales are being moved interstate on semi-trailers for sale in Geelong, Adelaide, Melbourne or Brisbane. Bale movement by road transport over long distances in Queensland and South Australia has always been substantial, while in Western Australia there is a trend towards greater use of road transport. The major proportion of wool bales moved into store in Tasmania goes by road transport.

Large quantities of wool bales are also moved by semi-trailers and 8-ton vehicles from farms to railheads, particularly in New South Wales and Western Australia.

In all States except South Australia there is legislation which limits road/rail competition. In New South Wales the movement of wool bales intrastate by road over distances in excess of 50 miles in competition with rail is prohibited. In Victoria, Queensland, Western Australia and Tasmania permits or licences are required. In Queensland, the permit fees on wool bale movement by road constitute a ton-mile tax.

Some notes on these regulations and restraints are contained in Appendix 1 to this Annex.

ROAD AND RAIL

General: A recent study on wool transport in Australia was published by the Australian Wool Board as part of a major effort aimed at establishing the most efficient way to market the Australian clip.(1)

According to the Australian Wool Board(2), legislation in the various States limiting the use of intrastate road transport by the wool industry represents a significant cost penalty.

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(1) Australian Wool Board, Wool Transport in Australia, August 1971.

(2) See Wool Transport in Australia and Submission to the Board of Inquiry into the Victorian Land Transport System, 1971.

It is argued that the legislation makes the railways 'virtual spatial monopolists in the transport of wool'. This situation is said to allow the railways to 'charge what the traffic will bear'. The Chairman of the Australian Wool Board has advised growers in the pastoral zone of the Eastern States to place their wool on interstate road vehicles in order to minimise their transport costs.(1) The basis for this advice is the data collected by the Development Division of the Australian Wool Board on the point-to-point cost (generally published freight rates) of moving wool by rail. These costs (charges) are considerably greater than the quoted competitive road transport charges over the same routes.

Whether or not such road freight charges would be adhered to if demand for road freight rose sharply is an important question. The factors which would influence the situation would all tend to work in the one direction. Economies of scale are modest in road transport - hence, the main factors which would be relevant would be difficulty of obtaining backloading, queuing at wool stores and problems with storage capacity and these would all tend to add to costs. On balance, road charges could be expected to be subjected to upward pressure.

It is fair to add also that there is at present considerable advantage accruing to many farmers in the pastoral zone from the requirement that the State Railways act as common carriers. Moreover, much of the outwards freight carried on rail to country areas is carried at concessional freight rates. If there was less return freight for the railways in the form of bulk loading of wheat and wool and other primary products, upward pressures would develop on freight charges for foodstuffs, machinery, replacement parts, oils, fuel and lubricants, superphosphate and other farm requirements. In addition, small items, forwarded by rail to country storekeepers at moderate cost, could become less readily available to farmers in the hinterland.

The study by the Australian Wool Board does emphasise, however, that land transport costs alone would not determine the future of any particular selling centre, institution or marketing function presently in existence and serving the wool industry.

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(1) Victorian Farmer, 22 December 1970; Melbourne Herald 7 September 1971.

Drought Assistance: In considering the economies of the land transport of wool, drought assistance deserves a mention. Rebates of freight charges for the transport of fodder and water to drought-affected areas in the various States, the cost of transport of starving stock out of drought areas and the cost of transport of stock to areas that have recovered from drought have been of considerable benefit to the wool industry in recent years. The value of this drought assistance to farmers(1), in the form of freight rebates, has been estimated as follows:

FREIGHT REBATES BY THE STATES FOR DROUGHT ASSISTANCE

$m

State	1965-66	1966-67	1967-68	1968-69	1969-70
N.S.W.	6.9	8.4	6.1	8.2	6.3
Vic.	.4	.4	3.1	2.1	.5
Qld	2.2	1.2	1.4	1.1	8.4
S.A.	-	-	.4	.3	-
W.A.	.7	.8	.7	.5	.6
Tas.	.1	.3	.2	.2	.2
TOTAL	10.4	11.1	11.8	12.4	16.0

Source: Commonwealth and State Treasuries.

For the pastoral industry, the important point is that the freight rebates are actually made as drought affects a particular area, and the result is to sustain particular districts and transport facilities during the period of drought.

Rail Delay: Compared with the speedy and efficient door-to-door service provided by the road transport industry generally, it must be accepted that the use of rail transport for the movement of wool can entail delays in transit due to multiple handling of wool bales. (See, in particular, delay points in flow diagrams D.1, D.2 and D.3, Annex B.)

However, the extent of delays experienced in movement of wool from farm to broker's store by road/rail/road due to inefficiencies in the railway systems of the respective States is a matter of contention. The Victorian Farmers Union (2) and the Graziers Association of Victoria(2) claim that delays in rail

(1) Separate figures are not available for woolgrowers.

(2) See Submission made by this organisation to the Board of Inquiry into the Victorian Land Transport System, 1971.

transit of up to three weeks occur for very short journeys in Victoria and these delays cause increased warehousing and selling costs to growers.

The Victorian[1] and New South Wales Railways Commissioners have commented on delays to the effect that wool brokers are often unable to handle the volume of wool arriving at their sidings during the height of the season with the result that wagons are often delayed for days awaiting discharge.[2] In addition, the New South Wales Railway authorities claim that brokers use rail wagons and sidings as an alternative to storing wool in costly city warehousing space during peak sale periods (See Appendix 2, to this annex, pages 3 and 4).

Economies of Scale in Rail and Road: Railway costing and, in particular, the role of fixed costs, is referred to in Chapter 4. The key point was that costs tend to vary inversely with traffic density and mileage.

More specifically, line-haul costs are influenced by traffic density, the ratio of net to gross weight in the trailing load, track conditions which impose speed and load limits, and the available tractive effort of locomotives. Unit line-haul costs are substantially lower on the high-density routes. The ton-mile rail costs taper as the length of haul increases primarily because terminal costs are independent of the length of the journey. Thus, the pick-up and delivery costs at each rail terminal are more significant for short than long hauls for the consumer. Additional handling at railway terminals hence tends to offset the advantages of the low line-haul operating costs which railways can attain over high density routes.

Road transport on the other hand is flexible and adaptable and can even compete with railways in long-haul operations. The adaptability of road transport is exemplified in recent innovations, such as the introduction of containers for small volume business by sea and rail and the development of 'piggy-back' and 'fish-back' services (joint road-rail and sea-rail operations).

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(1) See Submission made by this organisation to the Board of Inquiry into the Victorian Land Transport System, 1971.

(2) The wagon usage loss in N.S.W. in 1969-70 due to the inability of stores to accept wool promptly has been estimated at 7,000 wagon-days.

The smaller road haulage firms can avoid certain relatively fixed charges for repair and terminal facilities by paying commission to agents who procure consignments, and by arranging contracts with specialist firms for the maintenance of their vehicles. Thus the minimum volume of traffic which is necessary for viability in road haulage is very much less than is necessary for rail operations. Consequently, road haulage is more suitable when the volume of business is sparse.

The market structure of the road-haulage business is extremely competitive. Rate cutting is prevalent, with a fairly high turnover of operators. Entry into the industry is relatively easy, especially when hire-purchase finance is readily available and significant line-haul economies of scale are not apparent.

In brief, the economics of rail operations are dominated by economies of scale (density, mileage) but this is not true of the road transport industry.

Taxes and Road Track Costs: This matter is discussed in Chapter 4. Details of the taxation estimates used in that Chapter are shown in Appendix 2 to this annex.

INNOVATIONS

Pick up points: The common carrier obligation adds to the cost of transporting wool by rail. The railways are obligated to arrange for pick-up of 4 and 5 bale clips from little used railheads on branch lines. Considering the carrying capacity of State rail trucks normally used to transport wool bales, the out-of pocket expenses involved in these operations are substantial. No information is available on what constitutes a minimum economic wool train unit, but the capacity of rail trucks normally used to transport wool bales is as follows:

- N.S.W. - 'S' type 51 bales
- Victoria - 'I' type 63 bales
- Queensland 'H' type 60 bales
- South Australia - 'Y' type 48 bales.

A further difficulty the railways must take into account in any consideration of wool bale consolidation is the fact that double handling costs are incurred where wool bales are required to be transported from the farm to a railhead for consignment to a rail terminal. The Australian Wool Board has pointed out that a road vehicle, once loaded with wool.incurs little extra cost by takingthe wool past the regional railhead all the way to the

wool store.[1] A semi-trailer could pick up at least four 20-bale clips from scattered properties as part of an 80-bale load transported interstate direct to a broker's store. With reasonable backloading available the operation could be very competitive with rail, simply because of the savings in handling charges, journey time and demurrage charges on rail wagons. (These comments ignore factors relating to road track costs not paid for by the road transport industry).

The railways therefore have to seek innovations which give fast reliable transport service to the wool industry at a competitive price. The railways, of course, could compete more aggressively with road hauliers if they were able to ignore the common carrier obligation and sponsor the establishment of regional wool handling centres. The railways could then lower their operating costs for wool transport by moving consolidated train loads of wool.[2]

The following table indicates that there are opportunities for State railways to take action to consolidate train loads of wool:

State Railway System	Total Stations Accepting Wool	Stations Accepting less than 100 bales of wool during year		Year
		Total	Proportion of Total Stations Accepting wool	
	No.	No.	%	
New South Wales	290	53	18	1968
Victoria	498	179	36	1968-69
Queensland	178	67	38	1967-68
South Australia	190	109	57	1968
Western Australia	431	50	12	1969-70
Tasmania	48	26	54	1970-71

Source: Respective State Railways.

(1) See Wool Transport in Australia and Submission to the Board of Inquiry into the Victorian Land Transport System, 1971.

(2) This approach is already in operation at Walgett, Pokataroo, Moree, Wagga and Griffith in N.S.W. See Wool Transport in Australia, p5.

On this point, the National Materials Handling Bureau recommended, among other things, that the number of pick-up points for collecting bales of wool (using the existing pack) should be the subject of a co-ordination study to determine the best means of achieving a more economic and a better flow of wool to brokers' stores or to destinations.(1) It was argued that there is considerable inefficiency associated with the excessive number of country pick-up points and transport routes used for moving wool bales to brokers' stores. Increased efficiency, according to the National Materials Handling Bureau, would flow from controlled frequency of bale movement and increased volume. Controlled volume and frequency of bale movement would in turn enable existing systems of lifting and shifting to be improved or rationalized.

Efficiency in such circumstances would also be enhanced by the use of sophisticated automatic bale handling systems developed by the National Materials Handling Bureau. These innovations could be justified where there is increased volume and frequency, with intermittent handling operations reduced to a minimum and costly transit delays avoided.

Consideration of pick-up points for wool bales leads naturally to an examination of the economics of decentralised regional storage sheds. The National Materials Handling Bureau has suggested that regional storage sheds and wool bale pick-up points should be located together. Regional storage and bulk handling innovations are considered in more detail in the next section on warehousing and sale preparation. They are also commented on in Chapter 5, in the context of changes in marketing methods.

Specialised Vehicles: Where wool is hauled by road to wool stores the use of trailers and demountables(2) can produce savings in operating costs, leading to more competitive freight rates. Where these units are used in association with rail for the line-haul the cost savings in reduced freight charges could be singificant.

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(1) Department of National Development, National Materials Handling Bureau, Wool Handling (Sheep's Back to Store), 1970.

(2) A demountable is a self-contained truck body which can be lifted onto an appropriate chassis unit.

The advantage of trailers and demountables is that the units can be loaded and unloaded without immobilising drivers and prime-movers. The driver simply picks up a ready-loaded trailer or demountable each time he returns to base (which could be a rail-head, a rail terminal or a store), driving off within a matter of minutes. The unit can be loaded or unloaded at the time most convenient to the warehousing staff and not as a 'crash' operation each time a vehicle arrives at a loading bay.(1) These advantages can result in cuts in driving staff of up to 50 percent and cuts in receival and despatch staff of 30 to 40 per cent. These savings come from better use of materials handling equipment, by spreading the workload throughout the day and improving delivery services out of store but these may be partly offset by the cost of the additional units required.

Another advantage from the use of trailers and demountables(2) is that they permit piggy-back operations. A fleet operator or haulage contractor can equip himself with a mix of bodies which best suits the workload and then switch drivers and prime movers from one type of body to another. In Western Australia and South Australia Commonwealth Railways operate such services, with more economic freight rates being offered where no prime mover is shipped. The freight rate covers the cost of loading the semi-trailer unit onto the flat wagons, rail to destination, off-loading and arranging for pick-up and movement by a subcontract prime mover. Special reduced return rates for the trailer are also offered. Rail equipment required for these operations includes ramps, securing gear and large flat-top wagons, desirably with high-speed bogies. The piggy-back approach appears to be ideal for wool transport if it could be adopted in association with the establishment by the Railways in New South Wales and Queensland of pick-up terminals in the pastoral zone.

A further development of the approach is the use of detachable freight trays.(3) These trays, currently used by

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(1) For a detailed discussion on delays in despatch of wool from broker's store to dumper and delays in receipt of wool at a wharf see Department of National Development, National Materials Handling Bureau, Handling of Bales of Wool from Brokers' Stores to Stowage in Ships, March 1966.

