SEASONALITY IN THE NEW ZEALAND MEAT PROCESSING INDUSTRY

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THE AGRICULTURAL ECONOMICS RESEARCH UNIT

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The Agricultural Economics Research Unit (AERU) was established in 1962 at Lincoln College, University of Canterbury. The aims of the Unit are to assist by way of economic research those groups involved in the many aspects of New Zealand primary production and product processing, distribution and marketing.

Major sources of funding have been annual grants from the Department of Scientific and Industrial Research and the College. However, a substantial proportion of the Unit's budget is derived from specific project research under contract to government departments, producer boards, farmer organisations and to commercial and industrial groups.

The Unit is involved in a wide spectrum of agricultural economics and management research, with some concentration on production economics, natural resource economics, marketing, processing and transportation. The results of research projects are published as Research Reports or Discussion Papers. (For further information regarding the Unit's publications see the inside back cover). The Unit also sponsors periodic conferences and seminars on topics of regional and national interest, often in conjunction with other organisations.

The AERU, the Department of Agricultural Economics and Marketing, and the Department of Farm Management and Rural Valuation maintain a close working relationship on research and associated matters. The Unit is situated on the 3rd floor of the Burns Wing at the College.

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PREFACE

The research reported in this publication is a part of the Agricultural Economics Research Unit's continuing research effort into marketing and processing charges for livestock. Research Report No. 103 ("A Study of Excess Livestock Transport Costs in the South Island of New Zealand" by R. D. Inness and A. C. Zwart) presented the results of an analysis of the cartage pattern of livestock to freezing works for the 1977/78 season. This study identified a transport penalty cost of about $0.5 million associated with seasonality of sheep and lamb supply in the South Island.

The present study attempts to provide an economic assessment of the seasonality associated with the operation of the New Zealand meat processing industry and the relationship between seasonality and overcapacity. The author reviews the fixed/variable nature of costs in the freezing industry and suggests that the future path for the industry is likely to be the replacement of high labour fixed costs by lower capital fixed costs via the establishment of smaller higher technology works. This would allow more effective and efficient operation during the off-peak period of slaughter and may allow the payment of premiums to encourage off-peak production.

P. D. Chudleigh
Director

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SUMMARY

The New Zealand meat processing industry is characterised by a high degree of seasonality and a low average capacity utilisation. This results from the seasonal farming pattern which is closely related to climatic seasonality. The problems caused by this situation were closely studied in the late 1960's and early 1970's by the Agricultural Production Council and the Commission of Inquiry into the Meat Industry. Various recommendations were made but none were brought into effect.

This study reviews the seasonality in the industry since 1974 and, more especially, the 1978/79 and 1979/80 seasons. It is apparent that a high degree of seasonality exists, especially in the South Island where climatic factors are more significant. In addition, however, with regard to sheep, there also exists a high degree of excess capacity. This is particularly apparent in the North Island, especially in the Auckland region.

In order to improve the average level of capacity utilisation, it is suggested that reductions in capacity should be undertaken, along with adjustments to the seasonal pattern of slaughter. Improvements in the average utilisation level would result in significant cost savings to the freezing works which could be used to compensate farmers for the increased costs associated with out of season production, as well as result in a lowering of the overall animal processing cost.

The costs associated with running a freezing works are, to a large extent, fixed. This results from both the type of operation and agreements with the Unions on work practices. In addition to the fixed costs associated with the capital cost component, labour used in the freezer areas and by-product departments can also be

considered relatively fixed as the level of employment does not vary significantly with the level of throughput once the works is operating. The further major element of cost is the chain labour force. As the operation of each chain is a unit in the processing system, the level of employment will change as a function of the number of chains. Within each chain, the Union agreements make the individual chain labour units a fixed cost as well. Maximum/minimum daily throughputs and fixed daily payments (based on fixed hours) make the maximum utilisation of each chain essential to the reduction of per unit costs.

This situation has reduced the flexibility of existing freezing works and has meant that low throughputs can only be handled at a significant per unit cost penalty. This has discouraged the present system from offering premiums for out-of-season stock supply as the works are constructed to handle large volumes and are therefore only approaching a level of cost effectiveness at those large, seasonal peak volumes.

The likely path of future development in the industry is the establishment of smaller, high technology works, designed to replace expensive labour fixed costs with less expensive capital fixed costs. Such plants will be able to operate at a high level of utilisation at a lower throughput (due to their lower capacity) and will therefore be able to operate more effectively and efficiently in the off-seasonal-peak period. More effective utilisation of smaller plants resulting in lower per unit costs will allow the payment of premiums for off-season production. Extra employment, to replace that lost through the closure of the larger less efficient works, will be created through the expansion of further processing associated with the smaller slaughtering plants.

CHAPTER 1

INTRODUCTION

Labour and capital requirements of freezing works are greatly influenced by the seasonality of the livestock kill.

Much has been said in the past on the need for studies to determine the effects of spreading the livestock kill. Many broad studies have been made, especially in the early 1970's, and the conclusions reached then, still apply today in most cases.

The objectives of this study were as follows:

(i) To assess the extent of the present seasonal pattern of operations;

(ii) To evaluate the impact on freezing works capacity of an increased sheep supply;

(iii) To estimate the costs associated with excess capacity and hence the savings possible through a change to a less seasonal pattern; and

(iv) To recommend changes to the present operating system that could result in net benefits to the freezing companies, farmers and freezing company employees.

This study has been undertaken on a national basis with regard to present seasonality and an indicative basis with regard to costs. Therefore it was decided to limit the cost study to one Canterbury freezing works, although national implications from the nature of the freezing works costs are drawn. The study has been limited to the sheep and lamb area, as the magnitude of the seasonal fluctuation is greater than that for cattle.

Chapter 2 of this Research Report presents a review of previous studies in this area. In Chapter 3, an outline of the present seasonality and utilisation situation is given and Chapter 4 presents the impact of increased sheep supply on freezing works utilisation. Chapter 5 reviews the possibilities for seasonality alteration and the impact of this on freezing works capacity requirements. The nature of the costs associated with freezing works operations and their impact on capacity utilisation are reviewed in Chapter 6 and the conclusions are presented in Chapter 7.

CHAPTER 2

REVIEW OF PAST STUDIES

The seasonal nature of meat production in New Zealand has a significant effect on the sectors of the meat industry that handle and process the meat once it leaves the farm gate.

For many years the meat freezing industry and the New Zealand Meat Producers' Board have been concerned about the need for better utilisation of the existing freezing works and the labour employed in them. The "Spread of Kill Sub-Committee" of the Agricultural Production Council's Meat Committee was hence formed in March 1969, reporting in September 1970. They reported that the benefits of achieving a greater spread of the seasonal kill would fall primarily on the freezing companies, and to a lesser extent on the meat exporters and the transport sector (both internal and shipping). They concluded that there are no direct, immediate benefits accruing to the farmer from an increased spread of kill. Farmer benefits are indirect and lagged in the form of a slower rate of increase of killing, processing and shipping and livestock transport charges.

The major research carried out over recent times is that of Herlihy (1970) who conducted an extensive study in 1970 which is still relevant today.

2.1 The Freezing Companies

Herlihy found that a better spread of kill, with a resultant increase in the span of the killing season, would benefit the Meat Freezing Companies in two areas: those of capital and labour.

2.1.1 Capital

More efficient use could be made of the capital invested in freezing works if the main killing period was extended. It was suggested that the New Zealand economy could not afford to have this amount of capital invested in an industry that operated on a seasonal nature.

A much debated question in agricultural politics was whether New Zealand should have sufficient killing space to satisfy all farmers wanting to get stock killed at any point in time. If the farmer demanded that this space be made available, the extra capital cost, in providing the facilities, would eventually be passed on to the farmers as increased killing charges. Therefore, it was found that in the long term interests of the farmer it was not practicable to provide sufficient killing space to serve maximum possible demands. From the national viewpoint it would be a waste of the country's available investment funds (Herlihy, 1970).

The profitability of the meat companies was (and is) largely dependent on the degree of utilisation of their facilities that can be achieved. Under-utilisation leads to high per unit costs. This leads to decreased company profits and leads ultimately to an increased killing charge levied on the producer.

The "Spread of Kill Sub-Committee" attempted to estimate the capital required to provide facilities to process an additional tonne of meat per annum. It was calculated, assuming a kill pattern similar to the then existing national kill and on 1970 costs, that $440 per additional tonne was required. This was equivalent to $1,320 per additional tonne processed per annum (because the works were only adequately utilised one third of the time). In 1980 terms this cost would be approximately $1,354 per additional tonne or $4,062 per annum with a similar utilisation level.

If the assumption of a similar killing pattern was relaxed, (i.e. the increased kill is handled outside the seasonal peak), the capital costs avoided by the Freezing Companies handling stock outside the peak would have been $1.61 per head for lambs and $2.58 per head for sheep in 1970 terms ($4.95 and $7.94 for lambs and sheep respectively in 1980 terms).

More recently, the New Zealand Freezing Companies, through their Association, have expressed the view that there are very significant advantages to be gained from spreading the kill. Among the advantages they identify is the ability to reduce the capital commitment to the industry by a reduction in works and storage capacity and, associated with this, an expansion of further processing over a shorter off-season through the use of capital previously reserved for killing capacity. The benefits from this would accrue initially to the Freezing Companies and would be passed on to farmers through lower killing and processing charges.

2.1.2 Labour

Herlihy pointed out (in 1970) that there was an increasing shortage of labour in the meat freezing industry, due primarily to the lack of security associated with the seasonal nature of the work. There is effectively only a five month employment period for the majority of the freezing works labour force. Labour was being drawn away from the freezing works into jobs offering a longer term of employment. It was suggested that an increase in the length of the killing season could ease the problem.

Associated with the above problem was the monotonous nature of many of the individual tasks and the insecurity of employment causing demands for high wages for short periods.

The freezing workers union itself attempted to extend the killing season by the imposition of a daily killing quota. It meant an inability to achieve capacity in any one day and resulted in inefficient capital utilisation.

Herlihy suggested that in return for a guarantee of seven to eight months employment, the workers would have to be prepared to make some concessions. It was hoped that more permanent employment would be associated with more realistic wage rates and a relaxation of the daily killing quota.