(2) For a brief discussion on the use of trailers and demountables see F. Broadway, Highway Transport, 'Shifting the Goods and Cutting the Costs', September 1971, page 51.

(3) 'New Road/Rail Frieght System Success', South Australian Road Transport Journal, September 1971, p.9

Commonwealth Railways, are 37-feet long and each has a payload capacity of 21 tons. They provide a much faster and more efficient form of transportation of bulk goods by rail than either the conventional method of enclosed car loading or semi-trailers. The trays are loaded at a depot, transported by semi-trailer to the railhead and then loaded by crane onto a rail truck. Each tray is attached to the semi-trailer or rail truck by twist locks, as used by container transport, to facilitate securing en route. The trays are fitted with special detachable gates to facilitate loading of bulky goods.

These Commonwealth Railways 37-foot trays are not a piggy-back road/rail operation. The trays actually are an open type container pallet, fitted with side and end gates similar to a fixed tray of a semi-trailer. They can be loaded by crane onto a road or rail vehicle without difficulty

The 37-foot trays could be taken by road to a warehouse or station property for loading in the normal manner, transferred from road to rail, and again transferred from rail to road at destination for delivery. These units are particularly suitable both for a road/rail operation and for transfer rail to rail at locations where change of rail gauge occurs, e.g. at Marree on the Central Australia Railway

On some rail line hauls in the Eastern States there are problems of loading and height restrictions which can inhibit the use of the trailer piggy-back and freight tray approaches for integrated movement of wool bales.[1] Notwithstanding

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(1) For a general discussion on trains for freight see J.R. Day, Trains 1969, pp. 44-53 and 100-111.

this situation, it would be possible for the State Railway systems to take into account some possibility of rail/road integration at the same time as they are undertaking track upgrading and purchase of new locomotives and rolling stock.

Dimensional Limitations: The States have placed legislative restrictions on the size and weight of motor vehicles because the roads are not able to carry unlimited loadings. Road hauliers, in seeking to take advantage of innovations and technological developments in the automotive industry, and to lower their line-haul costs, claim that they are limited in what they can do by the need to comply with certain safety provisions, speed limits, limits on truck dimensions and limited hours of driving for individual drivers.

The National Association of Australian State Road Authorities (NAASRA) has summarised the more important statutory limitations applying in the various States and Commonwealth Territories.(1) NAASRA has divided the limitations on motor vehicles into two groups:-

1. those relating to weight(2) and tyre pressure, which concern the strength of road pavements and bridges,
2. those relating to vehicle dimensions, which concern the widths, clearances, curvature and the geometric characteristics of road, bridges and intersections.

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(1) National Association of State Road Authorities, Vehicle Limits for Road Safety and Road Protection, 1967

(2) Statutory weight limitations usually draw a distinction between the loadings transmitted through axles fitted with single-tyred wheels, axles fitted with dual-tyred wheels, and groups of axles. The permissible gross weight of the vehicle as a whole is also dependent on the wheelbase of the vehicle and the spacing of axles. For short bridges and culverts and for certain parts of longer bridges, axle loadings are the critical factors. Limitations on gross vehicle loadings and on the spacing of axles are intended primarily to safeguard longer bridges.

Statutory limits are placed on other vehicle dimensions which influence the width of road occupied by vehicles when turning. Height limitations are based on safety considerations on existing overhead clearances. Width limitations are based on considerations of pavement lane widths and clearances for vehicle passing and overtaking.

Statutory limits for length, and controlling dimensions such as wheelbase and overhang, are based on the requirement to set standards for pavement width on curves and intersections. Vehicle length requirements also need to take account of the length of road required for overtaking, and the effect of length on the volume of traffic which can be accommodated on a particular road without congestion. Length also influences the standards set by road authorities in Australia for gutter crossings, grade changes at subways and roads over railway tracks.

The restrictions in New South Wales, Victoria and Queensland in respect to the length of semi-trailers is a maximum of 47 feet; for Western Australia, Tasmania and the Northern Territory the maximum length is 45 feet. In South Australia the maximum length for all trucks is 66 feet. This South Australian limitation applies to a truck and trailer combination; in other States the maximum length for this type of unit is 55 feet.

The effect of these restrictions on vehicle <u>length</u> for wool truck operations is to limit the number of bales that can be carried by single tractive units. If the South Australian limits were to apply in other States, the number of bales that could be carried on a semi-trailer could be increased by as many as 40.

The vehicle width restriction is a maximum of 8 ft 2½in in New South Wales, Victoria Queensland and South Australia and 8 feet in Western Australia, Tasmania and the Northern Territory. The criteria for setting these standards are as follows:

1. standard practice of loading trucks at two pallet widths;
2. security of the load with ropes and chains;
3. width of marked traffic lanes in urban areas.

These restrictions make it difficult for wool truck operators to pack bales on table tops with a cover rail. Two wool bales placed across the table top will generally sit on the steel perimeter of the truck making a load width in excess of 8 ft 2½ in when the whole load is covered and secured with tarpaulins and ropes.

Many operators in the eastern States 'run the gauntlet' of inspectors and exceed the limits. The fines that result from being caught and prosecuted are built into truck operating costs.

The restriction in respect of <u>height</u> have been set at 12 ft. 6 in. in Tasmania, 13 feet in Victoria, 14 feet in New South Wales, Queensland, South Australia and Western Australia, and 14 ft. 6 in. in the Northern Territory. The criteria for height are determined by the Highway Bridge Design Specifications, the height of rail bridges and, in urban areas, the height of wiring for street lighting, telephones and tramway power. The height restrictions are applied 'across the board' by road authorities. Applications for movement of over-dimension vehicles are not encouraged and, where permits are given, costly precautions are required by the State Authorities.

The restrictions on dimensions limit the payload of a 20 - ton semi-trailer carting wool to about 85 bales. By risking prosecution in respect to width, height and length, and by development of a careful stacking pattern, with well pressed bales, these trucks can load 100 bales. A larger number of bales could be carried if a trailer could be attached to the semi-trailer - it is believed that up to 150 bales are carried in certain parts of Queensland.

Mr M.J. Owen, Australian Road Transport Federation representative on the Advisory Committee on Vehicle Performance (A.C.V.P.), has stated that the 'legal dimensional limitations on commercial vehicles restricts the ability of the road haulier industry to produce savings in transport costs of some

to the overall economy, in the same manner as other transport media'[1]. There is an obvious need, according to Mr Owen, for 'new length limits for special types of vehicles to operate in specific areas carrying commodities like wool, and livestock.' Mr Owen instances the use of double trailer combinations for the carriage of such items on interstate and rural routes in the Northern Territory, Western Australia and Queensland which result in large unit cost savings in transport, handling and labour time.[2]

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(1) Truck and Bus Transportation, August 1971, P. 82

(2) This approach does not take account of the basic reasons for such things as dimensional limitations, particularly in respect to movement problems on roads in older built-up areas; the argument also fails to take account of the costs to the rest of the community of increased congestion and accidents caused by the use of vehicles on roads which are not capable of handling large truck units.

ANNEX D

Appendix 1

STATE REGULATIONS AND RESTRAINTS AFFECTING WOOL TRANSPORT BY ROAD

Introduction: A comprehensive summary of existing transport legislation affecting wool bale movement by road in the respective States is contained in Appendix 1 of the Australian Wool Board Report, Wool Transport in Australia, pages 82 to 90. Much of the data in the Appendix was drawn from the South Australian Royal Commission on Transport(1).

The legislation under which the regulation of road transport is effected in the various States is listed below.

NEW SOUTH WALES:

- Road Maintenance (Contribution) Act, 1958-1964
- State Transport (Co-Ordination) Act 1931-1965
  - State Transport Co-Ordination Regulations 1931- 1969
- Motor Traffic Act, 1909-1970
  - Motor Traffic Regulations, 1964-1971
- Motor Vehicles (Taxation) Act, 1962
- Motor Vehicles Taxation (Management) Act, 1949
- Stamp Duties Act, 1962-1965
- Motor Vehicles Third Party Insurance Act, 1942-1968
- Motor Vehicles (Third Party Insurance) Regulations, 1942-1968

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(1) Royal Commission into the South Australian Transport System, Report, 1968.

. Local Government Act, 1919-1967
  - Ordinance No. 30C

. Main Roads Act, 1924-1967

VICTORIA

. Commercial Goods Vehicles Act 1958-1968
  - Part I Licences and Permits ss4-25
  - Part II Contributions to Road Maintenance ss 26-34

. Transport Regulation Act 1958-1968
  - Part I The Transport Regulation Board ss 4-17
  - Transport Consolidated Regulations 1960-1970

. Motor Car Act 1958-1970
  - Road Traffic Regulations 1962
  - Motor Car Third Party Insurance Regulations 1968

. Stamps Act 1958

. Country Roads Act 1958
  - Part III State Highways
  - Part VIII Div.2 Traffic Regulations on Country Roads s115

QUEENSLAND:

. 'The Roads (Contribution to Maintenance) Act, 1957 to 1958'
. 'The State Transport Act, 1960 to 1965'
  - 'The State Transport Regulations, 1961 to 1971'

. 'The Main Roads Act, 1920 to 1968'
  - 'The Regulations under the Main Roads Act, 1933 to 1962'

. 'The Stamp Act, 1894 to 1970'

. 'The Motor Vehicles Insurance Act, 1936 to 1968
  - 'The Motor Vehicles Insurance Regulations, 1937 to 1966'

SOUTH AUSTRALIA:

. Highways Act, 1926-1967
. Road Maintenance (Contribution) Act, 1963-1968
. Motor Vehicles Act, 1959-1971
  - Consolidation of Regulations under the Motor Vehicles Act, 1959-1967

Stamp Duties Act, 1923-1967

- Road and Railway Transport Act, 1930-1963
  - Consolidation of Regulations under the Road and Railway Transport Act, 1930-1959
- Road Traffic Act, 1961-1969
  - Regulations under the Road Traffic Act, 1961-1971
- The Traffic Act, 1949-1969
  - The Traffic Regulations, 1962-1970

WESTERN AUSTRALIA:

- Road Maintenance (Contribution) Act, 1965
- State Transport Co-ordination Act, 1966
- Road and Air Transport Commission Act, 1966
- Traffic Act, 1919-1970
  - Traffic (Licensing Authorities) Regulations, 1968
  - Traffic (Vehicle Weights) (Extra Load) Regulations, 1963
  - Vehicle Standards Regulations, 1965-1967
- Stamp Act, 1921-1971
- Main Roads Act, 1930-1969

TASMANIA:

- Transport Act 1938-1964
- Traffic Act 1925-1971
  - Protection of Roads Regulations 1962-1971
  - Traffic Regulations - Public Vehicles 1967-1971
- Stamp Duties Act 1931
- Motor Vehicles Tax Act 1917-1971
  - The Traffic Regulations 1943
  - Transport Commission By-Laws 1968-1969
  - Traffic (General and Local) Regulations 1956-1971
  - Traffic (Miscellaneous) Regulations 1968-1971

ANNEX D

Appendix 2

RECENT PUBLIC STATEMENTS ON THE MOVEMENT OF WOOL BY RAIL

1. Press Statement Issued by Mr N. McCusker, N.S.W. Commissioner for Railways, on 18 October 1971.

In arguing the case for road transport to supplant the Railways as carrier of the State's wool clip, the Australian Wool Board's Report, "Wool Transport in Australia", calls for some comment.

What was unsaid was the Report's own admission that "the analysis of a subject as complex as wool transport in Australia presents considerable conceptual and practical difficulties."

High on the list -- and one the Report was prone to play down -- is the social implications of the two transport modes in question.

It did not mention, for instance, that the Railways, as an instrument of government policy, has a dual role to fulfil in the community it serves and that commercial road transport's primary concern is with profit-making.

To fortify its argument, the Report ignores this important distinction and considers in isolation the respective charges of the two transport modes in stark terms of cents per lb. cartage of wool.

But can the railway service properly be reckoned in these terms?

Can any one of the many services it provides be considered in isolation when assessing overall values?

If comparisons are to be fair, some questions the Report did not ask must be answered.

One is that if free competition is to be the order of the day, would private road interests be prepared to:

+ Make available the many vehicles -- and grant the rebates the Railways now do -- in respect of the conveyance of starving stock, fodder for livestock and livestock carried for restocking purposes in times of drought?

+ Transport water, in times of drought, to rural communities in need of it, in the required quantity and at charges that barely cover the cost of axle grease?

+ Allow concessions to primary producers so that certain of their commodities may remain competitive on world markets?

+ Strike special contract rates to country industries to assist decentralization and development?

Although commercial road freight hauliers are not concerned with passenger movement, it might be noted that the Railways lost $34.5 million in providing passenger country services last year -- a not unusual result.

It remains, however, a community service underwritten by the Railways, and hence to be taken into account when rail fares and freight rates are considered -- and not in isolation.

Because the Report was necessarily somewhat empirical, and some conclusions (favourable to the Wool Board) adduced, the fact is that no prima facie case for the superiority of road transport as a carrier of wool has been established.

In a climate of unbridled competition, it is not to be questioned that road interests would indulge in price cutting to obtain this vital traffic. But would the primary producer be other than a short term beneficiary? And what of the State's economy, to which -- in transport at least -- the rail rating structure is so firmly hinged?

In the long run, if for no other reason than commercial road operators are in the business to make profits, transport costs for wool -- without the traditional regulatory influences of the Railways -- must, in the normal course of things, rise to threaten the well-being of the very industry it is currently claimed they will benefit.

(Ends)

2. Advertisement Placed in Major Daily Newspapers and Leading Provincial Newspapers in N.S.W. by the N.S.W. Government Railways, 19 October 1971.

"WHO'S PULLING THE WOOL OVER WHOSE EYES?"

It's being said that woolgrowers in New South Wales would save millions of dollars a year by sacking the Railways and transporting all their clip by road instead.

On the surface, the argument seems pretty logical, and looks like another one of those crusading exposes in which the Railways turn out to be the grasping, monopolistic baddies of this piece.

There's two sides to any argument....we'd like you to hear ours.

To begin with, no other method of transport can shift as much freight in one go as economically as rail can. A freight train will carry more than 15 semi-trailers can, yet it needs only a crew of three.

The Railways have been carrying wool for over a century and the freight we charge covers the inclusive cost of delivery into wool stores. The price offered by road operators is largely based on our freight charge - remove competition on rail and, who knows, the advantage claimed by road operators could disappear.

Then there's the problem of road congestion. If woolgrowers were to sack the Railways and use only road transport, there'd be a whole lot of extra traffic on our roads. Heavy traffic. That means that a lot of extra money would have to be spent on roads. Who do you think would pay for it? You would, of course, and all this is based on the optimistic assumption that there would be enough heavy road transports to handle the work with the same efficiency that rail does.

Traffic congestion also affects our costs. It takes twice as long to deliver wool today from railhead to wool store as it did 10 years ago. Master carriers in Sydney charge their clients $7.19 per hour waiting time. We don't. Is it likely that a country carrier could do this for less? It doesn't stretch the imagination too much to visualize the road traffic delays which would result if all wool came by road. At least, whilst it is in rail trucks awaiting

delivery into wool stores, the wool is safe and can be kept in places other than city and suburban roadways.

More importantly, despite the heavy poundings the big transports give our roads, they contribute only a fraction of what it costs to maintain the roads. With the road tax removed, who do you think would have to find the extra maintenance money needed? Again, one way or another - you would.

By comparison, the Railway maintains its highway at its own expense.

We have a whole lot of figures that back our case, too. We don't want to overload you with figures, we'll tell you just a few of the main ones.

In 1939, rail freight charges amounted to 4.37% of the selling price of wool. In 1971, it is only 3.07%. This despite the fact that Railways costs in respect of wages have jumped 669% in that period!

To give relief to woolgrowers in 1952, we actually reduced by 20 cents the freight rate for each bale of wool sent over 486 miles. We did much the same again in 1962 for mileages over 270.

Despite an 83% increase in costs between 1951 and 1966, freight rates for wool were not increased.

Last year, we gave back $4.5 million in freight concessions to primary industry, but earned only $3.1 million from carrying wool.

Wouldn't it be nice if road hauliers were to make that kind of contribution to the economic well-being of us all?

So much for the figures. We want to make one more point. Right now and probably so that they can get the business, it's being claimed that road interests could do the job cheaper.

What would you do if you wanted to get new business? You'd undercut your only competitor, of course. You'd take a loss for a little while, then slowly raise your prices to a profitable level. Who's trying to pull the wool over whose eyes?

The rail service to country dwellers is virtually a 24-hour day lifeline to the entire community. Consider what

alternatives would be open if Railways ceased to function.

The road offer is not significantly less than the average 1 cent per lb. charged by the Railways for carrying wool. Considering our vital role in transport, do you really think the very small saving, less than a quarter of a cent per lb. is worth placing all other things in jeopardy?

That's the basic story. Please don't get our intentions wrong. We know that rail and road transport can - and do - work in perfect harmony, serving Australia each in its own way.

(Ends)

3. Statement by South Australian Railways Commissioner: Letter to Editor of Australian Financial Review and Printed on 26 October 1971.

Sir, -

I refer to a report in "The Financial Review" in which Mr G.M. Pemberton of the Australian Wool Board said that general tonnage carried by rail in South Australia has increased roughly one-third since restrictions on road transport were lifted.

This statement is entirely misleading.

The facts are that, comparing the five-year periods before and after the lifting of transport controls in South Australia, intrastate rail freight traffic dropped by 2.3 per cent. Indeed, including interstate traffic which has been free of regulation since 1954, the tonnage rose by only 9.3 per cent, not 33.3 per cent as stated by Mr Pemberton.

But perhaps more significant is the fact that over the same periods the proportion of the State's wheat traffic carried by rail dropped from 67 per cent to 50 per cent; that for barley from 69 per cent to 42 per cent, and for manures from 69 per cent to 59 per cent. At the same time the South Australian Railways carried only 24 per cent of the State's wool clip, compared with 55 per cent before the lifting of controls.

In addition the load factor on agricultural lines dropped by 9.7 per cent.

It is a pity that Mr Pemberton did not check his facts with the South Australian Railways.

R.J. Fitch.

4. Statement by Director of the Development Division of Australian Wool Board: Letter to Editor of Australian Financial Review and Printed on 2 November 1971.

Sir, -

In his argument against competitive transport ("Financial Review" October 26), the South Australian Railways Commissioner has selected statistics which effectively overstate the impact of open competition on the South Australian Railways.

By basing his comparison on the period immediately after the lifting of road transport restrictions he gives maximum emphasis to the short-term impact on the railways.

Even on this basis, his figures confirm that the lifting of transport controls had little immediate impact on overall rail tonnage despite the decline in the railways' share of the State's agricultural produce.

Since that time, rail tonnage has increased to a level roughly one-third higher than the pre-1964 level - an estimate which Mr Fitch appears to question, despite the fact that it is based on figures published in his own annual accounts.

The Commissioner's statement further substantiates the view that competition in transport does not result in the disastrous railway repercussions many would have us believe.

G.M. Pemberton.

5. Statement by South Australian Railways Deputy Commissioner Letter to Editor of Australian Financial Review and Printed on 9 November 1971.

Sir, -

I refer to the comments of Mr G.M. Pemberton of the Australian Wool Board ("Australian Financial Review", November 2) in which he states that by basing comparisons on the period immediately after the lifting of transport controls the South Australian Railways Commissioner has selected statistics which effectively overstate the impact of open competition on the South Australian Railways.

He is, of course, referring to the use by the Commissioner of the average tonnages over five-year periods before and after the lifting of transport controls.

On the contrary, it is submitted that Mr Pemberton has effectively understated the impact of open competition on the South Australian Railways by making a direct comparison between operations during a single year in each of the periods before and after the lifting of controls.

Also, in doing this, he has evidently obtained his information from the 1969-70 annual report figures and selected the year of the lowest traffic volume (1963) for comparison with the year 1970, the year of the highest traffic volume since the lifting of controls.

Owing to the impact on railway tonnages and revenues of the grain traffics, a comparison of operations over a single year period is not only of little value but also misleading.

This is substantiated by the fact that had he made his comparison between the year 1964 (still a full year under transport restrictions) and 1970, when grain tonnages were comparable in both years, Mr Pemberton would have disclosed that the volume increase was 13½ per cent and not roughly one-third as stated by him.

In addition, it is pertinent to mention that this increase of 13½ per cent resulted from an increase of approximately 64 per cent in interstate traffic (not subject to control since 1930) and a drop of approximately 5 per cent in intrastate traffic.

R.J. Bridgland.

ANNEX D

Appendix 3

TAXES, FEES, FINES AND CHARGES ESTIMATED AS PAYABLE BY THE OWNERS AND OPERATORS OF COMMERCIAL VEHICLES HAVING A CARRYING CAPACITY IN EXCESS OF FOUR TONS, 1969-70

This appendix outlines the method employed and the assumptions made in estimating total taxation payable in respect of the purchase and operation of heavy commercial vehicles as shown in the attached table on page 31 and quoted in Chapter 4. Taxes which are not specific to the purchase and operation of motor vehicles, such as income tax and local government rates and land tax, have been disregarded. Taxes are imputed to heavy commercial vehicles whether or not they actually paid them - that is full taxes are notionally deemed to be payable in respect of governmental heavy vehicles (excluding vehicles of the armed forces) and in respect of vehicles enjoying concessional rates of taxation.(1)

Assumptions and Methodology

In this Appendix the term heavy commercial vehicles (i.e. vehicles with a load carrying capacity exceeding 4 tons) includes all trucks but excludes a small number of other load carrying vehicles which are classified as Other Trucks (e.g. tankers, concrete agitators).(2) For the calculation of certain estimates the numbers of heavy commercial vehicles have been divided into three categories based on carrying capacities, as follows:-

(1) Over 4 and up to 8 tons

(2) Over 8 and up to 12 tons

(3) Over 12 tons

Because of the absence of recent official figures of number of trucks by carrying capacity categories, the figures used in this Appendix are estimates made in the B.T.E. for each State and Territory.

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(1) The estimates do not include any provision for road maintenance charges or co-ordination taxes and permit fees not actually paid.

(2) Classifications of vehicles as used by the Commonwealth Bureau of Census and Statistics.

In preparing the estimate of taxation paid in respect of heavy vehicles in cases where tax payable depends on the size of the vehicle, for instance registration tax, the vehicle with the maximum carrying capacity in each class has been selected as representing that class; in the largest classification the carrying capacity was arbitrarily taken to be 20 tons. This assumption is clearly over-generous - however, it was thought reasonable in the light of the underestimation, elsewhere in the calculation, implied in footnote(1) on the preceding page.

Taxes and other charges levied in 1969-70 have been determined separately for each State and Territory and the totals for Australia are shown in table on page D.

1. MOTOR TAXES

Registration Tax: The actual rates used in the estimate are based on information supplied by State and Territory authorities unless otherwise specified. The method of calculating this tax varies between States. However, tare weight is a common element used in the calculation in each State and Territory. For the purpose of this exercise the tare weight is assumed to be half the carrying capacity of representative vehicles.

In Victoria, Queensland and South Australia registration taxes are based on power-weight units (tare weight of vehicle plus its R.A.C. horsepower rating). In these States the maximum R.A.C. horsepower for representative vehicles known to be included in each category has been used in the estimates.(1)

Registration Fees: Where applicable, these fees are fixed charges levied in addition to the registration taxes. The estimates, with the exception of Victoria, are equal to the product of the number of heavy commercial vehicles and the fixed fee. In Victoria, this tax is levied only on new registrations (of both new and second-hand vehicles) and the tax estimated to be incurred by

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(1) Ratings were extracted from the Australia Automotive Year Book. 1969 published by the Federal Chamber of Automotive Industries.

heavy heavy commercial vehicles was calculated on the basis of the ratio of the number of heavy vehicles to total vehicles on the register.

Driving Licence Fees: Information provided by registration authorities showed that between States there were differences in both the annual charges and the method of collection. For example, in Queensland owners of registered vehicles pay a fee at the time of annual registration; persons who do not own a vehicle pay only when the licence is issued (for periods of up to ten years). Elsewhere, there is a set fee per licence issued. Estimates of the revenue collected in each State and Territory, except Victoria, have been calculated by multiplying the number of heavy commercial vehicles by the set licence fee. These estimates would be conservative as there are more drivers' licences issued than the number of vehicles registered For Victoria, an estimate was obtained from total licence fees collected on the basis of the number of heavy commercial vehicles to total vehicles on the register.

Collection Costs: With the exception of the Territories and Western Australia total administration costs of the Departments concerned with collecting the above taxes were taken from the respective Auditor-General's reports. Estimates of the collection costs attributable to the registration of heavy commercial vehicles were made on the basis of the number of heavy commercial vehicles to total vehicles on the register. For Western Australia the cost of registration of commercial vehicles in the Metropolitan Traffic Area was taken as $1.50 (collected by police). In other areas of the State the cost was estimated at $4 per vehicle(and was collected by municipal and shire authorities). In the case of the Territories the collection cost was assumed to be 1.5 per cent of the registration taxes collected as this ratio approximates the cost of collections in the States.

2. ROAD MAINTENANCE CHARGES

This charge is levied on commercial vehicles having a carrying capacity greater than 4 tons in Victoria, New South Wales and Queensland, and greater than 8 tons in South Australia and Western Australia. This charge is not levied in Tasmania or the Territories. The actual taxes imposed during 1969-70 were taken from the Auditor-General's reports of the respective States.

Collection Costs: Where the costs were not explicitly stated in the above mentioned reports a proportion of the collection costs of the administrative body equal to the ratio of registered heavy commercial vehicles to total vehicles on the register was used. For Western Australia the cost of collection was $206,560.(1)

3. CO-ORDINATION TAX/PERMIT FEES:

These types of taxes are applied in all States except South Australia and are levied on intrastate road hauliers operating, generally, in competition with State Railways. The data were extracted from the Auditor-General's report of each State concerned.