The overall conclusion was that an increase in the spread of kill would benefit directly both the freezing companies and the workers, and indirectly benefit the primary producer.

A submission to the Commission of Inquiry into the Meat Industry by the North Island Freezing Workers Federation in August 1973 stated:

> "To attain maximum returns from expensive plant, that plant must be utilised to its greatest extent. For years in conciliation the employers have advocated an extension of shift work in the industry. If that had been granted and works processed one class of stock only, then that expensive plant would be working less than 25 per cent of the year.
>
> There would be no incentive for any worker to settle and make a home with the freezing industry as a means of livelihood. Unemployment would be widespread. The works would be reliant on an itinerant section of the population for their work force, and this is not always the best labour."

In April 1974 the Commission of Inquiry into the Meat Industry reported and made the following observations (Paragraph 771):

> "The unions were of the opinion that a longer, more even killing season would be of benefit to their members. The Freezing Companies' Associations likewise could see considerable benefits arising from better use of their facilities ... From evidence received it has been difficult to estimate the financial and social benefits which would be derived from a changed pattern of seasonal export killing and to weigh those against the undoubted advantages of being able to match peak killings to optimum use of natural pasture and animal production."

2.2 The Meat Exporter

Little published research on the effect of a significant seasonal pattern of animal slaughter on export meat markets is available. This is probably largely because the extensive meat storage facilities, which the industry has, are sufficient to help offset the major impact of killing and processing seasonality.

However, the effect of large supplies of lamb to the United Kingdom market at certain times has resulted in severe price reductions. It has been the policy of the New Zealand Meat Producers' Board to encourage the early shipment of lamb to the United Kingdom market, to both take advantage of high lamb prices in December and January and to help keep those prices down, in order to attempt to offset possible movement of consumers to other cheaper meats. In addition, spreading the supply of lamb to the United Kingdom market was designed to help avoid large price falls in February and March resulting from over-supply.

Therefore, the production of early lambs was seen as a benefit to meat exporters in that this enabled them to put lamb on the United Kingdom market prior to Christmas to take advantage of higher prices. The "early lamb" premium built into the lamb schedule was an indicator of the value of early lambs and this can be seen as an attempt to encourage a change in production patterns for marketing reasons.

2.3 The Transport Industry

It was considered by the "Spread of Kill Sub-Committee" that some benefit may result to the Shipping Lines, Harbour Boards and Stevedoring Companies by a spread of kill allowing for a greater utilisation of tonnage and facilities during the latter months of the year.

Innes and Zwart (1979) observed several reasons for high (and excess) transport costs to the Freezing Industry. Reasons relevant to this study include the following:

" (i) Lack of capacity of local freezing works in certain months due to a seasonal demand for killing space;

(ii) Freezing works operating below efficient through-put levels may pay long distance transport costs to obtain supplies or specific export contracts may warrant a similar search for livestock where local supplies are inadequate; and

(iii) Companies with more than one freezing works often schedule openings and closing of works and livestock movements to minimise total costs of all works in the company."

Inness and Zwart go on to observe that:

"the average distance of livestock movements during the periods when supplies are most concentrated could be shortened as a result of early slaughter or by the withholding of livestock in order to utilise local facilities in the subsequent, uncongested period. Presently, however, there is little incentive for suppliers to alter existing patterns and, hence, reduce the amount of excess livestock transport."

2.4 The Farmer

Seasonal weather conditions result in a seasonal production pattern under the New Zealand system of animal production. In order, therefore, for any change to be made in the seasonal supply of livestock for slaughter, it will be necessary for animal feeding systems to be altered to overcome the seasonality factor. As any alteration away from the present system is likely to result in increased costs to the farmer, there must be an adequate incremental reward to the farmer to cover the extra cost of "out-of-season" production.

In addition to the movement of production away from the period of maximum pasture growth, Barton (1973) suggested some other methods of reducing the seasonality of livestock slaughter. These are as follows:

(a) Very Light-Weight Lamb Production

Barton suggested that the Mediterranean lamb market requires small, light-weight lambs. These could be produced by various methods as follows:

(i) Progeny of ewe hoggets;

(ii) One of a pair of twins, (the remaining lamb would likely grow more rapidly and reach a heavier weight);

(iii) Progeny of very old ewes, slaughtered before the end of November; and

(iv) Young wether lambs from hill country flocks.

In order to maintain a small carcase and light weight, these lambs would be slaughtered and processed at from one month to six months of age in September and October. A special schedule price could be offered for such lambs during that period.

(b) Heavy-Weight Lamb Production:

Barton identified a market for heavy, lean lambs. Production of such animals would require careful selection of appropriate breeds from which such lambs could be produced.

The Perendale and Cheviot and strains of Romney would be the dams considered. The Suffolk, Hampshire, Dorset Horn and Poll Dorset would be the main sire breeds capable of producing an offspring of the desired weight and carcase leanness.

Lambs of this type could be produced before or at normal weaning time but this would not contribute to a spread of the kill. However, these lambs can be carried on the farm until well into autumn by which time their average carcase would be greater than 20.5 kg and would still be lean. Slaughter at this time would involve a significant spread of the kill (but could clash with the slaughter of cull ewes).

There is also the possibility of using crops, or feedlots, to enable the stock to be carried on the farm longer.

(c) New Sheep Breeds and/or Crosses:

Some breeds such as the Dorset Horn, Poll Dorset and the Merino have the capacity to breed not only in autumn but also in other seasons of the year. Crossing of these breeds with the more favoured New Zealand breeds (because of higher wool production) may result in an ability amongst the resulting sheep type to breed more often. This could lead to a spread of the breeding time and consequently, the time of slaughter.

(d) Feedlot Finishing of Lambs:

Lambs must be of the late-maturing type capable of being fed to heavy weights without deposits of excess fat in their carcases. This type of feeding would allow a departure from the seasonal nature of the operation related to pasture growth.

(e) Ewe Slaughterings:

Barton suggested that ewes should be slaughtered early in the season to allow the available feed and water to be used to carry lambs over a longer period. This would mean that the cull ewes would be slaughtered ahead of the lambs.

A further problem in attempting to encourage a change in the seasonality of livestock slaughter is the need to overcome a reluctance of farmers to change their traditional production system.

The "field survey" carried out by Herlihy (1970) indicated that most farmers were against the incentive for early lamb production in the form offered in the 1969/70 season in Southland. The scheme was an incentive system involving a schedule premium and a killing charge rebate. The scheme operated until the last week of November 1969.

The main objections by farmers to the incentive scheme to encourage early lamb production were:

(i) There was a waste of potential poundage of mutton;

(ii) Under Southland conditions it was trying to "beat nature";

(iii) Stock was being "dropped" when peak pasture production was occurring; and

(iv) The premium was not large enough to compensate for the drop in lambing percentage.

2.5 Conclusion

Previous studies of the prospects for spreading the kill of livestock on either side of the seasonal peak relate mainly to the late 1960's and early 1970's. Interest in the subject has continued throughout the 1970's however, and the meat freezing industry has, on occasion, expressed a desire to see some action taken on the subject. Very recently (1981), increased attention on the level of killing and freezing charges and their relevance to the farm return for lambs, has brought the question of the seasonality of the killing season to the fore again. It is considered by many that a reduction in seasonality could result in lower per head processing costs.

The studies previously referred to, lead to the conclusion that spreading the lamb kill is a feasible alternative to the present operating method. Technically, there are means available to overcome problems presented by seasonal growth patterns and seasonality in sheep breeding patterns. Also, on the part of the freezing companies and unions involved in the meat processing industry, there is a willingness to consider ways of encouraging a change in the present seasonal killing pattern.

The meat processing companies would appear to have the most to gain from any change in the system. The better utilisation of their facilities over a longer period of the year could result in cost savings to this sector.

The unions involved in the industry have identified the extension of the killing season as a means of improving the employment conditions in the industry, in terms of job security and income earning potential.

On the marketing side as well, there would appear to be advantages to be gained from extending the killing season. The availability of product over a longer period could contribute to a better flow of product onto world markets, allowing more control over the release of product at appropriate times. The requirement for extensive cold storage facilities could also be lessened by the more even spread of product. In addition, the supply of a wider range of animal types (e.g. light and/or heavy lambs) could allow entry to new market areas where the premiums available for such products could be more than sufficient to offset the extra costs involved.

The Commission of Inquiry into the Meat Industry recommended that (Paragraph 806):

> "Meat exporters and processors, in their own interests, should investigate changes in buying methods which may encourage farmers to provide stock for slaughter during off-peak periods and development of markets which would justify the increased price farmers would expect to receive to cover their costs".

Previous studies have identified the farmer as the major area of resistance to the concept of an extended killing season. Farm management techniques are based on a seasonal pattern in conformity with the seasonality of grassland production. Farmers are therefore reluctant to consider new methods of handling stock in order to provide a more consistent flow of product to the processing sector. Historically, farmers have considered the processing sector as a service industry for farmers. This concept implies that the processing sector should always fit in with farmer requirements (with regard to animal slaughter) and the costs associated with this are often not considered by farmers (the size of the killing and freezing charge not being related by farmers to a less than optimum use of processing company resources).

It would therefore appear, based on past studies, that "The Farmer" is the area that pressure should be brought to encourage changes in the killing season. Such pressure should not, however, be used until there is sufficient evidence to indicate that changing the killing pattern will have a beneficial effect on farmers. It remains to be proven whether there are savings and whether such savings can be injected into the present livestock production and marketing system or whether structural or ownership changes may be necessary before such savings may be realised. It is apparent that savings to the system, through reduced seasonality, can be foreseen, but it is not clear whether the present structure of the industry will result in the transfer of these savings to farmers or, in fact, whether these savings will be sufficient to more than offset the additional costs involved in alteration of the industry under its present structure. Also, the production of animals under new management systems may result in a different type of product being produced, e.g. a light or a heavy lamb. It must be proven that markets exist for such animals. In addition, if a premium

price is available for these animals, it must be secured to assist with compensation to farmers for the difficulties associated with the new production system.

CHAPTER 3

PRESENT SITUATION

In order to adequately review the present situation with regard to the seasonality of animal slaughter, it is necessary to establish what the seasonal pattern is and how well the freezing works are utilised. These areas are discussed separately in this chapter.