The Victorian estimate includes all revenue from discretionary licences, all permit fees for the carriage of goods by road, plus half of the fees collected for 'as of right' licences.(2) In Queensland, where the tax is levied on a ton-mile basis, it was necessary to estimate the proportion of total ton-miles performed by heavy commercial vehicles, using 1963 data.(3) Using this proportion of total ton-miles performed by heavy commercial vehicles it was possible to extract from total permit fees collected in 1969-70 the contribution made by these vehicles. The estimate for Western Australia was derived by taking a proportion of commercial vehicle licence and permit fees equal to the ratio of commercial vehicles exceeding 8-tons carrying capacity to total commercial vehicles, plus the total of overload permit fees paid. The Tasmanian estimate was calculated using a proportion of total permit fees collected equal to the ratio of commercial vehicles with a carrying capacity greater than 4 tons to total commercial vehicles.

Collection Costs: Data on administration costs were obtained from the respective Auditor-General's reports. In New South Wales

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(1) Source: Treasury Department, Western Australia.

(2) Victorian Transport Regulation Board, Annual Report 1969-70.

(3) Data for 1963 were collected by the Commonwealth Bureau of Census and Statistics and published in Survey of Motor Vehicles Usage, 1963 (Ref. 14.4).

the estimate is proportional to the co-ordination taxes collected in respect of heavy commercial vehicles and the total co-ordination taxes attributable to all vehicles. The Victorian estimate is equal to the ratio of the number of permits issued to the total number of all types of transactions conducted by the Transport Regulation Board. The estimate for Queensland is proportional to the revenue collected for permit fees and total revenue collected by the Department of Transport. The Western Australian estimate is proportional to the number of registered commercial vehicles exceeding 8-tons carrying capacity to total registered commercial vehicles. For Tasmania the collection costs have been included in the cost of collection of registration taxes.

4. FINES FOR BREACHES OF LEGISLATION RELATING TO COMMERCIAL VEHICLES

For Victoria it was possible to obtain the figure relating to commercial vehicles. i.e. fines under the Commercial Goods Vehicles Act, plus those relating to other Acts and Regulations governing the use of commercial vehicles. This figure was expressed as a percentage of total fines collected and applied to total fines in the other States to obtain an estimate.

As fines for the Territories are relatively small in comparison with State figures no estimates have been made.

5. STAMP DUTY ON NEW VEHICLES

The basis for this tax is the market value of a vehicle at the time of original registration or on transfer of registration. All States levy this tax but the rate varies from State to State. The estimate has been calculated by applying to total taxes a ratio calculated by giving heavy vehicles a weighting of two and then taking the proportion of heavy vehicle to total vehicle registrations.

6. SURCHARGE ON THIRD PARTY INSURANCE

This charge is levied in all States except New South Wales and Queensland. It is levied at a flat rate per vehicle and the estimate has been calculated for each State by multiplying the number of heavy commercial vehicles by the rate per vehicle. No collection cost has been computed.

7. SALES TAX ON NEW COMMERCIAL VEHICLES

Estimates were based on as detailed a dissection as possible of new heavy vehicle registrations in each State. The numbers in each class were combined with actual sales taxes payable in respect of representative makes of vehicle in each class to obtain the figure of sales tax payable.

8. and 9. SALES TAX ON SPARE PARTS AND TYRES

It is exceedingly difficult to obtain an estimate of sales tax on automotive spare parts and tyres as the set rate applies to a diverse range of goods. However, a crude estimate has been calculated for heavy commercial vehicles but the margin of error is probably large.

The rate of sales tax is 15 per cent and this was applied to the estimated purchase of tyres and spare parts to obtain the amount. The estimated purchase of tyres was obtained by assuming six tyres cost $450 and lasted 20,000 miles, and the number of sets purchased were computed based on the calculated mileage travelled. An amount per mile travelled was used for spare parts.

10. EXCISE TAX ON FUEL

To obtain estimates of fuel consumption by class of vehicle, data relating to average annual mileage and average miles per gallon were used.(1) The tax rate used was 12.3 cents per gallon for all fuel. No estimates of the collection costs have been made as it is believed that they are not significant.

Petrol Subsidy: The Commonwealth Government provides a subsidy on fuel sold in areas outside of a specified radius from metropolitan areas. This subsidy has been treated as an offset to the excise tax on fuel.

11. CUSTOMS DUTY ON AUTOMOTIVE SPIRIT

The estimate was obtained by assuming that the proportion of excise tax attributable to commercial vehicles with carrying capacity exceeding 4 tons would also be applicable to customs duty.

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(1) Based on the Survey of Motor Vehicle Usage, 1963.

TAXES, FEES, FINES AND OTHER CHARGES ON OPERATORS OF COMMERCIAL VEHICLES HAVING A CARRYING CAPACITY IN EXCESS OF FOUR TONS (a), AUSTRALIA, 1969-70

	Type of Tax		Estimated Total Net Revenue
			$'000
1.	Motor Taxes (Registration taxes and fees; driving licence fees)		35,039
2.	Road Maintenance Charges		32,578
3.	Co-ordination Taxes/ Permit Fees		7,801
4.	Fines, etc.		1,184
5.	Stamp Duty on New Vehicles		2,411
6.	Surcharge on Third Party Insurance		103
7.	Sales Tax on New Vehicles		25,228
8.	Sales Tax on Vehicle Parts		6,619
9.	Sales Tax on Tyres		5,696
10.	Excise Duty on Fuel		
	Collections	26,169	
	- less Commonwealth fuel subsidy	2,055	24,114
11.	Customs Duty on Automotive Spirit		577
	TOTAL TAXES		141,350

(a) Includes Trucks, but excludes some other load-carrying vehicles classified as Other Trucks (e.g. tankers, concrete agitators).

NOTE - For details of the bases on which these estimates have been derived, see preceding paragraphs of this Appendix.

ANNEX E

WAREHOUSING AND PREPARATION FOR SALE

General: The activities carried out by the grower's agent, the broker, in warehousing and preparing the wool clip are dominated by the fact that the sale unit is a low density bale of comparatively light weight. The costs of these activities are discussed in respect of one clip in Annex B, pages B7 to B11, and are depicted in Diagrams D.3 and D.3(a) attached to that annex.

The problems and possibilities of effecting economies in warehousing and sale preparation are discussed in this annex. In discussing bale weights, however, it should be emphasised that nothing in the discussion detracts from the desirability of the growers themselves aiming for greater bale weights up to the 450 lb ceiling. Nor does the discussion imply that it is the large bale per se which is required. An alternative is high density dumping of 5 bale units - this is referred to in Annex G.

Sale Agents: Broker's profits from wool handling come from acting as agents for growers. Their main activity is making the arrangements necessary for buyers to examine, appraise, value and offer a price at auction for their clients' wool. The brokers' charges for this are fairly low per bale - brokers' incomes, in consequence, depend to a large extent on economies of scale in manhandling wool bales into store, in bale movement within the store, in activities such as bulk stacking and setting out show lot bales for appraisal, and in movement of bales out of the store after sale transactions are completed.

The multifarious activities in a broker's store leading up to the sale require repeated manhandling, opening closing, weighing, marking and sorting of bales, all limited by agreement to a maximum of 450 lb weight. (In the Case Study considered in Annex B the average weight in each of the different lot classifications varies between 299 and 400 lb). Where

bales are required to be reclassed, blended and interlotted the handling costs are very high - indeed, sometimes realisations from bales of inferior wool types may not justify these additional sale preparation activities. This aspect is discussed in Annex B, pages B9 to B10, with the manhandling aspects being given particular emphasis in sub-Diagram D.3(a). The flow diagram illustrates the activities involved in a bulk classing organisation which reclasses or blends wools as part of sale preparation.

In the Case Study of the Walgett clip, the bales, upon receipt at the Broker's Store, were unloaded, weighed, marked and then moved to the bulk stack storage area. Sale preparation required that the bales be opened and appraised by the Broker's valuation staff. This examination led to highly labour-intensive sale preparation activities such as reconditioning, reclassing, blending, repacking, reweighing and interlotting. Movement of the bales within the store in carrying out these activities, together with general warehousing activities such as removal from the bulk stack for display on the show floor, were carried out by hand trucks, elevator and chute.

The opportunity in wool stores for movement of bales by fork lift trucks is generally restricted by the lack of hardstanding floor space (most city wool stores are multistoreyed with wooden floors), and union demarcation arrangements. The use of fork lift trucks in single storeyed wool stores has resulted in substantial reductions in handling costs. Truck loads of bales can be driven into the store, and the bales can be unloaded, weighed and stacked on the spot. Selection and movement of bales for appraisal and show is facilitated in particular by fork lift trucks capable of speeds of up to 25 mph in the store. Wool managers have suggested that the truck is worth at least five storemen. The opportunity to reduce warehousing costs is further facilitated by a circular flow of bale movements within the store. The use of alleyways and a fork lift truck in these circular handling procedures is in marked contrast to the hand-trucking of bales to chutes and elevators evident in many wool stores.

The location of wool stores in high rental metropolitan areas, the handling and transport costs involved in sending bales to and from the broker's store by road/rail/road and the need to appraise and set out the wool bales for show add to the cost problems of the wool industry. Declining sale realisations of wool over recent years have highlighted the need for a detailed reconsideration by the whole industry of the approach to warehousing and sale preparation of all wool types. Several alternative schemes are discussed below.

Before discussing them it should be noted that wool stores in Goulburn and other regional centres escape the diseconomies of city location. Land and buildings are cheaper than in the city locations, the labour force is stable and hard-working[1] and the stores are all on ground level in close proximity to a main highway and rail sidings. One store has a throughput of 45,000 bales, employes only 29 men and is able to prepare and set out bales in less than 3 weeks at very low unit warehousing and sale preparation costs. (Of course, within the existing marketing structure country location also has the disadvantage that buyers must travel to them which increases buying costs but in warehousing and preparation for sale, per se, there are the economies noted).

Bulk Handling: The Australian Wool Board's Development Division is experimenting with the use of cotton trailers and cotton gins for wool handling and packing. The experiments are being conducted at Wee Waa and Narrabri. Attempts are being made to pack 1,000 lb or more of wool in a cotton press. Furthermore, the experiments at Wee Waa and Narrabri involve putting the large packs into 20-ton container units, as well as developing

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(1) One Goulburn wool broker stated to us that storemen employed in his store are about twice as productive as storemen working in the metropolitan centres.

WAREHOUSING OF COTTON BALES

(Photograph by courtesy of the Australian Wool Board)

pallet loads of container size to facilitate handling, transport and storage in Australia. The Australian Wool Board recently demonstrated to interested parties the results of these experiments with 1,000 lb wool bales. The demonstration, at a carrying company depot in North Ryde, N.S.W., placed due emphasis on the advantages in moving and stacking large bales of wool with sophisticated mechanical handling equipment. The handling and stacking advantages of big bales is well illustrated in the photograph of 1,000 lb cotton bales in a warehouse, shown opposite.

Use of the cotton trailer as a road train enables the cotton industry to be fully equipped and well organised to use bulk handling and packing procedures. The experiments at Wee Waa however have shown that a similar approach for wool could present some problems because the N.S.W. Department of Main Roads only issues permits to the Cotton Farmers' Co-operative to use side tracks in transporting cotton over short distances by road train. The advantage of using this approach for wool, however, would be that the equivalent of thirty-five bales of wool could be moved from the shearing shed to a grading and packing complex quickly and cheaply. The wool could then be pressed mechanically direct from the trailer to get a 'constant clean wool weight' and packed in bales of 450 kilograms nominal weight (i.e. about 1,000 lb). These large bales could then be mechanically handled on each subsequent transport leg, with fewer delays and lower unit costs of transport.

The cotton presses being used in these handling and packing experiments are capable of pressing large bales at the rate of 20 per hour. These presses cost up to $120,000. It is understood that Sissons of Perth are working on a waste-paper press which, with minor modifications, could be adopted as a wool press. It is understood that this press will take six months to develop and that its cost could be a good deal less than the cost of the cotton press. Grazcos are proposing to install a 1,000 lb press at Yennora for high density packing

of bulk-classed wool. This press is also expected to be less expensive than the cotton press, with the same mechanical pressure capacity.

The Australian Wool Board at a recent demonstration of handling and stacking 1,000 lb bales listed possible advantages from the introduction of big bales as follows:

- Reduced handling costs by a reduction in the number of packages handled and the use of mechanised equipment. In effect, the extraction of the sample during rebaling reduces storage of the wool bulk to a conventional warehousing operation.
- Reduced warehousing space. Conventional pre-and-post-sale warehousing of wool requires about 2.2 square feet per hundred pound. With big bales, the requirement is reduced to an estimated 0.58 square feet per hundred pound.
- Sale by sample. Should sampling equipment, similar to that now used for cotton, prove suitable for wool then the introduction of sale by sample could be simplified. This would eliminate the conventional show floor and its associated costs.