3.1 The Present Animal Slaughter Pattern

Figures 1 and 2 depict the slaughter pattern for New Zealand for sheep and cattle. The data are presented for 1974/75 to 1979/80. The pattern is regular over the decade and does not exhibit any tendency toward a change in season length. It should be noted that the peak in the cattle kill is slightly later in the year than that for sheep, so allowing some savings to be made in terms of longer utilisation of common facilities. However, such commonality is not extensive; facilities and labour that are used for handling sheep are usually quite distinct from those used for handling cattle (with the exception of some areas of the animal by-product department). (It should be noted that sheep have been converted to lamb equivalents in the ratio of 1.25 lambs to 1 sheep).

3.1.1 Sheep Slaughter Seasonality

Figures 3, 4 and 5 present the North Island, South Island and New Zealand sheep slaughtering and capacity situation for 1978/79 and 1979/80. In Appendix I, figures depicting the regional slaughtering patterns are given. The regions (as defined by the New Zealand Meat Producers' Board) are as follows: Auckland - Moerewa to Rangiuru; Hawkes Bay - Kaiti to Tomoana; Taranaki - Waitara to

Figure 1: New Zealand Sheep Slaughter Seasonality

(1974/75 to 1979/80
(Sheep and Lambs for Export; 000 Lamb Equivalents)
(1 Sheep = 1.25 lambs)

Source: NZMPB Annual Reports

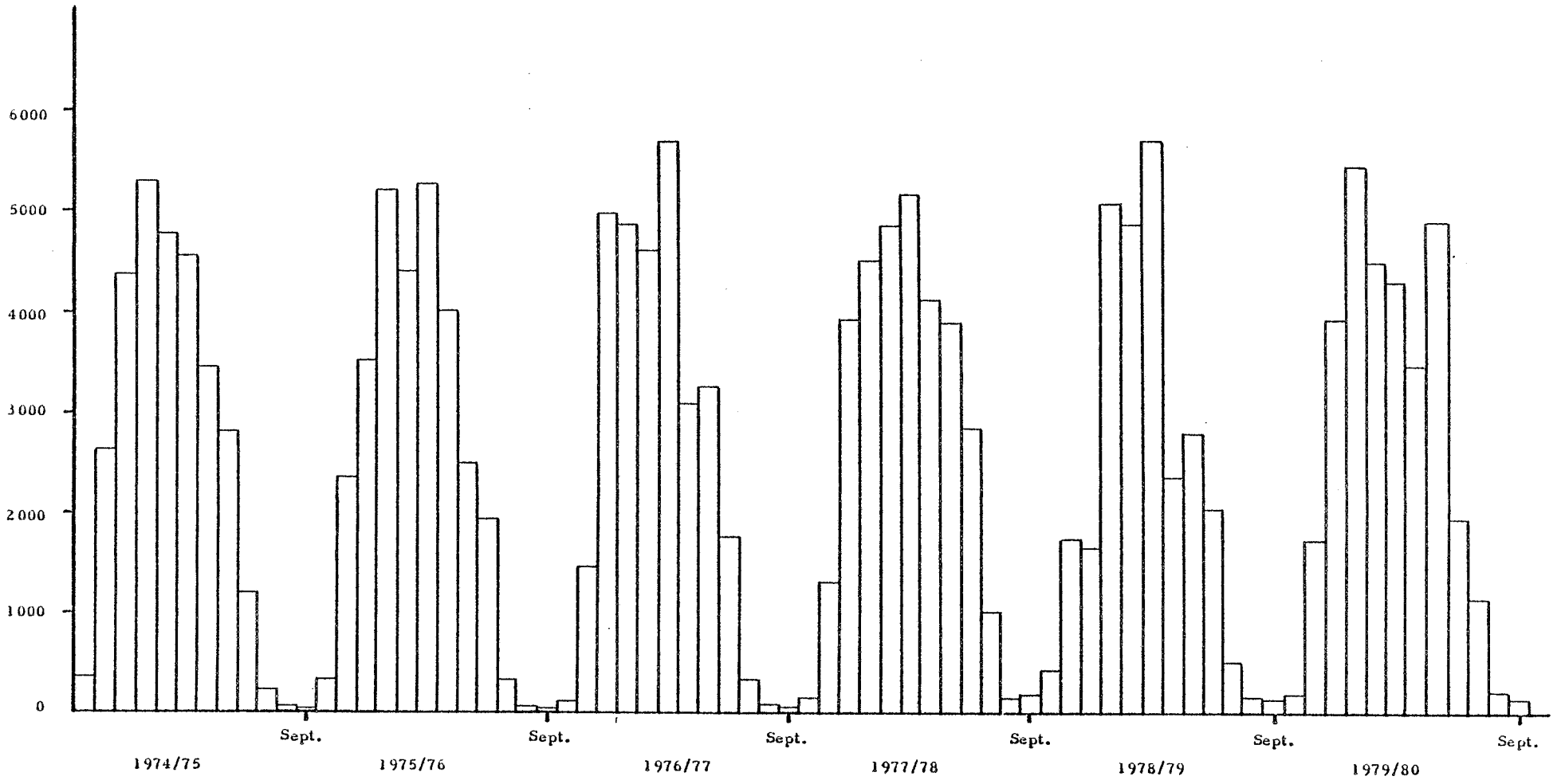


Figure 2: New Zealand Cattle Slaughter Seasonality

(1974/75 to 1979/80)
(000's of Cattle for Export)

Source: NZMPB Annual Reports

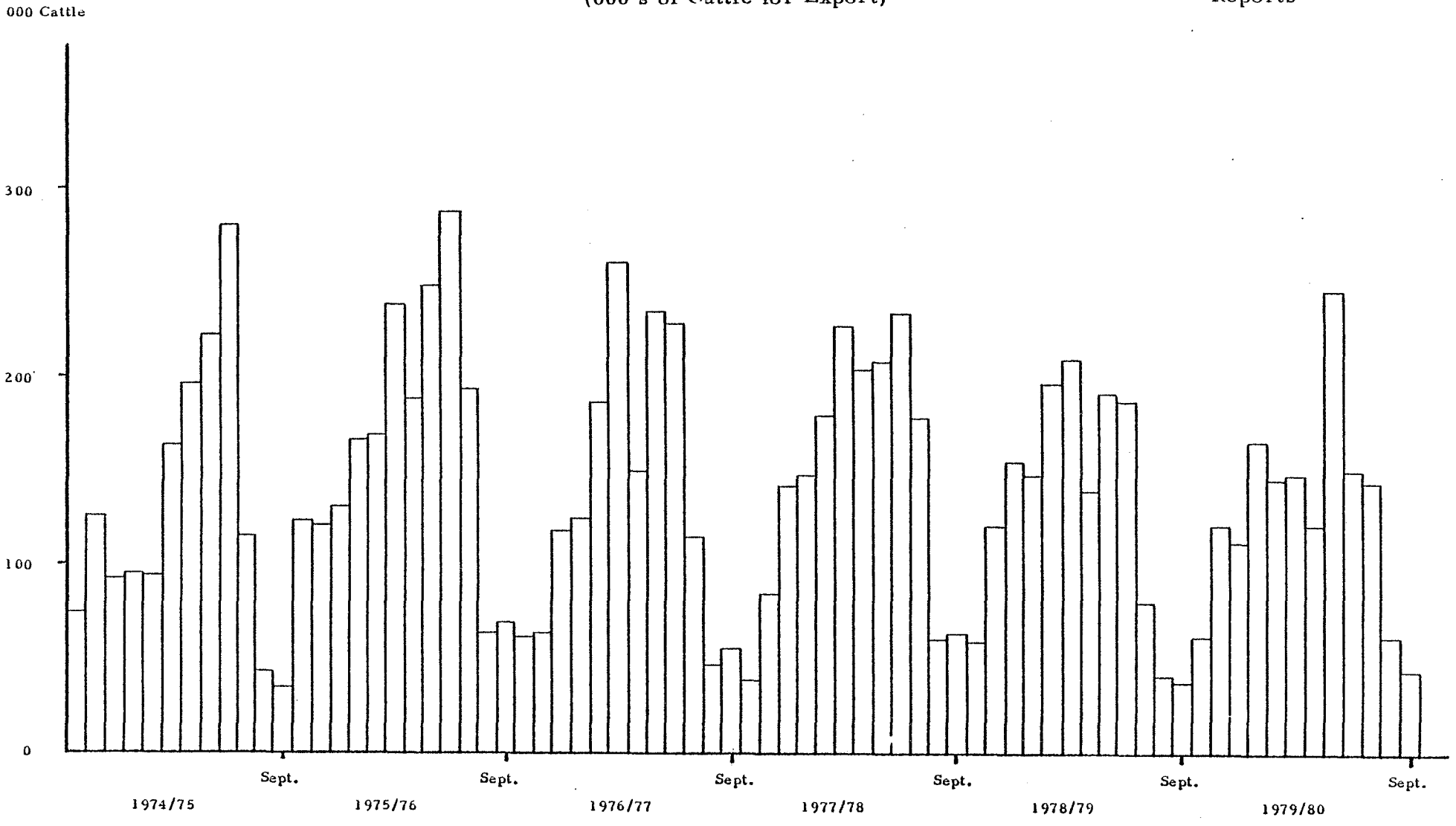


Figure 3: North Island Sheep Slaughter and Capacity Utilisation

Source: NZMPB Annual Reports

(1978/79 and 1979/80)
(000 lamb equivalents)

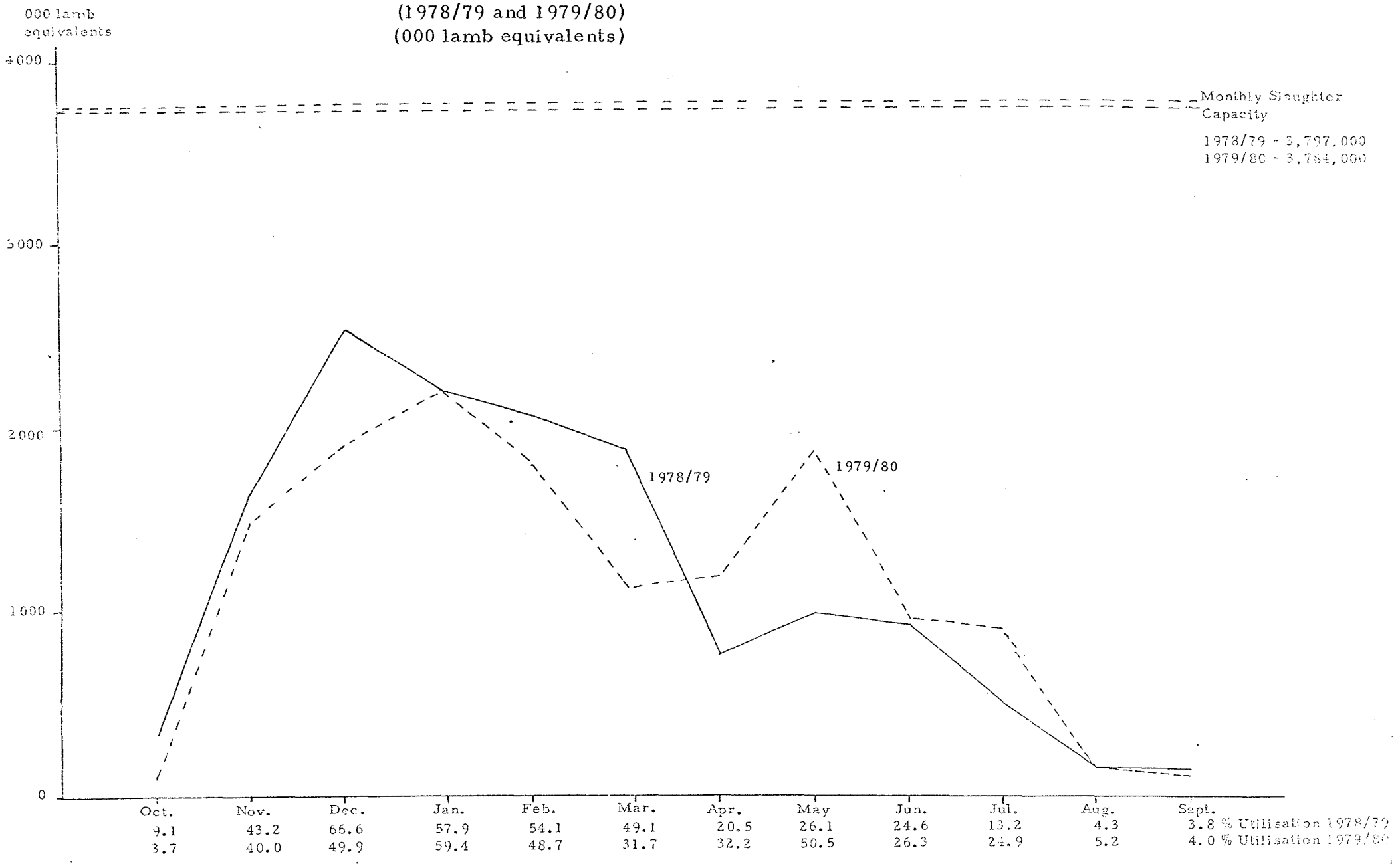


Figure 4: South Island Sheep Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 lamb equivalents)

Source: NZMPB Annual Reports

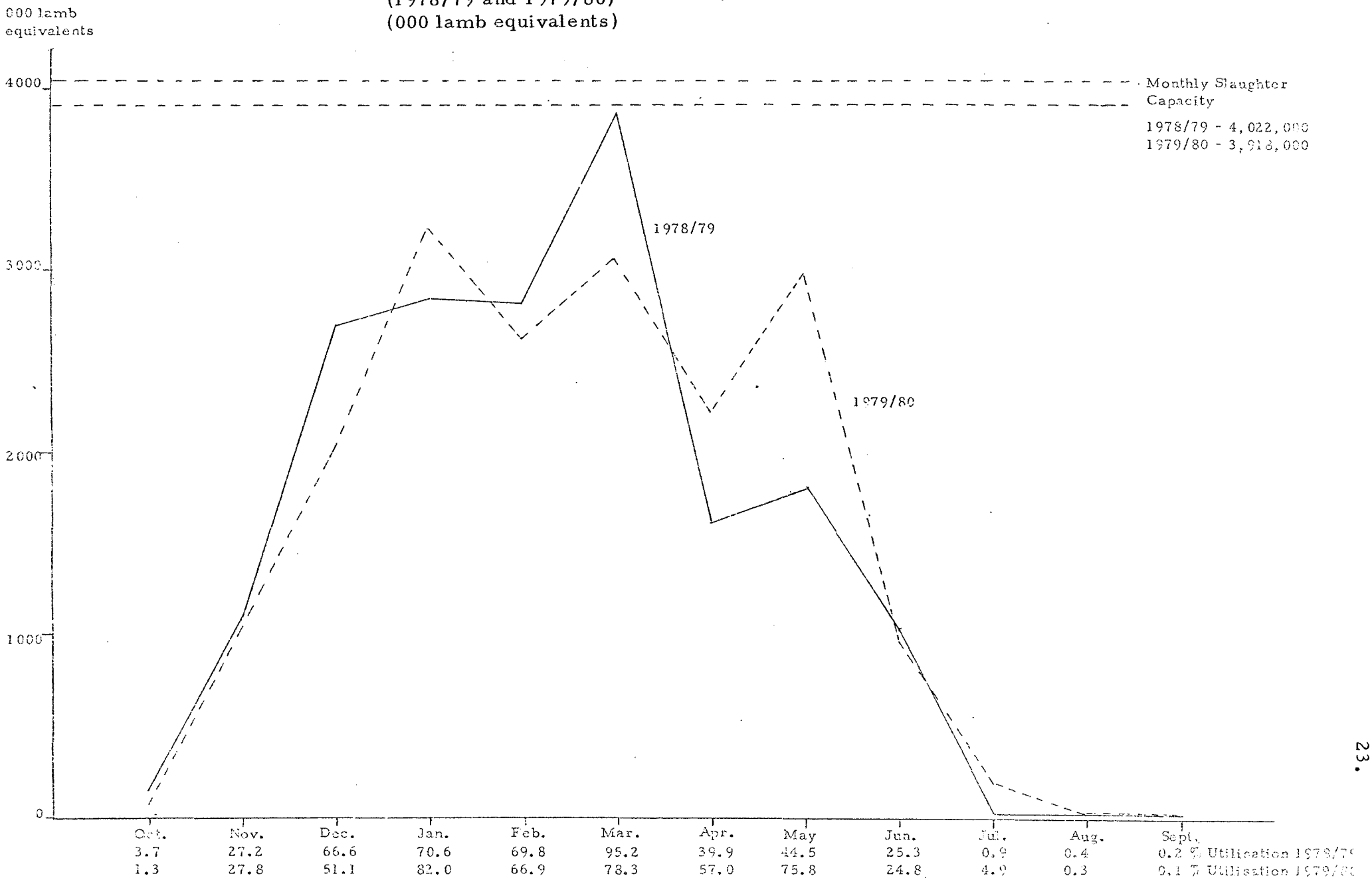
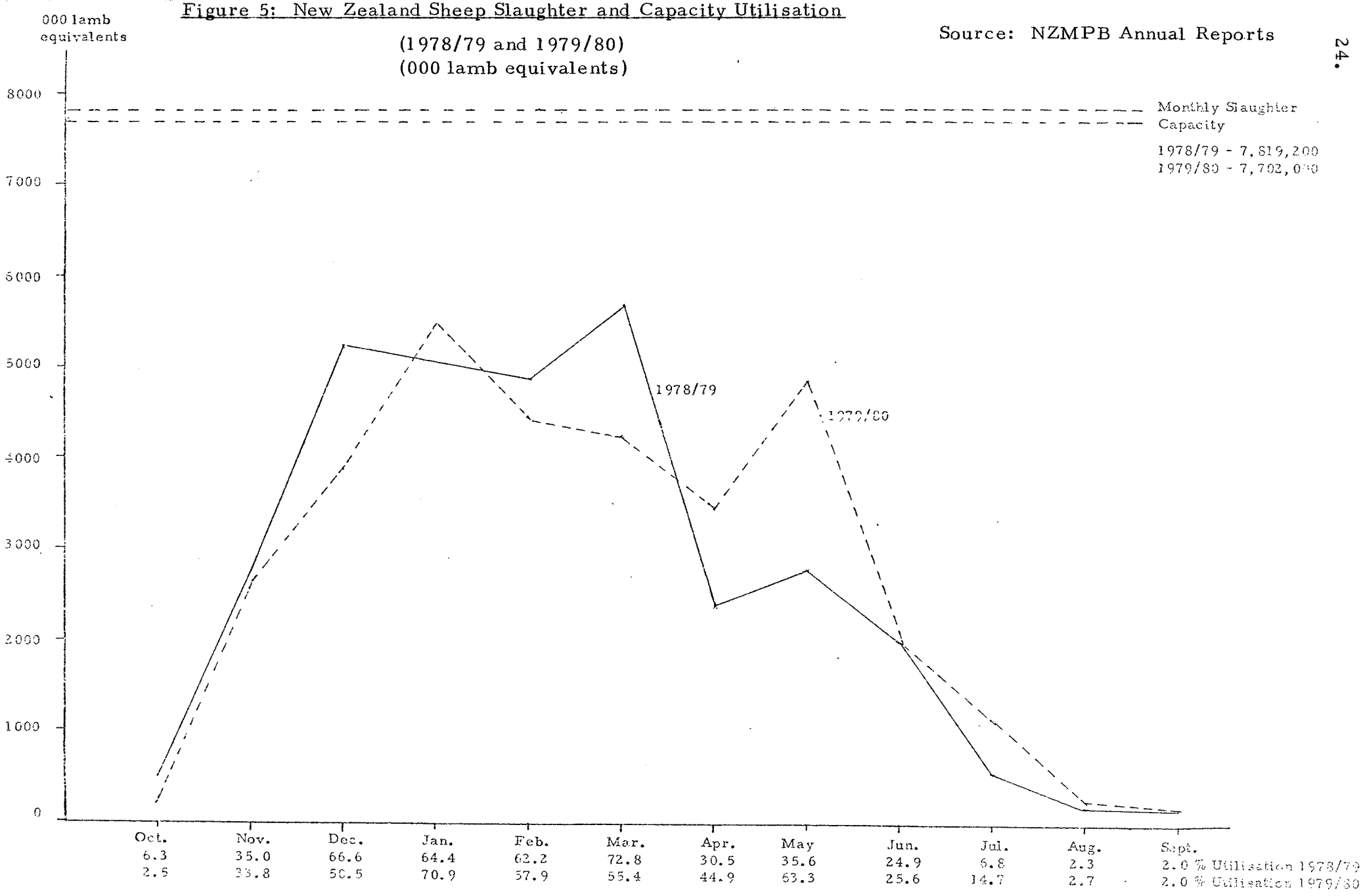


Figure 5: New Zealand Sheep Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 lamb equivalents)

Source: NZMPB Annual Reports



Imlay; Wellington - Wellington to Feilding; Canterbury - Nelson to Waitaki; Southland - Burnside to Ocean Beach. These statistics are given for the 1978/79 and 1979/80 seasons and are intended to indicate the degree of difference that exists between each region.