  The routine availability of objective data on sale lots, as a by-product of the sale process, could also be expected to lead to a progressive rationalisation of classing procedures towards the production of large lots.
- Reduced transport costs. Transport costs should be reduced by better utilisation of transport capacity. In addition, the elimination of dumping should allow significant reductions in shipping costs through the elimination of the flow problems and delays normally associated with the transfer of wool from brokers' stores through dumps to shipside.
- Reduced documentation. Documentation and any other costs directly related to the number of packages handled would be reduced by the introduction of larger units.
- Lower packing costs. The introduction of dense baling should allow conventional wool packs to be recycled and used several times. Alternatively,

> it will allow the introduction of various transport innovations between farm and rebaling, e.g., bulk transport.(1)

In summary, these experiments point to at least the possibility of innovations in the industry, including bringing wool from the shearing shed in cotton-trailer loads, classing wool on sight into broad categories, packing in large bale units of 1,000 lb and then core sampling and storing these large bales away from the seaboard. The wool could then be sold by sample and description, containerised and moved to the ship's side for despatch overseas. (This aspect is discussed in detail in Chapter 5).

However, according to the National Materials Handling Bureau, the preferred bale weight is about 700 kg (1,543 lb) as a minimum (equivalent to about <u>five</u> conventional bales). The maximum weight should be 1,400 kg (about ten conventional bales), with the further opportunity for larger parcels by pressing or tying(2). The load, when compressed, should be of such dimensions that it can be handled by modern materials handling gear and carried securely on existing transport media, without fear of slipping or sliding. The dimensions should ensure that the load, at every handling and movement point, is compatible with the several transport systems being used. <u>In other words, wool packages of the future should be designed to take advantage of the most economical forms of transport and handling facilities which are available.</u>

<u>Bulk Classing</u>: An important problem area in preparation of the clip for sale is the traditional attitude of growers and brokers to classing out the clip into as many lines as possible. A

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(1) 'Savings all round with big wool bales', <u>Australian Financial Review</u>, 6 October, 1971

(2) These weights suggest that experiments with 1,000 lb bales may be losing relevance. Already, larger units of heavily dumped bales called 'slugs' are being used in Melbourne to pack 105 conventional bales into conventional I.S.O. 20-foot containers. See Annex G for further details.

delivery docket on a 50 bale clip produced in the Hillston area of New South Wales was shown to B.T.E. by a private buyer as an extreme example of the traditional attitude of the grower: the 50 bales had been classed into 32 lines of wool. One broker in a single wool season might handle a large number of different lines of wool, with the single objective of maximising total realisation from each individual lot offered at auction. There are some indications from within the industry that this objective is being abandoned, though slowly.

There appears to be considerable evidence to support the establishment of much broader classing categories within individual clips.(1) This would enable lot sizes to be increased well above the average 8 bales without jeopardising the value of the wool from a processing point of view. The obvious economy from this practice is the saving in the high cost of handling of small lots.(2) An individual grower's clip could be much more quickly arranged on the show floor if it were classed, lotted and catalogued into less than 5 lines for a medium-sized clip.

High speed bulk classing methods are already in use in South Australia and Western Australia and are ideal for handling small to medium-sized clips. The Australian Wool Board experiments at Wee Waa have been conducted with skirted fleeces, uniformly classed into broad lines. The wool is fed along an air line to conveyor belts which feed the wool into the press as the tramping ram compresses the material.

These innovations would, of course, require a dramatic change in attitude by the industry to wool classing and sale

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(1) Bureau of Agricultural Economics. Economics of Wool Classing, Wool Economic Research Report No. 21, December 1970.

(2) This saving has been recognised by Economic Wool Producers Limited who designate that the minimum acceptable lot size is 3,000 kilograms, equivalent to 20 to 25 conventional bales.

preparation standards. It is beyond the B.T.E.'s province to comment further on this. However, it has been suggested to us that there are two catalysts which may bring about these changes. The first is the dependence of the industry on gross returns from the sale of fleeces in a highly competitive textile market. The second is the relationship which currently exists between price and fibre diameter; it has been put to us that the relationship between price and fineness is linear, indicating that successively higher premiums are not being offered for the finer wools except perhaps at the lower end of the scale. The implications of this trend are said to be that classing should be devoted more to grading on staple length characteristics and to the removal of stained and tender wool in the clip rather than on the basis of quality number.

An alternative to the traditional method of classing and preparing the wool for sale is indicated in the actions of private wool buyers who purchase wool in the shed and dispose of it outside the traditional auction system. The innovations and procedures adopted by these buyers in both the Eastern States and Western Australia appear logical in so far as they buy all wools on the basis of season, breed and area of production. (For the private buyers these factors affect the value that the mill puts on the wool, within the context outlined in the previous paragraph). With private acquisition of large lots the classing process can be carried out using mechanical conveyance systems. The bin lots can be fed to the bale press along an air line with the wool being sucked into the feed system through a large flexible pipe. The large bales, after core sampling, can be dumped and unitised or packed in 20-foot containers in mill lots by broad class lines, ready for movement to the wharf apron.

The conveyor belt system of handling wool could be coupled with large individual lot packaging and core testing for physical characteristics before the sale. It has been suggested that the power core testing machinery developed by

the C.S.I.R.O. could be used or, alternatively, a core tube can be located in the main press. Samples of bale contents might then be taken at the same time as the wool is being compressed and packed and the test results sent to the textile mill in advance of receipt of the raw material at the mill gate. This type of sampling is now done with cotton pressing and packaging.

The most important element in classing and packing wool into small bales grouped into specific lots is the broker's and grower's objective of seeking to maximise the grower's realisations from the sale of each lot. This objective is thought to be best achieved by the actions of classing the wool right out in the shed. The broker's interlotting of 2 and 3 bale lots, blending, reclassing and resorting (at the grower's expense), also seek to gain at auction the extra few cents for premium grade wools. The difficulty in this approach is that each action taken to increase realisations from a small unit such as the traditional bale generates additional handling costs. In today's market these costs may not be covered by the additional price paid at auction for the lot.

ANNEX F

SELLING AND PURCHASING

General : The existing selling procedures for disposal of the Australian wool clip provide for sale by auction. The conditions governing wool sold by agents (brokers) to buyers, acting as agents for textile mills, are set down in 'Conditions of Sale', which are attached to the catalogue of wools on offer, and the Wool Selling Regulations. These regulations (previously referred to in Annex B at page B10) cover such handling and selling matters as shown bale arrangements, weighing, claims, sampling, fines, sale procedures at auction and the basic conditions of sale. Of necessity, innovations and technological developments affecting the operation of the regulations would require detailed consideration by the standing committee responsible for these regulations. (1)

Considerable handling and sale preparation activities are necessary before wool is finally sold. (2) In particular, valuation, show bale arrangements, cataloguing, invoicing and other clerical work and significantly to selling costs. Brokers therefore have an incentive to be continually seeking more efficient ways of sale preparation, simply because declining sale realisations mean lower commissions. Alternatively, higher handling charges could be set for each bale processed through the sale procedures. (3) The buyer, on the other hand, should be seeking ways in which homogeneous wools can be quickly and cheaply

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(1) The Australian Wool Commission has representation on the Joint Wool Selling Organisation; this organisation has recently acquired responsibility for the Wool Selling Regulations from the standing committee of buyers and sellers.

(2) See, for example, Annex B, pages B7 to B14.

(3) Declining gross sale proceeds are also having an effect on research and investigation work aimed at innovations and technological developments applicable to the wool industry.

assembled by the broker into mill lot sale sizes adequately described in the sale catalogue[1].

The difficulties that brokers have in covering selling costs seem to have been recognised by the setting of an equalised 'delivery charge' of $1.65 per bale. (See activities 72:73 to 77:78 on the flow diagrams in Annex B). The 'delivery charge', agreed to by both buyers and sellers in all recognised selling centres, covers brokers' expenses from the 'fall of the hammer' at the auction to receival of the bales at the dump. The charge covers out-of-pocket expenses incurred by brokers in searching for lost bales, assembly of purchased lots for despatch, waiting time at loading dock, auction expenses, cartage costs and strike contingencies. The 'delivery charge' is raised by the broker against the buyer, irrespective of the nature and incidence of these expenses.

Selling: It is clear that only through a radical change in the way wool is sold, or through a revolutionary change in the attitudes of brokers and buyers towards warehousing and sale preparation, can opportunities for improvement in handling and transport procedures now becoming available to the industry be exploited.

Growers pay the service sectors of the industry to sell, transport and handle their output. They pay either directly in commission, freight charges and warehousing, or indirectly through the prices they receive for output - that is, buyers lower their bidding limits to offset the service costs they incur in purchasing wool on commission for overseas mills. (On this point see in particular the section on Purchase Expenses on Buyer's Account, pages B14 to B22 of Annex B).

These payments and the effect on the grower's realisations are well illustrated in our Case Study. Selling Expenses on Grower's Account and the realisations on the sale of

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(1) Brokers report that interlotting is now on the decline, with increasing quantities of wool being blended and sold under the broker's or reclasser's brand.

the 210 bales in the model clip are referred to in detail in Annex B, pages B11 to B14, and Appendix 2. The net realisations on bale lots are shown to be significantly affected by the sale preparation procedures adopted in the warehouse by the broker, as well as by the actions taken by the buyer to appraise the wool. (See in particular activities set down in Diagrams D.3, D.3(a) and D.4).

The basic problem therefore in preparing and selling wool can be seen to revolve around traditional attitudes within the industry. These require that each individual bale be treated as a unique parcel of textile raw material. This system of selling might be acceptable in a situation where wool is worth $1 a lb. But with present prices of 30 cents a lb or less the traditional selling procedures involved in preparing and marketing wool appear excessively costly. The need to explore scope for economies through modernising practices is evident.

Improved selling procedures may be capable of being developed in association with the use of quality control procedures that will ensure that manufacturers are able to buy wool on firm specification. Such innovations and technological developments in selling could add to the competiveness of wool as a textile fibre. Certainly such procedures should reduce preparation for sale, selling and purchasing costs and subsequent transport and handling expenses. These changed procedures can be related specifically to reductions in the cost of transport in moving wool between the farm and the mill gate, reductions in the risks associated with the purchase and manufacture of wool into yarn and reductions in the amount and cost of labour required to process wool and hold stocks. These economies depend on the degree of success in moves to sell wool by objective measurement and representative sample. Successful sale by sample and description could enable the activities associated with selling to be separated from the physical presence or storage location of the wool.

Transport and handling changes which could be expected to result from altered appraisal and selling methods such as pre-sale testing and sale by sample are considered in detail in Chapter 5.

Pre-Sale Testing: The selling of wool on the basis of a representative sample and details of tests carried out by an independent authority for fibre properties would eliminate much of the labour-intensive costs that the industry now incurs. In this connection purchase expenses on Buyer's Account in our Case Study showed that a deal of emphasis was placed on the steps taken by the Broker and the Buyer to verify the wool lots purchased at auction. For example, the discussion at pages B14 to B22 in Annex B, and the activities in flow diagram D.5, were concerned to establish the interrelationships and the cost of activites leading up to the payment by the Buyer for wool purchased at auction and assembly of the sale lots in the wool store.

In addition, the Case Study drew particular attention to the cost of verifying the wool purchased with the detailed mill specification held by the Buyer, and the inherent risks involved in such wool purchases. The charges raised by the wool testing authority on the Buyer in our Case Study, added to the administrative expenses assigned to the order by the Buyer, totalling $4.25 per bale, must be viewed as substantial.

The wool industry is badly placed to bear such high purchasing expenses. A practical alternative requiring exploration is the use of these same objective testing procedures as a means of purchase, rather than as an after purchase means of verifying the correctness of subjective judgments made on the part of buyers.

New Sale Transaction Forms: New selling procedures could break the nexus between location of the sale and the physical presence of the show bales, and the bulk storage. Innovations could involve changes in the timing of sale, changes in methods of sale, and even changes in the instruments of sale. Sales could take place

before the sheep were shorn, while wool is in transit to the selling or handling centres, while it is in storage at a regional handling selling centre or on the wharf apron, or even in the earlier stages of processing. The auction system could be retained using these procedures, preferably with sales in larger lots of at least 20 bales or 3,000 kilograms. Alternatively tenders could be called. (Tenders were invited in the first sale organised by Economic Wool Producers Limited). Alternative methods of sale worth considering include sale by direct negotiation with mill principals or with large buying organisations, or alternatively sales could be made 'across the counter'. The use of forward sale contracts could also be further developed.

Sale by scientific measurement of wool characteristics would also present an opportunity to effect changes in the instruments of sale, with ownership of the wool changing hands by cable, by letter, or by any other means of modern, reliable communication, wherein contract terms could be made known and agreed to.

The Interim Report of the Australian Wool Commission for 1970-71 advised Parliament that the Commission was examining all avenues of selling procedures as alternatives to sale by auction; methods considered to date include direct sales to users, sales on extended credit or for forward delivery, processing before sale, c.i.f. selling, sales from stocks placed strategically in overseas countries, and other means by which the sale of wool from stocks, held in Australia or overseas, could be used to encourage the development of new markets. The Commission reported that no sales had been made by these methods to date, but pilot projects had been planned and exploratory negotiations entered into, using some of these new selling procedures.

The possibility of exploiting a variety of selling procedures presently available would seem to depend on the ability of the industry to appraise wool objectively. Selling procedures could then be adopted to meet the technical, transport

and stock-holding requirements of particular end-users of wool at significantly lower unit costs of sale preparation and purchase.

Trends in Wool-Buying Operations: In the course of a research project for the Australian Wool Board on wool price formation Mr S. Durbin of the University of New England has prepared a description of the economic aspects of wool buyers' operations.(1) The study seeks to determine how wool buyers operate. The description covers:

(i) definitions of the different trading policies buyers employ to obtain wool for clients,
(ii) the salient features of each trading policy,
(iii) aspects of wool buyers' operations which pertain to buyers' decision making processes.

The report is primarily concerned with Australian-based wool buyers and many physical aspects(2) are largely ignored. The following paragraphs deal with the short term and long term trends in trading operations identified in the report which have handling and transport implications.

Purchasing Policies: Most buyers employ several purchasing policies. The principal methods of obtaining or trading in wool used in Australia are commission buying and merchanting. Commission buying or buying on indent orders involves buying on behalf of a client not taking ownership, but operating for a given rate of commission or fee for the technical service provided.(3)

Merchanting involves taking ownership of wool purchased at auction - the buyer acts as a principal. Merchanting operations

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(1) S. Durbin, A Description of Economic Aspects of Woolbuyers' Operations, a report to the Australian Wool Board, May 1971

(2) Such as details of display, valuing and bidding for wool at auction, private buying, objective measurement and freight considerations.

(3) The commission buyer acts as a broker or agent, but he may subcontract to other firms certain aspects of his duties.

generally involve firm offering to a client, forward selling or uncommitted purchasing.[1] A buyer involved in merchanting must devise procedures to hedge, speculate or cover a forward contract so that risk is minimised and returns to capital are adequate to keep him in business.

Trends in purchasing policies of wool buyers in Australia were identified by Durbin[2] as follows:

	1956-57	1958-59	1960-61	1969-70
Commission Buying (%)	80.7	74.2	72.7	60
Firm Offering or Forward Selling (%)	16.2	22.3	24.5	38
Uncommitted Purchasing (%)	2.5	2.7	2.5	2

According to Durbin the figures for the 1969-70 season underestimate the level of uncommitted purchasing and stock held to hedge against forward sale. Further, the quantity of wool bought by the firms in the sample may be overestimated through double counting due to the practice of subcontract and change of ownership. The buying trade advised Durbin that subcontracting was becoming increasingly important, while the practice of reselling of lots purchased at auction was declining. Durbin makes the further point that consideration of the method of trading at auction must take account of the fact that client purchases on a commission basis may be sold forward in the form of greasy wool

(1) For a full discussion on purchasing policies used at auction see Section 2 of the Report prepared by S. Durbin, pages 3-7.

(2) S. Durbin, A Description of Economic Aspects of Woolbuyers' Operations, p.6. Figures for 1969-70 were developed by Durbin from a sample of Australian-based woolbuying firms. Firms in the sample purchased 2.72 million bales in 1969-70. Figures for earlier years, based on purchases of 3.91 million bales in 1956-57, 3.75 million bales in 1958-59 and 4.11 million bales in 1960-61, were taken from the Report of the Wool Marketing Committee of Inquiry (The Philp Report). 1970.

or tops.[1]

Firm Offering: The table shows a trend towards increased firm offering. Durbin suggests that this trend is due to:-

1. increasing confidence of overseas merchants and/or processors in the ability of Australian-based buyers to supply wool to firm mill specifications,
2. increasing safety in guarantees of wool qualities undertaken by woolbuyers through the use of core testing certification of lots,
3. increasing bargaining power in the hands of clients creating increasing competition between buyers for orders.

Further, the accelerated competition in the Australian-based greasy wool buying trade has increased competition in the top making trade, making the trend to increased firm offering desirable.

Forward Selling: Coupled with competition from synthetics, the trend towards increased forward selling, which favours the buyer/client rather than the seller of wool, compels the woolbuyer to undertake more of the functions of carrying the risks inherent in price variability, providing finance and guaranteeing quality.

Private Buyers: Private buyers operate on the basis of shed purchase, consolidation and repacking and some reclassing in a country location, then interstate shipment to a reclassing, blending and repacking organisation. These operations are essentially based on small scale but efficient operations backed by a strong and loyal clientele of buyers for particular wools built up over the years.

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(1) It is estimated by Durbin that about 50% of indirect orders placed by Japanese trading houses on Australian subsidiaries are sold forward to mills by the parent Company. Commission orders from European processors are considered by Durbin to be sold forward in the form of tops.

As suggested in Annex B, page B19, the objective in repacking, sorting, culling, reclassing and blending is to offer a product to buyers that is not over-classed or deficient in yield potential.

Other factors leading to the success of private buying operations, in competition with brokers, have been identified as:

1. Low staff turnover.
2. Higher labour productivity carrying out pre-sale handling in decentralised locations.
3. Immediate cash settlement with growers following price negotiation and bale weighing - this, of course, requires substantial capital backing.
4. Savings in handling and transport costs by the use of contractors for repacking and transport operations.
5. Lower bale storage and warehousing activity costs in country centres.
6. Business acumen and local knowledge in dealing with growers and mill buyers.

Private buyers play a larger role in Western Australia than elsewhere, but they are active in South Australia and New South Wales. In seeking to reduce handling costs after purchase these private buyers tend to class wool into less than 20 lines, with gradings set to meet known mill requirements. Classing work is being done either by contract or by using subjective methods of culling and sorting, easily carried out by men who 'know wool' rather than by qualified classers. The mill orders simply demand a line of wool which will produce a good top. Core testing is being carried out after packing and few claims arise from mill clients because of the care taken by the private buyer organisation in purchase and repacking and sorting. Packing of mill lots in large units is facilitated by the use of mechanical log presses or vacuum presses with capacities up to 2,000 lb.

Buyer Profits: When it is considered that the buyer must incur considerable expense to physically inspect and appraise the wool, spend time and effort in bidding at auctions and consolidating these purchases into mill lots to meet stringent order specifications, and then cover financial and consignment risks for his mill client, the return of $2.03 per bale calculated in our Case Study appears modest.

Because this net realisation on an individual bale is not great, the income of a wool buyer will depend to a large extent on economies of scale and large bale movements of a similar order of magnitude to that of the brokers - that is, a minimum throughput of 60,000 bales per annum.

Sale Lots: Wool selling procedures should aim to achieve maximum returns by the most efficient means of selling at the lowest unit sale preparation and purchase cost. As suggested in the Case Study the cost per bale of buying, selling and preparing wool varies inversely with the lot size. Sale lots of growers' brand wools normally correspond to the classers' lines, which are based on subjective estimates of the value, from a processing viewpoint, of the wool contained in each line.

It is not unusual for wool classers to separate a single clip into twenty or more lines with the result that lot size tends to be very low, the average for Australia being about 8 bales. In many instances it would be possible to assemble much larger lines while still retaining grower identity of the wool.(1) This could be achieved by the grower having his wool scientifically tested and then using the results in future classing.

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(1) In a broadcast on the A.B.C. Country Hour on 17 November, 1971 Mr K.D. Williams, Past President of the National Council of Wool Selling Brokers, and a member of the Australian Objective Measurement Project Team, suggested that sale lot sizes should be set at a minimum of 25 bales, with opportunities in the selling schemes of the future for lot sizes as large as 300 bales.

A second important aspect of lot size requiring changed procedures is reflected in the costs of purchasing. The larger the number of lots, the greater is the cost of valuing and documentation and also the more difficult it is to build up mill consignments in the auction room. A reduction in buying costs, in a competitive environment, would be passed on to the grower in the form of higher prices bid at auction by the buyer, simply because the buyer's risk elements in purchase have been reduced.

ANNEX G

BROKER'S STORE TO SHIP'S SIDE

General: In 1965 the National Materials Handling Bureau carried out an investigation of handling bales of wool from brokers' stores to stowage into ships. The investigations, initiated by the Australian Wool Industry Tripartite Council, were required to take account of the reasons for existing operations and to provide an assessment of the causes and extent of the intermittent and peak flow of bales to ships at main wool handling centres in Australia. The object of the Study was to ascertain what could be done to improve handling techniques and reduce the costs of handling bales of wool(1)

Quite apart from the detailed conclusions and recommendations put forward in the National Materials Handling Bureau report. the contents clearly pointed out that a new approach was required, particularly in respect to buyers' actions as consignors of wool bales and shippers' actions as transporters of wool bales, if the wool industry were to take advantage of the superior control and cost savings made possible by organised handling and movement.

The Australian Wool Board took up this theme by pointing out the highly inefficient methods used by brokers. buyers and shippers for central sorting, dumping, unitising and loading wool bales in the major wool handling ports. Sir William Gunn in 1967 expressed the view that the wool industry would seek complete control over the packaging and physical distribution of its product in order to have wool handling charges reduced(2).

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(1) Department of National Development, National Materials Handling Bureau, Handling of Bales of Wool from Brokers' Stores to Stowage in Ships. March 1966.

(2) Departments of Trade and Industry, and Primary Industry, Workshop on Wool Transport, 1967, p.12.

The concept of a wool village was developed from this approach, with the sorting, dumping, unitising and loading facilities incorporated in the plans for Yennora. The consensus in the industry to that point in time appeared to be that large cost savings could be obtained by a capital-intensive approach to handling, as at Yennora which centralised the packaging and distribution of wool. Unfortunately, the temporary lack of dumping facilities at Yennora has interrupted the planned flow of wool, with bales moving some 15 to 18 miles to a dump in the city and the unitised load moving back by road some 15 miles to the container depot at Chullora. The containers are then moved to the wharf apron. With such procedures, the expected savings in handling charges have not yet materialised for the industry, despite a reduction in the rail charges for wool bales moved to Yennora. Nevertheless, five wool-broking companies have announced their intention to move to Yennora(1).

Wool Bale Consignment: One of the more significant costs of wool marketing pointed up by the detailed analysis in the Case Study in Annex B was for shipment to an overseas destination. In this connection, the description of shipping expenses on Buyer's Account at pages B22 to B26, and the illustration of activities, covering dumping, delivery to wharf and delivery to an overseas port depicted in Diagrams D.6 and D.7, emphasise the multiplicity of actions required to consign wool bales to an overseas mill client. An additional complication, shown in the analysis, has arisen from the flow procedures required to ensure that movement of bales to the ship is co-ordinated to meet ship loading patterns. These procedures make it necessary for consignment charges to be set on the basis of individual bale movements, rather than a straight shipping charge for a large single parcel. There are no less than twelve separate charges raised against each bale in every mill lot consigned by the Buyer to an overseas port.

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(1) Australian Financial Review, 15 November 1971, p.3.

Dumping: The average volume of a dumped bale (17.18 cubic feet) has been adopted because overseas mills have reacted adversely to high density dumped bales. The C.S.I.R.O. advised the B.T.E. that if the mill wished to sort the wool at the mill end of the handling chain, then the problem arose of reclassing the wool again when the wool had been highly compressed through dumping. The mills maintain that it is very difficult for textile machinery to pull high density dumped wool, especially if it has been stored in a cold environment for any length of time.

The C.S.I.R.O. further advised B.T.E. that if high density dumped wool was fault-free (i.e. wool with little burr, dust and waste content) there were no difficulties in pulling the wool onto the textile machinery. In addition, the fact that re-sorting at the mill was dying out in the industry suggested that rising shipping costs would accelerate the utilisation of high density dumped bales.

In considering new ideas for handling bulk wool in large units the use of a large capacity press at railhead depots or at a city storage depot would only bring economies of scale where the wool has been classed in bulk. It is technically possible to use the 20 foot container as a wool press. The problem in using this approach however is that there is usually not much wool of one particular type going to an individual mill.

Containers take 18 tons at once. whereas mill lots range from 25 bale lots for specialty wools to 300 bales for general mill lots, with each bale averaging around 300 lb.

The present dumped bales are not well shaped for packing into containers, nor are they nearly dense enough to fill the containers to their weight load ratings. The C.S.I.R.O. Division of Textile Physics has been investigating ways of reducing the volume of dumped bales further[1]. Existing presses actually compress the wool bale to 7 cubic feet - one-quarter the size of a shed-pressed bale - and the bale is only 10 inches high when

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(1) Details of past research in this area are set out in 'New Approaches to Wool Baling', Rural Research in C.S.I.R.O., March 1967.

under the press. Despite the steel bands, the springy nature of wool expands the bale vertically to 29 inches after release. Half the bale's volume is taken up with bulges. Various attempts have been made to save volume by experimenting with bales, bale handling and tying under pressure and unitising. With the development of container shipping the incentive towards innovation and technological development in this area of wool bale handling has accelerated.