The North Island slaughter pattern for sheep indicates a season peak in December/January (with another high area in May). In the South Island, the peak was not reached until March in 1978/79, whereas in 1979/80 the peak was reached in January. Seasonality (in terms of length of sheep killing season) is not so marked in the North Island as in the South Island, as a result of the longer growing season experienced in the North Island. A "New Zealand view" of the sheep killing season therefore conceals the real degree of seasonality by the combination of two different peaking areas into an overall statistic.

Significant differences even exist between adjacent regions with, for example, Canterbury reflecting more sheep slaughtering prior to March and Southland exhibiting a more significant later kill (again as a result of different feed conditions).

As a result of differing feed conditions between seasons, differences in the slaughter pattern do arise. Overall, however, the general pattern is similar for successive years with only minor variations in the actual month of the peak and the height of the peak. In addition to the climatic factor, market returns can have a significant influence on the time animals are presented for slaughter. This factor does appear to be more significant for beef than for sheep, however.

3.1.2 Cattle Slaughter Seasonality

Cattle slaughtering Figures (by region) are given in Appendix 2. Figures 6 and 7 depict the North Island, South Island and New Zealand

Figure 6: South Island and North Island Cattle Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 of Cattle for Export)

Source: NZMPB Annual Report

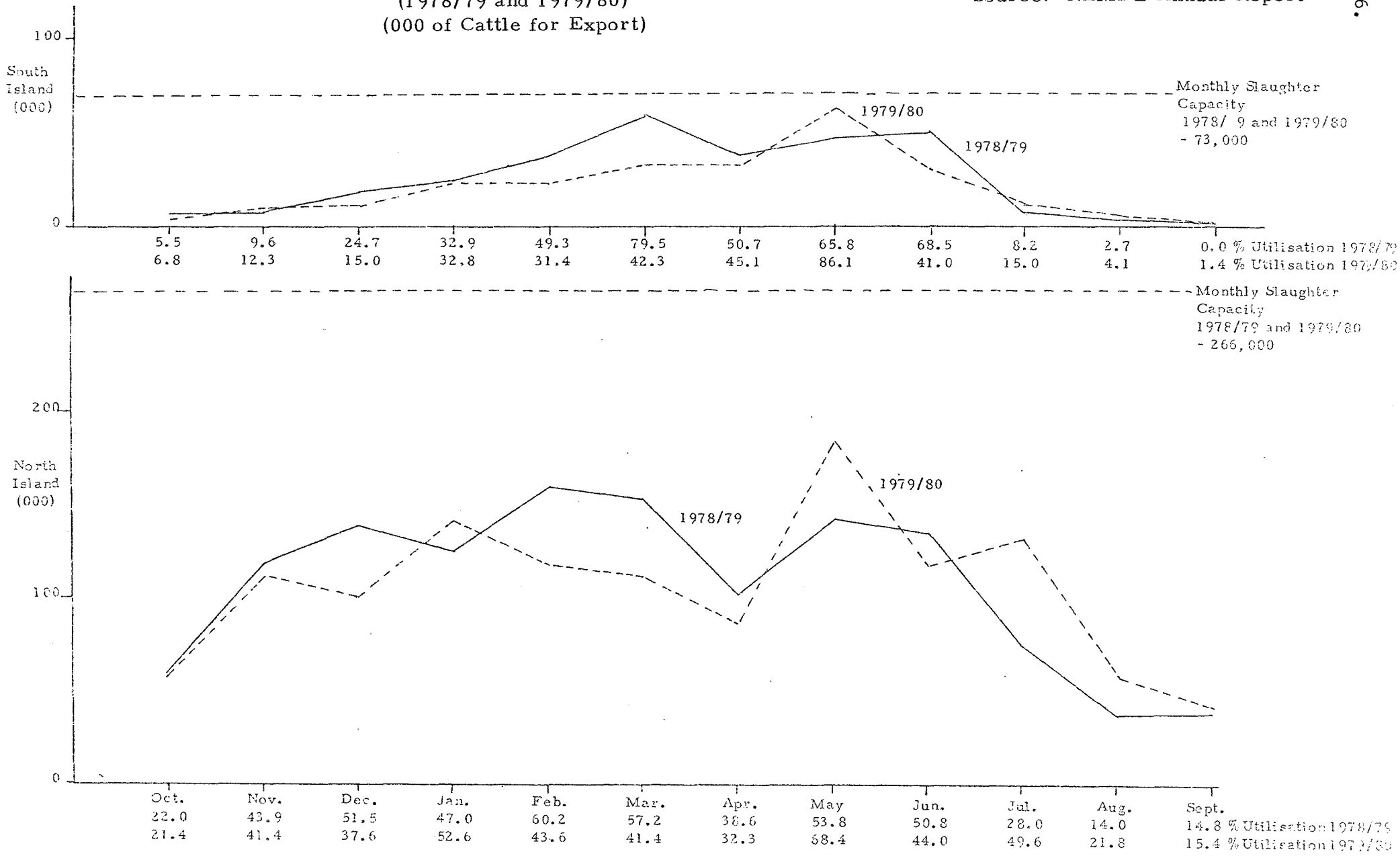
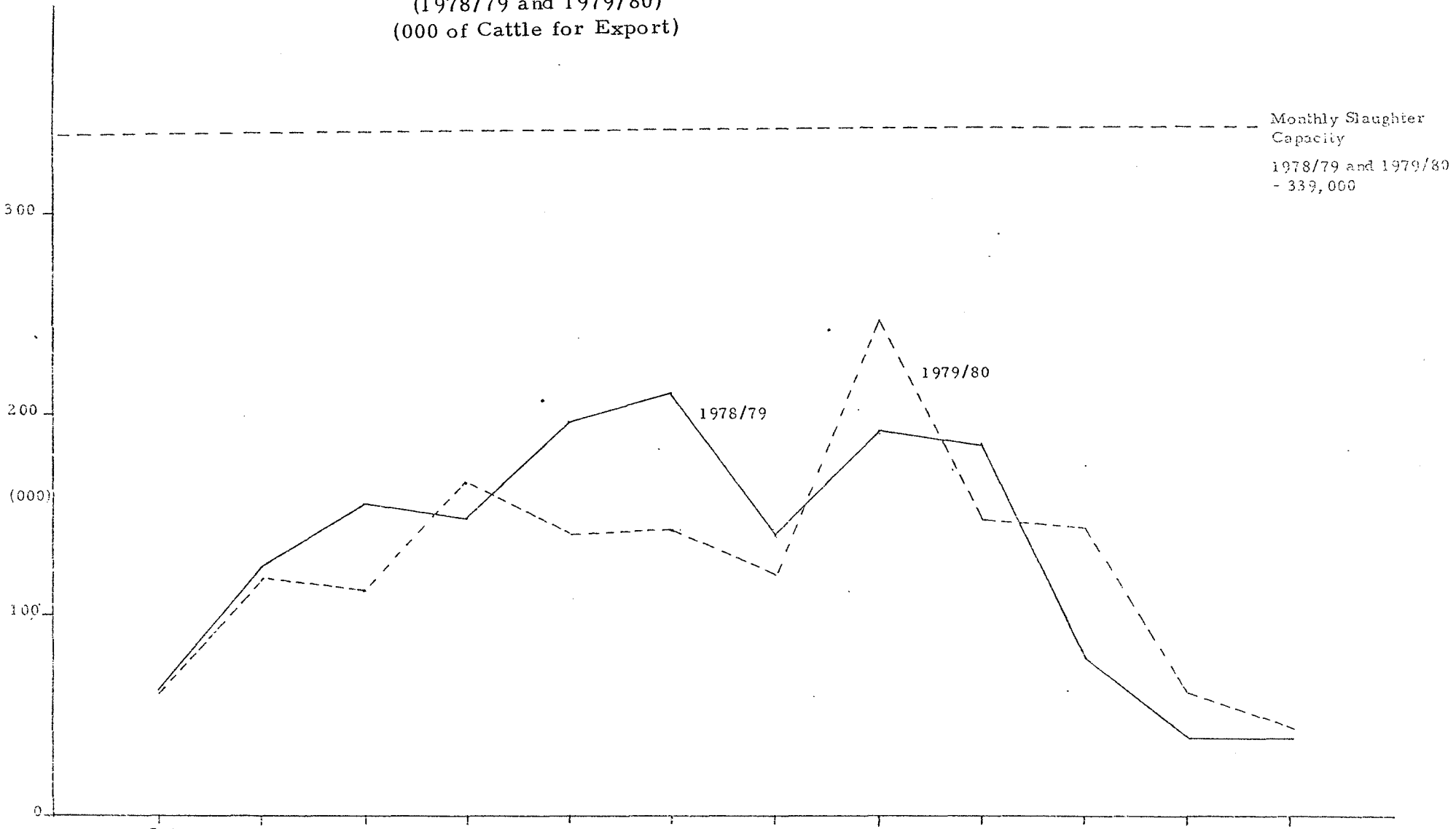


Figure 7: New Zealand Cattle Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 of Cattle for Export)

Source: NZMPB Annual Reports



	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
	18.3	36.3	45.4	43.7	57.5	61.7	41.0	56.5	54.3	23.6	11.5	% Utilisation 1978/79
	18.3	35.1	32.7	48.4	41.0	41.6	35.1	72.3	43.4	42.2	18.0	% Utilisation 1979/80

situation for 1978/79 and 1979/80. For the 1978/79 year, the spread of the cattle slaughter can be observed to be reasonably even, without a major peak. This reflects the less seasonal aspects of cattle production, with the impact of feed conditions not being as severe an effect as for sheep. As cattle are usually run as a secondary enterprise to sheep and are therefore a less intensive enterprise, there is more flexibility in the consignment of these animals to slaughter.