New methods of dumping and packing would help to increase the number of bales which can be packed in a standard 20-foot by 8-foot by 8-foot shipping container and help to lift the load weight in each container nearer towards its designed capacity of 18 tons net. Estimates of the number and weight of bales in a shipping container by type of dumped bale are as follows:-

ESTIMATES OF THE NUMBER AND WEIGHT OF BALES IN A SHIPPING CONTAINER 20FT x 8FT x 8FT

Type of dumped bale for export	Bales in Standard Container	Gross Weight of Container and Contents
	No.	Tons
. Conventional	42	6
. Slack pack, dumped conventionally	72	10
. Stapled	70	10
. Biaxial (horizontal and vertical dumping)	100 (Approx.)	14

Source: C.S.I.R.O. Division of Textile Physics.

More recently a dump press has been developed which packs five conventional bales into a single unit or 'slug' weighing 1,500 lb. The photograph on page G6 shows the new press in operation. At least 21 of these 'slugs', equivalent to 105 bales, can be packed into a standard shipping container. High density dumped bales pack 63 to the container, so that it is easy to see the advantages from the use of densely packed and large units of wool. Dimensions of the five-bale unit or 'slug', for example, make it particularly suitable for roll-on roll-off vessels and cellular container vessels. Savings in handling and transporting these large units of wool can be achieved through the use of mechanisation in warehousing and stevedoring operations and reductions in stowage and overseas storage space requirements(1).

A further alternative is the use of a vacuum press to handle wool in bulk, using 2,000 lb. bundles. This approach has worked well in a number of applications. A large polybag and a vacuum pump have been used, with the unit covered by a strong protective fish-net bag. The bundles of wool bales can be handled quickly and cheaply as 'slings'. Where wool is placed in a polybag, however, it is not possible to dump the wool, as the polyliner and the pack burst under pressure. Some variations to this concept have been tried at Geelong, where the polybag was pierced before being placed in the dump press. However, the resulting pack was irregular in shape and not easily stored.

Development in Bulk Handling by Ships: One of the most significant impediments to faster ship turnround in ports has been the stevedoring problem. The problem has been associated with the slow manual handling of innumerable small parcels of cargo. These packages have required many different movements and a large labour force to transfer the goods from transit or wharf apron to the ship's hold.

The most logical means of speeding up the process is through innovations and technological developments which treat homogeneous consignments as bulk items. Improvements in

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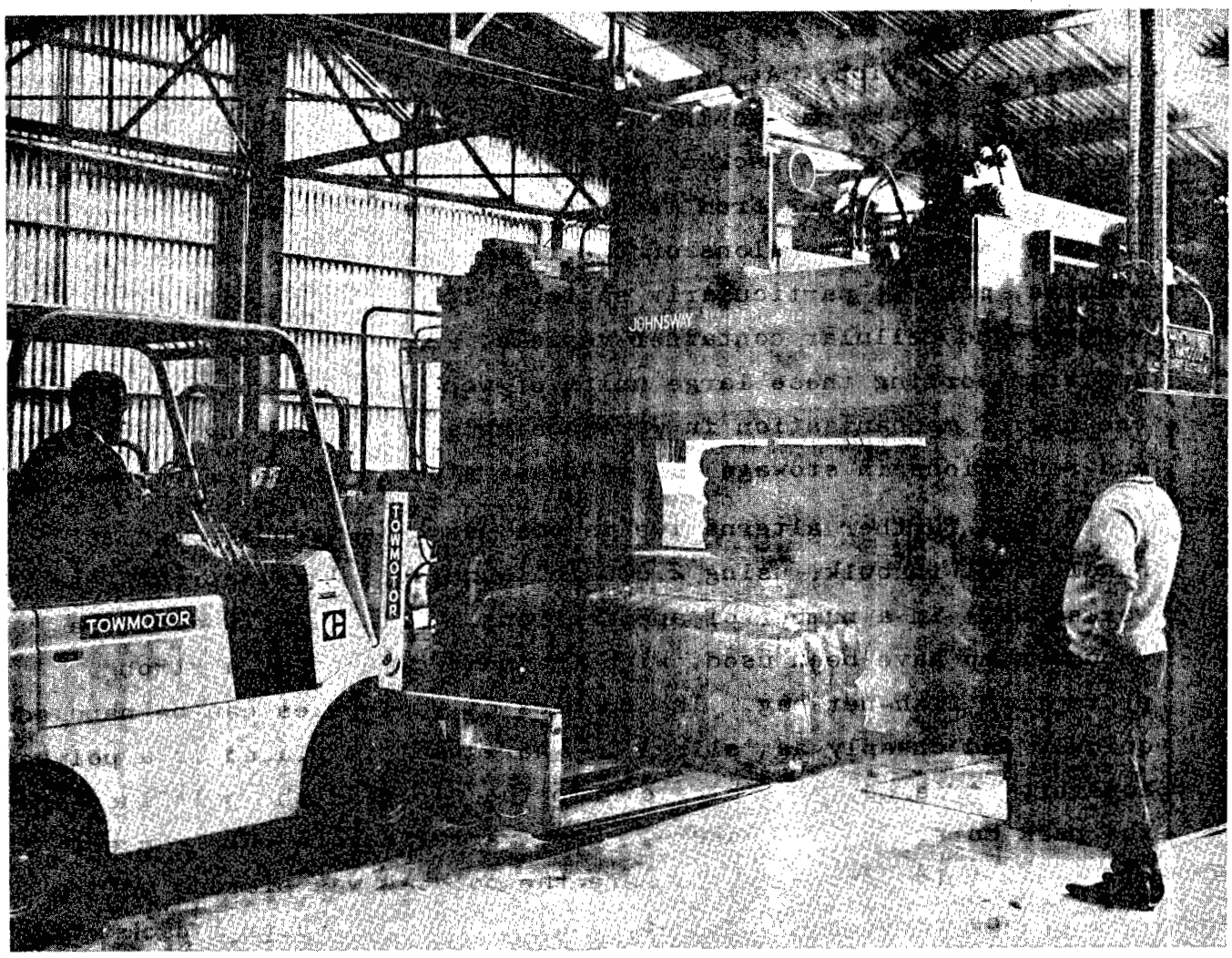
(1) 'Wool Baler for "Jumbo" Packs', Australian Financial Review. 18 October, 1971.



NEW UNITISING WOOL PRESS DEVELOPED

BY JOHNS AND WAYGOOD LTD. FOR

WOOLDUMPERS (VICTORIA) LTD.

(Photograph by courtesy of Melbourne Harbour Trust and Wooldumpers (Victoria) Ltd.)

handling, based on the experience of bulk loading of wheat and coal, have culminated in the present sophisticated cargo handling systems of gravity feed loading, the use of massive grabs mounted on gantry cranes and the development of pneumatic discharge facilities at sea terminals for cargoes which can be made to 'flow'[1]. Even though wool is a relatively highly differentiated commodity, some of these bulk loading methods are capable of being used by the wool industry, in association with specialised vessels and handling procedures for bulk or unitised cargoes.

There are currently operating into and out of Australia several variations of types of specialised ships capable of accepting fully unitised cargoes based on a 'container' of some shape or form, whether it be:

(a) a loaded trailer on wheels
(b) a loaded rail wagon
(c) a large specialised pallet
(d) a standard 20-foot or 40-foot container
(e) a floating container such as a fully-loaded lighter or barge.

The basic principle involved in all of these shipping systems is that of extremely high utilisation, with a minimum of time in port and a relatively fast sea speed. This principle follows the growth in use of bulk carriers on major sea routes. The difficulty with the trend towards these larger ships comes from the need to develop port facilities capable of handling these bulk carriers and their large cargoes.

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(1) Writing in the July 1971 edition of the Chartered Institute of Transport Journal, Mr B.S. Cole, Director of Union Steam Ship Company of New Zealand Ltd. expressed the view that 'the changes (to date) have been an evolutionary process - developed over the years in the provision of better facilities for handling and carrying cargoes; and the process will continue at an even faster rate for the future'.

Modern unitised cargo handling methods require not only costly terminal port facilities with high utilisation rates for lower overall transport costs, but also detailed consideration of packaging, transit times probabilities of transit delays, the economics of storage and the accumulation of stockpiles at areas of despatch and receipt. In other words, there is a basic interdependence of transport operations which if not examined and rationalised in relation to the total system of movement of such items as wool can inhibit the adoption of innovations and use of technological developments. Where a product readily embraces the total distribution concept the effect is to make that commodity much more competitive simply because efforts have been made to reduce the costs of marketing that product per unit of output(1). This has been the case with wool's main competitor, synthetic fibres and yarns

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(1) For a detailed general discussion on materials handling and physical distribution of a product as one all-encompassing system see J.M Apple 'Don't just ease your materials handling problems, solve them'". Today's Transport, August-September 1971.

ANNEX H

TECHNICAL ANNEX TO 'SHIPMENT OVERSEAS' SECTION OF CHAPTER 4

(A) ELASTICITY OF DEMAND FOR SEA TRANSPORT OF WOOL

It can be shown that the price elasticity of demand for sea transport of a commodity (in this case wool) is[1]:

$$E_{trans} = f \left[\frac{E_{xs} E_d}{E_{xs} - (1-f) E_d} \right]$$

where E_{xs} is the price elasticity of export supply of wool,

E_d is the price elasticity of mill demand for Australian wool,

f is the proportion of the final price of wool, at the mill, contributed by the freight.

Estimates of E_{xs} and E_d can be derived from the elasticities estimated as follows:

Elasticity of Farm Supply

Gruen[2]	+0.05 (1-year adjustment period)
	+0.25 (5-year adjustment period)
Malecky[3]	+0.05 (1-year adjustment period)
	+0.16 (7-year adjustment period)

On the basis of these estimates, the medium-term farm supply elasticity is taken to be +0.2.

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(1) Esra Bennathan and A.A. Walters, The Economics of Ocean Freight Rates, 1969, p. 111.

(2) Gruen et al., 'Changes in Supply of Agricultural Products', Ch. 7, p. 169 in Agriculture in the Australian Economy (D.B. Williams ed.), 1967.

(3) J.M. Malecky, A Study of Supply Relationships in the Australian Sheep and Wool Industry, Wool Economic Research Report No. 19, Bureau of Agricultural Economics, February 1971, p. 77 Table No. 14.

Elasticity of Demand

Emmery[1]: elasticity of demand for wool in U.K.: -0.27 to-0.40 (end of period 1952-1964).
implied elasticity of demand for Australian wool: -0.82 to -1.17 (end of period 1952-1964).

As synthetics have been becoming increasingly substitutable for wool, the elasticity of demand for Australian wool (in the U.K.) is assumed to have risen to -1.5.

To compute the elasticity of export supply (E_{xs}) it is necessary to apply the following formula:

$$E_{xs} = \frac{1}{g} (E_{fs} - E_{hd}) + E_{hd}$$

where g is the proportion of wool exported,

E_{fs} is the elasticity of farm supply,

E_{hd} is the elasticity of Australian home demand.

The proportion of wool exported is taken to be 93 per cent and the elasticity of home demand to be -0.7, the resulting estimate of the export supply elasticity being +0.27.

Finally, the values of 0.27 for the export supply elasticity (E_{xs}), -1.5 for the price elasticity of mill demand for Australian wool (E_d), and 15 per cent for the proportion of the mill price contributed by the freight[2] are substituted into the main formula. The resulting estimate of the elasticity

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(1) M.K. Emmery, The Price Elasticity of Demand for Wool in the U.K., Wool Economic Research Report No. 11, Bureau of Agricultural Economics October 1967, pp. 43-49.

(2) The gross freight rate (including dumping) has been used here because it is this rate that the shipper experiences.

of demand for sea transport of wool is -0.04.

Should the elasticity of demand, both in Australia and overseas, increase by a factor of three, for example, the following results would be obtained. Export supply elasticity (E_{xs}) would increase to 0.37 and elasticity of mill demand (E_d) would become -4.5. The resulting elasticity of demand for sea transport would be -0.06.

(B) WOOL FREIGHT RATE REQUIRED TO MAKE A BULK CARRIER SERVICE VIABLE

It is assumed that the service would be provided by 30,000 ton bulk carriers making the following round voyage: from Europe to the east coast of North America in ballast, to Japan with 30,000 tons of coal, to Australia in ballast, and to Europe with 7,000 tons of wool. The wool cargo is assumed to be limited to this quantity so that there can be fairly frequent shipments (one every 8 to 10 days), enabling buyers to get their wool away more or less within the prompt period (16 days) after each sale.

The basic profitability calculation is given by the following formula:

$$NR = \frac{1.025\ (Q_1R_1+Q_2R_2+Q_3R_3)-(PC+2,600D_s+1,540D_p)}{D_s + D_p}$$

where NR is net revenue per day for the whole round voyage,

Q_1, Q_2, Q_3 are tons of wool, coal and any other cargo respectively,

R_1, R_2, R_3 are F.I.O. freight rates per ton for these cargoes (i.e. the actual rates for sea transport only),

PC is the total of port charges and the Panama Canal charge,

D_s is total days at sea for the whole round voyage,

D_p is total days in port for the whole round voyage,

The figure of 1.025 represents a commission of 2.5 per cent on gross proceeds; the 2,600 and 1,540 represent running expenses and bunkering costs per day at sea and in port.

If the required net revenue per day is given then the formula can be rearranged to give the required wool freight rate:

$$R_1 = \frac{D_s(NR+2,600)+D_p\ (NR+1.540)+PC}{1.025\ Q_1} - \frac{Q_2R_2+Q_3R_3}{Q_1}$$

To find the required net revenue per day, we assume that the shipowner seeks an internal rate of return on the ship capital of 12 per cent. If the ship has a life of 20 years this is equivalent to a capital recovery factor of 13.4 per cent.(1) The latter is a simple measure of return on capital that is commonly used in the shipping industry, being defined as follows (assuming 350 effective working days per year):

$$\text{Capital Recovery Factor} = \frac{NR \times 350}{\text{capital cost}}$$

First Calculation: At a ship capital cost of $7.5m and a capital recovery factor of 13.4 per cent the net revenue per day (NR) is approximately $2,900. We now have the following data to substitute into the formula to find the required wool freight rate (R_1):

NR = 2,900	PC = 96,000	R_2 = 8
D_s = 89	Q_1 = 7,000	Q_3 = 0 (i.e. no third cargo)
D_p = 29	Q_2 = 30,000	

(1) If net revenue is constant throughout the life of the ship then the equivalent capital recovery factor (in this case 13.4 per cent is the reciprocal of the present value of an annuity of one dollar for the life of the ship (20 years) discounted at the internal rate of return (12 per cent))

The resulting F.I.O. freight rate for wool required to give an internal rate of return of 12 per cent (C.R.F. of 13.4 per cent) is approximately $65 per ton or $9.30 per bale.

Second Calculation: If it is assumed that 5,000 tons of additional cargo (not wool) are carried from Australia at an F.I.O. rate of $20 per ton, and that an additional port call and two more port days are required then we have the following changes to the data (all the rest being unchanged):

$$D_p = 31$$
$$PC = 100,500$$
$$Q_3 = 5,000$$
$$R_3 = 20$$

The F.I.O. wool freight rate now required to give a 12 per cent internal rate of return for the whole voyage is $52.85 per ton or $7.55 per bale.

Third Calculation: If there were 10,000 tons of the additional cargo and no more port calls, but one more port day, the data are changed as follows:

$$D_p = 32$$
$$PC = 101,000$$
$$Q_3 = 10,000$$

The result is a required F.I.O. wool freight rate of $39.25 per ton or $5.61 per bale.

ANNEX I

TECHNICAL ANNEX TO CHAPTER 5

(A) OBJECTIVE MEASUREMENT

The processing performance of wool depends on certain inherent properties of individual fibres and the percentage yield of top and noil.(1) The important fibre characteristics are diameter, length, colour and strength. The first three characteristics are presently assessed by visual appraisal while strength is assessed tactually.

The basis of visual appraisal is an assumed relationship between fibre properties and staple characteristics(2), an association that recent research has demonstrated to be questionable. For example, fibre diameter is presumed to be reflected in quality number, the latter indicating the crimp frequency within a staple.(3) Research has demonstrated that within an average wool clip, variation in quality number is only associated with about half the variation in fibre diameter.(4) On the question of fibre length, there is evidence to suggest that staple length is a poor indicator; average fibre length has been found to vary between 90 per cent and 200 per cent of the length of staple.(5)

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(1) Noil refers to the short and broken fibres which are separated from the top during processing.

(2) A wool staple is defined as an assembly of individual fibres; a fleece consists of numerous staples.

(3) Crimp frequency is not an important parameter in wool processing. See A.D. Bastaway, et al, 'Some Relationships Between the Properties of Fibres and their Behaviour in Spinning', Jnl. Text. Inst., Vol. 51, 1961.

(4) R.B. Whan and J.R. Paynter, 'The Relationship Between Quality Number Wool and Fibre Diameter Within Clips', Jnl. Text. Inst., Vol. 58, 1967.

(5) J.M. Boney, 'Variation in Fibre and Staple Length over the Body of the Sheep', Aust. Jnl. Ag. Res , Vol. 10, 1959.

Stained or otherwise discoloured fibres will affect the dyeing behaviour of wool. The only way this defect can be isolated is by eye. If objective measurement were introduced into the marketing system as a complete alternative to visual appraisal it would be most important that any wool containing discoloured fibres should be separated. This function will need to be performed in the shearing shed.

The strength of fibres can only be assessed by tactile appraisal although, apparently, research is being undertaken to develop a scientific means of estimating tensile strength on a commercial scale. The same comments apply to this as for colour in the event of objective measurement being introduced into the market.

Buyers estimate yield by taking account of the amount and type of vegetable matter, the amount of dust, the colour and the feel of the wool. These estimates are based on a combination of visual and tactile assessments. The ability of individual buyers to correctly estimate yield varies quite considerably. Research conducted by the Bureau of Agricultural Economics suggests that buyers tend to overestimate low yielding and underestimate high yielding wools of a given type, and that their variability of yield estimation is greater for wool with a high dust content which is also heavily contaminated with vegetable fault.(1)

The information provided by objective measurement is fibre diameter, measured in microns (1×10^{-4} centimetres), and yield which is expressed as a percentage of the greasy weight. These two characteristics are obtained by taking four core samples from each bale of wool and testing these samples under strict requirements, determined by the International Wool Testing Organisation, in a registered laboratory.

At present, about 60 per cent of the Australian wool clip is tested in this manner following each sale. One wool broker in the Goulburn selling centre indicated that in 1970-71 about 70

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(1) R.B. Whan and D.H. Moffatt, 'Some Differences Between Estimated and Tested Yields of Greasy Wool Sold in Australia', Jnl. Text. Inst., Vol. 59, 1968.

per cent of the wool sold through his store was post-sale tested and expects that this will increase in the 1971-72 selling season. Only a very small proportion of the wool offered for sale is tested prior to the sale.

The introduction of objective measurement into the present marketing system would involve pre-sale testing of sale lots and display of the results with the show bales. The only benefit likely to accrue to the grower, and indeed the industry, would be a somewhat higher price which might or might not cover the cost of testing. A price premium for tested wool would be due to one, or a combination, of two things, viz a reduction in buyer risk and an absolute premium for wool which, visually, appeared to be of lower value.

It would be unusual for buyers to be conscious of the risk associated with buying a wool lot, except in very general terms. Thus, the payment of a premium on an individual lot for this reason would seem unlikely except perhaps with wool that is difficult to value, as with wool heavily contaminated with vegetable fault. Wool which is finer or has a higher yield than is visually apparent will obviously attract a premium if test results indicate this, but the reverse holds for wool which is broader or lower yielding than it looks. In aggregate it seems reasonable to assume that these would cancel out.

From the wool grower's point of view the testing of his wool, whether it be pre- or post-sale does provide him with information about his clip which would be useful in the preparation of his wool for future sales. For example, if the tests show that there is only a very small variation in fibre diameter within the clip the grower need not place so much emphasis on estimated quality number when making up lines. This would enable him to offer larger lots for sale and reduce the amount of classing in the shed.

Trials have been conducted with the results of tests being made available to buyers prior to the sale. In 1969 the Bureau of Agricultural Economics arranged a trial under traditional auction conditions in which test results were provided along with

normal catalogue information.[1] In this trial the prices paid for the tested lots showed a (statistically significant) tendency to exceed the prices of untested lots which contained the same wool; buyers were unaware that the untested and tested lots contained identical wool. However, in their report of this trial the authors concluded that '...a study of this kind ought to be extended to cover other wool types and different districts and strains before sound conclusions can be drawn on the apparent benefit of pre-sale testing'.[2]

As a general rule, it would seem unlikely that significant economies would result from introducing pre-sale objective measurement into the present marketing system. Objective measurement will have its biggest impact if it becomes the basis for separating the selling and storage functions.

(B) REGIONAL HANDLING STORES

The regional handling store proposed in this report would differ from the traditional wool store in that representative bales from each lot would not be displayed on a show floor for buyer inspection prior to a sale.

The purpose of the regional store would be to assemble all the wool grown in the surrounding district and prepare it for a sale based on objective measurement. The annual throughput would be large enough to allow economies of size with respect to handling; a throughput of 250,000 bales per year is hypothesised here.

On receival, each bale would be weighed and cored with an automatic coreing machine. The core sample would be subjected to test to determine the physical properties of the wool. If the wool required any rehandling such as repacking or reclassing then this would be done before the bale was cored. After coreing, sale lots would be determined. There should be a minimum lot size of about

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(1) S.A.S. Douglas and R.B. Whan 'A Pilot Study of Pre-Sale Testing of Greasy Wool', Bureau of Agricultural Economics, Occasional Paper, No. 1, November 1969.

(2) 'A Pilot Study of Pre-Sale Testing of Greasy Wool', p. 6.

20 bales. Wherever possible, a lot should be made up from the wool of one individual grower but in many cases this would not be possible with the smaller clips or with the balance of larger clips; interlotting would then be necessary. After the sale lots were determined each bale would be dumped and then unitised into five bale slugs making four slugs for each twenty-bale lot. Following this operation the units would be stacked until the delivery instructions were issued. The regional centre would be able to handle containers but it would also be possible to load the units without being containerised.

The following calculations, of the order of magnitude of the costs of a regional centre, have been based as far as possible on accurate information but because they deal with a system that is not yet in operation they must be regarded as speculative.

For an annual throughput of 250 000 bales the store itself would need to occupy about 8 acres with an additional 7 acres of land being available for outside storage if required. The land is assumed to cost $1,000 per acre. The structure would consist simply of a concrete floor and prefabricated walls and roof. The estimated cost of construction is about $10 per square foot. The plant required in the store would include a core sampling machine, six bale dumping presses, a unitising press, five 2,000 lb capacity fork-lift trucks and one 20-ton fork-lift truck for container handling. The estimated cost of this plant is summarised in Table 1.

The labour requirement of a complex of the type envisaged depends on the seasonality of production. Taking New South Wales, the major wool producing State, about 70 per cent of all wool is received into brokers' stores between July and December.(1) Thus, on the assumption that 30 storemen would be required in this peak period of receivals, the pro rata labour requirement for the remaining six months would be 13 men. Details of labour and other operating expenses are shown in Table 2.

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(1) Australian Wool Board, Report and Recommendations on Wool Marketing, Vol. 3, October 1967, Appendix 13, p. 210.

TABLE 1 - ESTIMATED CAPITAL COSTS OF A REGIONAL HANDLING CENTRE

Item	Estimated Life	Initial Cost
	Years	$
Land (15 acres)	-	15,000
Building - covering 8 acres	36	3,484,800
Coreing Equipment	35	32,000
Six Bale Dumping Presses	36	510,000
One Unitising Press	36	150,000
Five Fork-Lift Trucks	12	62,500
One 20 ton Container Fork-Lift	18	75,000
Miscellaneous	18	100,000
TOTAL CAPITAL EXPENDITURE		4,429,300

TABLE 2 - ESTIMATED ANNUAL OPERATING EXPENSES OF A REGIONAL HANDLING CENTRE

Item		Expenses
	$	$
Labour:		
30 storemen for 6 months @ $260 per month	46,800	
13 storemen for 6 months @ $260 per month	20,280	67,080
Managerial and clerical salaries		30,000
Plant operating expenses at $1.00 per bale with a throughput of 250,000 bales		250,000
Add contingency provision of 15 per cent		52,062
TOTAL OPERATING EXPENSES (EXCLUDING DEPRECIATION)		399,142

If it is assumed that the regional centre would levy a charge on the grower which earned an internal rate of return on capital of 12 per cent the magnitude of this charge can be computed for different throughputs. With an annual throughput of 250,000 bales the charge would be $3.82 per bale which would increase to $5.76 per bale with a throughput of only 150,000 bales. These charges would cover all operations involved in bale handling up to the point of loading on to a rail wagon. The current charges for wool handling under the traditional system are as follows:

	$
Warehousing and sale preparation	2.90
Breaking wool from bulk stack for coreing	0.85
Coreing bales	0.50
Dumping and unitising	2.10
Delivery charge for dumping(1)	0.83
TOTAL	$7.18

The difference between the estimated charges for the proposed regional centre and the actual charges levied at present is $3.36. With a throughput of 150,000 bales per annum, the difference in favour of the regional centre is $1.42.

The main reason for the cost differences cited above is that the regional centre would not be involved in the heavy expense of displaying show bales. It is practically impossible to isolate the cost of resources used in this operation although brokers consider it to be one of their highest costs.

A second reason for the lower cost of handling wool in this manner is that by having all the operations of receival, coreing, dumping, unitising, storing and containerisation (if required) under the one roof the flow of wool from receival to despatch would be a continuous operation.

Finally, costs in the regional centre would reflect lower land costs and, perhaps, labour economies. However, this annex

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(1) The delivery charge is actually $1.65 but includes miscellaneous expenses incurred by the broker for refreshments, buyer transport to the auction rooms, clerical work and so on. This has been reduced by half to cover the cost of assembly and loading, transport and an allowance for vehicle waiting time.

deals only with 'in store' costs and there are additional transport economies associated with regional location. These are dealt with in Chapter 5.

ANNEX J

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