Cattle slaughter is therefore more responsive to market price considerations than sheep slaughter and therefore larger changes in the cattle slaughter pattern from season to season are exhibited. The 1979/80 season exhibits a more seasonal slaughter pattern with a peak in May (versus March for 1978/79), reflecting the impact of changes in market returns and feed availability from one season to the next.

As the facilities used in cattle slaughter are normally quite distinct from those used for sheep slaughter and, in view of the fact that there appears to be more flexibility in the cattle slaughter pattern, the remainder of this paper does not concern itself with the cattle situation but only considers that for sheep. Many of the comments made with regard to sheep may be applicable to cattle but this is not necessarily so.

3.2 Works Utilisation

Any review of past utilisation levels cannot consider the total New Zealand situation to be a useful indicator of the magnitude of the utilisation problem facing the New Zealand freezing industry. Every works can have different specific areas where capacity is constrained and therefore different actions may be needed to change capacity levels. These actions may be more or less feasible depending upon the particular circumstances facing each company. Also,

it is not relevant to assume that animals can be transported all over New Zealand to match processing capacity with animal availability. However, movement within regions and movement within the North and South Islands can be considered feasible.

In Appendix 1, Figures 12 to 17 depict the regional monthly sheep slaughter pattern, freezing works capacity[1] and utilisation levels for 1979/80. Figures 8 and 9 provide a comparison of North and South Island sheep slaughtering capacities and utilisation levels for 1974/75 to 1979/80 and Table 1 presents the average and peak month utilisations for each region. These all indicate a significant degree of excessive capacity and, as a consequence, low utilisation.

The North Island utilisation level is lower than that for the South Island with the Auckland and Wellington regions being particularly significant. It is apparent from these statistics that the New Zealand meat processing industry has manifest significant over-capacity for a considerable period. The cost of this and the consequent under-utilisation, has been spread over the stock that have been processed resulting in a higher than otherwise charge for processing. As far as average utilisation levels are concerned, any spread of kill, based on the levels of throughput of recent years, cannot be expected to have any significant effect on the fixed costs of the meat processing companies, as there would be no improvement in the average utilisation level. Capacity has not been reached over recent years; therefore, although a more even kill pattern would keep operations going longer, the over-capacity situation would mean a continuation of excess costs being placed on the throughput. A further beneficial situation could arise where processing companies could dispose of a portion of their investment and so reduce their debt servicing, allowing savings to be made as a result of a reduced need for high capacity levels. This would appear to be appropriate, as

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[1] Capacity is calculated from a weekly base published by the New Zealand Meat Producers' Board in their Annual Reports. This is converted to months by multiplying by four. Therefore, total annual capacity is equivalent to only 48 weeks rather than 52. This margin provides for a works maintenance period.

Figure 8: North Island Sheep Slaughter and Capacity

(1974/75 to 1979/80)
(000 lamb equivalents)

Source: NZMPB Annual Reports

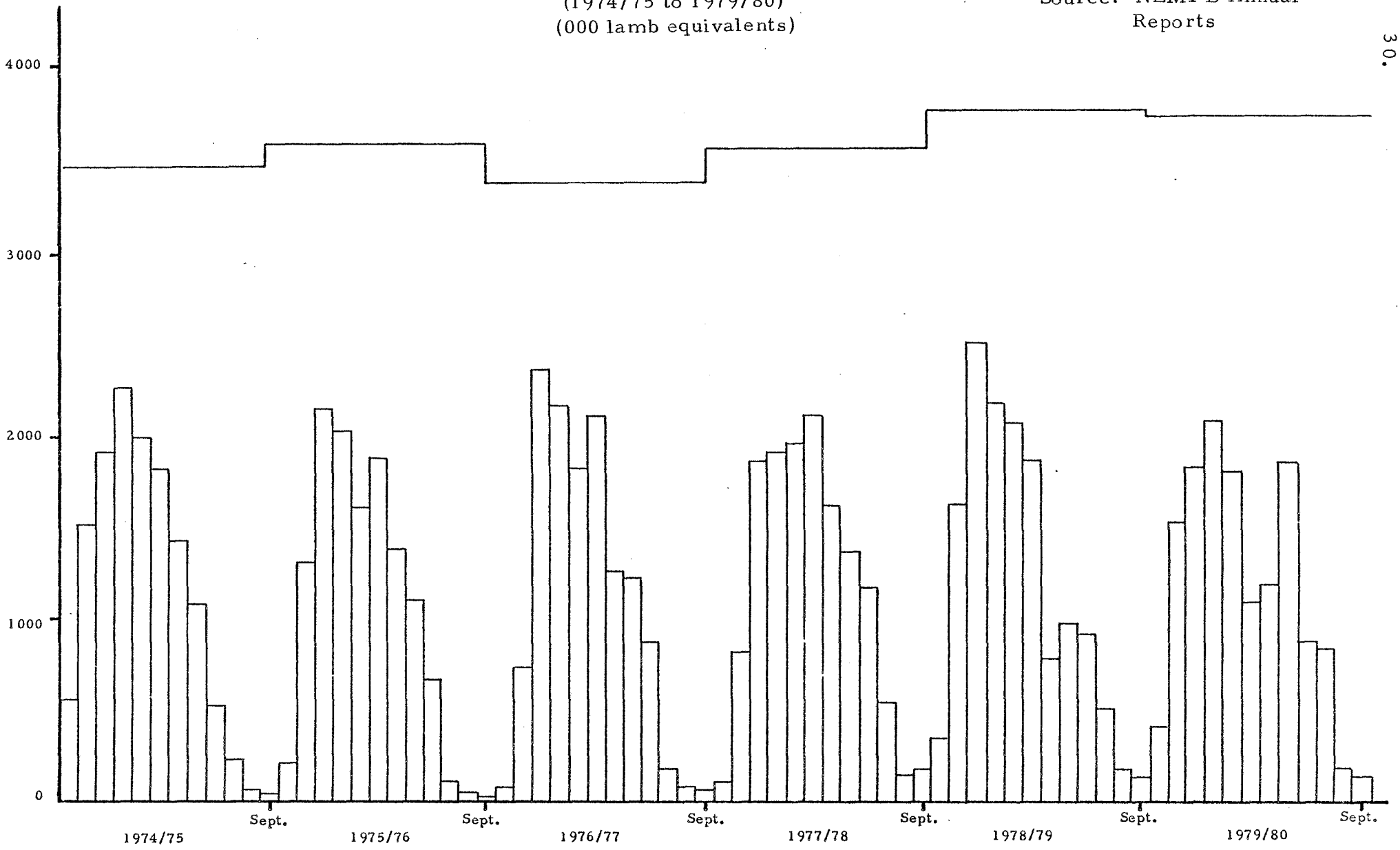
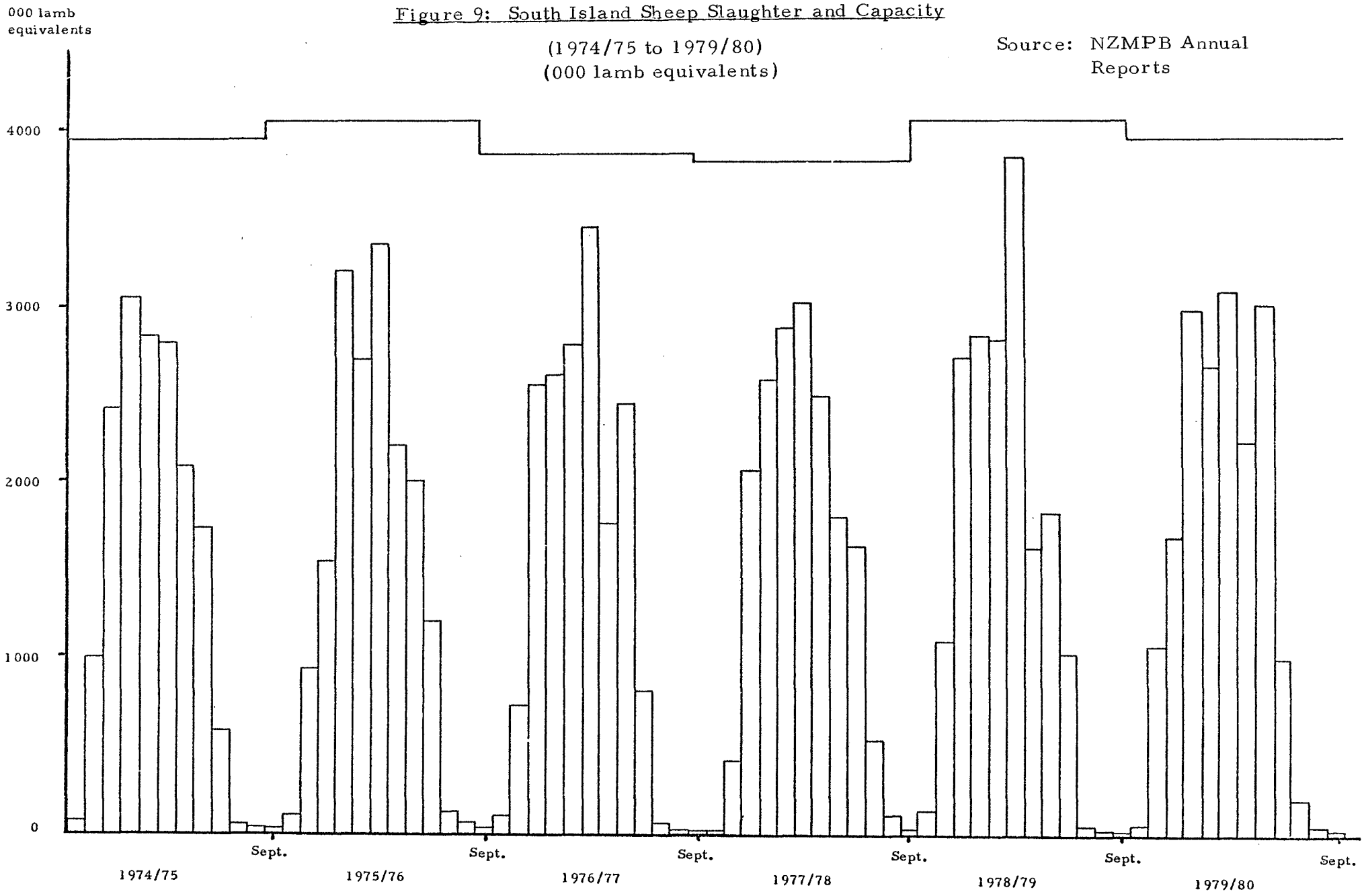


Figure 9: South Island Sheep Slaughter and Capacity

(1974/75 to 1979/80)
(000 lamb equivalents)

Source: NZMPB Annual Reports



even peak production levels are significantly below full capacity (Table 1). It is only in the South Island that peak month sheep slaughtering has risen to greater than 90 per cent of capacity over the last six years. In some weeks, theoretical capacity may have been exceeded through the incorporation of weekend work to overcome specific peaks.

Seasonality would therefore appear to be only a potential problem in the South Island, as far as sheep slaughter capacity is concerned. The high degree of seasonality in the South Island, as evidenced by the difference between peak month utilisation levels and average utilisation would therefore appear to be the most appropriate area for a revision of sheep slaughter patterns. The North Island situation reflects a signficant level of over-capacity, well in excess of that required by seasonal peaking.

TABLE 1

Freezing Works Utilisation by Region[a] - Sheep Slaughtering

(Per Cent)

	1974/75		1975/76		1976/77		1977/78		1978/79		1979/80	
	Average Utilisation	Peak Month Utilisation	Average Utilisation	Peak Month Utilisation	Average Utilisation	Peak Month Utilisation	Average Utilisation	Peak Month Utilisation	Average Utilisation	Peak Month Utilisation	Average Utilisation	Peak Month Utilisation
Auckland	23	52	23	50	27	63	28	50	24	61	25	54
Hawkes Bay	39	78	39	72	37	80	37	65	42	75	39	67
Taranaki	35	80	27	62	31	70	35	87	26	60	37	79
Wellington	30	61	24	59	33	72	29	62	32	71	29	57
North Island	31	65	29	60	32	70	32	59	31	67	31	59
Canterbury	32	68	37	75	36	83	39	74	34	97	42	89
Southland	37	84	33	89	38	95	40	83	39	94	37	88
South Island	35	77	35	83	37	90	40	79	37	95	39	82
New Zealand	33	71	32	68	35	78	36	69	35	73	35	71

(a) Note: the regions used in this study are those defined in the New Zealand Meat Producers' Board Annual Report as follows:

- Auckland - Moerewa to Rangiuru
- Hawkes Bay - Kaiti to Tomoana
- Taranaki - Waitara to Imlay
- Wellington - Wellington to Feilding
- Canterbury - Nelson to Waitaki
- Southland - Burnside to Ocean Beach

CHAPTER 4

THE IMPACT OF INCREASED SHEEP SUPPLY

The impact of increases in sheep supply for slaughter will be assessed in this section in terms of the relationship between slaughter capacity and sheep supply. This assessment will be based upon the 1979/80 slaughter patterns and slaughter numbers.

4.1 North Island

Table 2 presents the monthly sheep slaughter statistics for the 1979/80 season. In addition, a 20 per cent level of increase in supply is shown. (The effect of 3, 5, 10 and 15 per cent increases is given in Appendix 3).

The regional capacity of the North Island freezing works exceeded the 20 per cent hypothesised increase in slaughter levels. It is therefore apparent that even under conditions of increased sheep supply any spread of the kill would have negligible effect, in terms of a higher average works utilisation level. The results indicate that no expansion in regional capacity in the North Island is required. The extent of the total over-capacity situation is clearly demonstrated. Savings could probably be made by the freezing companies through a reduction in capacity to a level more in line with throughput requirements. This is especially so for the Auckland and Wellington regions where average utilisation levels are particularly low. (Note: the Auckland region capacity will have been reduced by the closure of the Southdown freezing works from the 1980/81 season on and the Gear plant closure will reduce capacity in the Wellington region from 1981/82). Any capacity reduction decisions made by the freezing companies would need to be considered in the light of possible seasonal extension activities and changes in capacity should therefore be considered as a part of a wider adjustment of killing patterns. The achievement of a significant increase in the average level of utilisation should be possible given a combined approach to both works capacity and seasonality problems.

TABLE 2

1979/80 North Island Regional Sheep Slaughter and Capacity[a]

(000 lamb equivalents)

	Auckland			Hawkes Bay			Taranaki			Wellington		
	Actual Slaughter	+20%	Capacity	Actual Slaughter	+20%	Capacity	Actual Slaughter	+20%	Capacity	Actual Slaughter	+20%	Capacity
October	42	50	1,372	76	91	1,078	6	7	508	17	20	825
November	461	553	1,372	535	642	1,078	237	284	508	282	338	825
December	625	750	1,372	544	653	1,078	295	354	508	423	508	825
January	736	883	1,372	638	766	1,078	402	482	508	470	564	825
February	517	620	1,372	576	691	1,078	320	384	508	428	514	825
March	354	425	1,372	444	533	1,078	154	185	508	246	295	825
April	285	342	1,372	485	582	1,078	203	244	508	247	296	825
May	467	560	1,372	717	860	1,078	297	356	508	429	515	825
June	249	299	1,372	376	451	1,078	187	224	508	185	222	825
July	236	283	1,372	384	461	1,078	164	197	508	157	188	825
August	53	64	1,372	109	131	1,078	7	8	508	26	31	825
September	43	52	1,372	101	121	1,078	2	2	508	5	6	825
TOTAL	4,068	4,881	16,464	4,985	5,982	12,936	2,274	2,727	6,096	2,915	3,497	9,900
% Average Utilisation	25%	30%	-	39%	46%	-	37%	45%	-	29%	35%	-

Source: NZMPB Annual Report

[a] Note: Capacity is calculated from a weekly base. This is converted to months by multiplying by four. Therefore total capacity given above is equivalent to only 48 weeks rather than 52. This margin provides for a maintenance period.

The Hawkes Bay region exhibits the highest average utilisation level with no significant pressure on monthly capacity levels. This reflects a more even slaughter pattern and, over recent seasons, the movement of sheep into the region to take advantage of the lower killing and processing charges prevalent in this area. A 20 per cent increase in sheep supply can be easily handled within existing works capacity over all months of the year with a higher average utilisation. The retention of the present level of sheep slaughter capacity is therefore indicated. Any reduction in seasonality, especially with regard to January and May, would result in a lower capacity requirement and the possible further reduction of processing charges. In fact, two new sheep slaughter facilities are being constructed in the area. These will result in a significantly worse over-capacity situation than presently exists and it could therefore be assumed that the fixed cost portion of the killing and processing charge would rise significantly. If, however, no change in the general level of killing and processing charge occurs, this would indicate that very substantial efficiencies are able to be obtained from new slaughter premises and may therefore indicate the need to completely modernise existing facilities while, at the same time reducing the overall capacity and encouraging a reduction in slaughter seasonality.

4.2 South Island

The impact of a 20 per cent increase in sheep slaughter on the South Island regions is shown in Table 3. Average utilisation levels and peak utilisation requirements are greater in the South Island than in the North Island and this is reflected in the emergence of capacity deficit periods in both Canterbury and Southland when a 20 per cent increase is allowed for. Both of these capacity deficit periods (January in Canterbury and May in Southland), could be overcome by delaying the slaughter of stock until the following month,

or, as is more likely given the small size of the deficits, weekend work would be used.

The degree of seasonality in the South Island is particularly significant, especially in Southland where over three months of the 1979/80 season there was negligible slaughter activity. It is in the South Island that alterations of the seasonal slaughter pattern would be most significant, in terms of achieving a better works utilisation, but such alterations would also be more difficult to achieve. The present seasonality is a result of climatic conditions. The shorter feed growing period in Southland makes the achievement of a more even lamb fattening and slaughter pattern difficult. In order to encourage such a change, more substantial incentives would be required than elsewhere in New Zealand. Such incentives could be funded from the savings made by the freezing companies through the better utilisation of their facilities and the consequent reduction in labour costs per animal slaughtered resulting from optimum utilisation of chain capacity (see Chapter 6). If this saving was paid to farmers supplying early and late stock, the incentive may be sufficient to encourage increases in supply at these times so reducing the peak requirements.

Low utilisation levels represent an inefficient use of capital. Although a 20 per cent increase in supply would appear to cause a capacity shortage in some months, this shortage could be overcome by alteration of the seasonal pattern, not the addition of extra capacity.

There are at present indications that another freezing works will be constructed in Otago and additional facilities are planned in Southland. This addition of capacity and the consequent use of scarce capital resources cannot be defended from a national interest

TABLE 3

1979/80 South Island Regional Sheep Slaughter and Capacity[a]

(000 lamb equivalents)

	Canterbury			Southland		
	Actual Slaughter	+20%	Capacity	Actual Slaughter	+20%	Capacity
October	50	60	1,789	-	-	2,129
November	1,024	1,229	1,789	65	78	2,129
December	1,156	1,387	1,789	845	1,014	2,129
January	1,590	1,908	1,789	1,624	1,949	2,129
February	1,314	1,577	1,789	1,306	1,567	2,129
March	1,338	1,606	1,789	1,731	2,077	2,129
April	973	1,168	1,789	1,262	1,514	2,129
May	1,097	1,316	1,789	1,872	2,246	2,129
June	352	422	1,789	621	745	2,129
July	113	136	1,789	80	96	2,129
August	13	16	1,789	-	-	2,129
September	5	6	1,789	-	-	2,129
TOTAL	9,025	10,831	21,468	9,406	11,286	25,548
% Average Utilisation	42%	50%	-	37%	44%	-

Source: NZMPB Annual Report

[a] Note: Capacity is calculated from a weekly base. This is converted to months by multiplying by four. Therefore total capacity given above is equivalent to only 48 weeks rather than 52. This margin provides for a maintenance period.

point of view unless the efficiences to be gained from such an addition outweigh the additional capital cost imposed on the total sheep slaughtered. Unless the efficiencies gained through the use of a new facility result in lower regional average killing and processing costs, the expanded utilisation of existing facilities is indicated as a better path to follow. Excessive use of capital in the industry leads to higher capital charges on the throughput. The spread of the capital over a greater throughput, or the reduction of the capital involved could result in a reduced per head cost.

4.3 Summary

Increased sheep supply of up to 20 per cent over 1979/80 slaughter levels would present few regional capacity problems to New Zealand freezing works. In the North Island, there is a substantial over-capacity situation, reflected in low regional capacity utilisation results. This is particularly so in the Auckland and Wellington regions. The Taranaki and Hawkes Bay area capacities are better utilised but these areas can still accommodate a supply increase of 20 per cent without any need for additional capacity. In fact, at the peak month, an 86 per cent increase in supply could be handled within the Auckland region, 76 per cent in Wellington, 50 per cent in Hawkes Bay and 26 per cent in Taranaki. The inclusion of a spreading of the seasonal supply would result in an even greater increase in total supply being able to be handled within each region. The total ability of the freezing works to handle increased supplies of stock on an even supply pattern is an increase of 305 per cent (over 1979/80) in Auckland, 240 per cent in Wellington, 168 per cent in Taranaki and 159 per cent in Hawkes Bay. The extent of the over-capacity situation and supply seasonality is therefore clearly illustrated.

The present move to construct new slaughter facilities and provide additional capacity must therefore be viewed in the light

of the present over-capacity situation. Substantial savings resulting from new works operations must be available to offset the cost of increased capital input to the industry in order for such construction to be economically efficient in a national sense.

In the South Island, works utilisation is higher than in the North Island, but seasonal patterns are more severe. Some capacity constraint could be encountered if supplies increased 20 per cent on present supply patterns. If supplies were evenly spread, however, supply increases of 172 per cent in Southland and 138 per cent in Canterbury could be accommodated. There is therefore ample scope for the handling of increased supplies within existing capacity, providing some adjustment to the seasonal pattern is undertaken.

CHAPTER 5

SPREADING THE KILL

The discussion in this chapter is concerned with possible changes in the kill pattern, and the impact of these changes on freezing works utilisation. The changes suggested in the slaughter pattern for each region are based on the experience of the author in examining the existing New Zealand sheep production and slaughter pattern and are intended to illustrate possible changes and their effect rather than present the results of in-depth research and analysis. The discussion in this chapter therefore concerns changes that are of an illustrative nature only. It is, however, considered that the suggested changes are realistic and that the material presented is relevant to any review of the seasonality situation.

5.1 Slaughter Pattern Changes

In order to provide a realistic footing to this discussion, the 1979/80 season slaughter pattern has been used as a base. Lamb slaughtering in 1979/80 was a record (since exceeded by the 1980/81 slaughter level) but in spite of the 1979/80 lamb slaughter being the highest to that time, no region in New Zealand achieved maximum monthly capacity utilisation in any month and average annual utilisation ranged from 25 per cent to 42 per cent, depending on the region, with a national average capacity utilisation of only 35 per cent (Table 1, p. 31).

In order to achieve a higher level of utilisation it will be necessary to reduce capacity, increase the level of slaughter or achieve both through a reduction in slaughter seasonality to fit in with a lower capacity availability. While capacity exceeds maximum requirements, spreading the kill by itself cannot result in better utilisation. Therefore, a combined approach is necessary to enable maximum savings to be achieved. A reduction in capacity combined with an increase in slaughter at remaining plants and spreading of the kill can lead to better utilisation

of the resources used by the freezing industry, lower processing charges for the farmer and longer employment for the freezing works labour force.

The analysis of the utilisation effect of the suggested potential changes in the slaughter pattern is carried out on a regional basis.

5.1.1 Auckland Region (Moerewa to Rangiuru)

Figure 12 in Appendix 1 presents the slaughter pattern for the 1978/79 and 1979/80 seasons for the Auckland region. Maximum utilisation was 60.7 per cent in December 1978 and 53.6 per cent in January 1980. Average utilisation was 24 per cent in 1978/79 and 25 per cent in 1979/80. This suggests that capacity could have been reduced by a maximum of 75 per cent and sufficient killing capacity would still have been available to handle the 1979/80 sheep slaughter. Such a situation is highly impractical, however, as some seasonality in supply will always remain. There would, however, appear to be significant opportunities for a reduction in the peak of the season by moving stock to a later time in the year for slaughter. A movement of a portion of the December/January slaughter volume into March and April would allow a continuous even slaughter pattern from November through to May. Based on the 1979/80 season this would involve a total movement of 350,000 lamb equivalents from the December and January slaughter to the March and April slaughter. The reduction in peak requirements would be approximately 250,000 lamb equivalents (or 34 per cent from the January peak). The smoothed 1979/80 kill pattern would be at a maximum of 500,000 lamb equivalents per month.

Over the past 10 seasons, the range of absolute annual variability[2] has been from 0.1-21.4 per cent (Table 4). It would therefore be appropriate to allow sufficient capacity to cover a range of this size. Based on the 1979/80 slaughter of 4,068,000 lamb equivalents

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[2] Absolute annual variability is calculated by determining the percentage change in slaughter from one year to the next regardless of the direction of change.

TABLE 4

Annual Regional Slaughter (1970/71 to 1979/80)

(000 Lamb Equivalents)

	Auckland	Hawkes Bay	Taranaki	Wellington	North Island	Canterbury	Southland	South Island	New Zealand
1970/71	4,667	5,142	2,128	3,663	15,600	6,411	10,163	16,574	32,174
1971/72	4,007	5,080	2,016	3,616	14,719	6,916	10,259	17,175	31,894
1972/73	4,187	4,822	2,340	3,605	14,954	7,470	10,281	17,751	32,705
1973/74	3,291	5,041	1,909	2,516	12,757	6,497	9,361	15,858	28,615
1974/75	3,322	5,097	1,963	2,784	13,166	6,644	9,796	16,440	29,606
1975/76	3,320	5,154	1,799	2,319	12,592	7,856	9,009	16,865	29,457
1976/77	3,426	4,743	1,911	3,044	13,124	7,332	9,744	17,076	30,200
1977/78	3,933	4,767	2,194	2,898	13,792	7,932	10,187	18,119	31,911
1978/79	4,040	5,275	1,639	3,190	14,144	6,742	10,585	17,327	31,471
1979/80	4,068	4,985	2,274	2,915	14,242	9,025	9,406	18,431	32,673
Average absolute annual variability	6.9%	4.2%	15.1%	12.7%	4.7%	12.6%	5.6%	4.7%	3.7%
Range of absolute annual variability	0.1-21.4%	0.5-10.7%	2.8-38.7%	0.3-31.3%	0.7-14.7%	2.3-33.9%	0.2-11.1%	1.3-10.7%	0.5-12.5%

a margin of 871,000 lamb equivalents (21.4 per cent) could be reasonable. If these animals were to be slaughtered over the December to April period (five months), a monthly capacity margin of 175,000 lamb equivalents (35 per cent) would be appropriate. Total monthly capacity could therefore be 675,000 lamb equivalents.

With this structure, regional average capacity utilisation would have been increased in 1979/80 from 25 per cent to 50 per cent (with a reduction in capacity of 50 per cent). (Note: the closure of the Southdown plant will have raised the utilisation in this region).

5.1.2 Hawkes Bay Region (Kaiti to Tomoana)

The 1978/79 and 1979/80 slaughter pattern and capacity utilisation for Hawkes Bay is given in Figure 13, Appendix 1. Maximum utilisation was 74.6 per cent in December 1978 and 66.5 per cent in May 1980. Average utilisation was 41.8 per cent in 1978/79 and 38.3 per cent in 1979/80. The slaughter pattern in Hawkes Bay presents a relatively even picture over the period from November to June. The movement of the slaughter peak from December one year to May the following year indicates that a real degree of stock supply flexibility already exists in this area and this contributes to a more even seasonal pattern. Scope for further smoothing of the slaughter pattern exists, however, in the instigation of a deliberate effort to encourage increased stock supply in the March/April period (for the 1978/79 season, increased supplies in April/May would have been appropriate). If a theoretical monthly maximum of 600,000 lamb equivalents was imposed, the result in the 1979/80 season would have been the movement of 38,000 lamb equivalents from January to February/March slaughter and 117,000 lamb equivalents from May to April (or June) slaughter.

The range of absolute annual variability in slaughter volume over the past 10 seasons was 0.5-10.7 per cent (Table 4). Allowing a

capacity margin of 10.7 per cent over the 1979/80 slaughter would result in the need for capacity to slaughter an additional 533,000 lamb equivalents between November and May (7 months). The monthly capacity increment would therefore be 76,000 lamb equivalents. Total monthly capacity could therefore be set at 676,000 lamb equivalents. (With regard to the 1978/79 season, such a capacity would have meant the transfer of 125,000 lamb equivalents from December to March slaughter to April slaughter).

The net effect of these changes could be a total monthly capacity of 676,000 lamb equivalents (a reduction of 37 per cent from the present levels), a target monthly slaughter rate of 600,000 lamb equivalents and, in 1979/80 terms, an average utilisation of 61 per cent.

5.1.3 Taranaki Region (Waitara to Imlay)

The Taranaki (including Wanganui) slaughter pattern (Figure 14, Appendix 1) is similar to the Hawkes Bay pattern. The potential for an even flow of stock to slaughter is shown by the high slaughter levels in January (79.1 per cent of capacity) and May (58.5 per cent of capacity) in 1979/80. This is a contrast to the 1978/79 season when the slaughter was relatively constant from December 1978 to March 1979 before falling away. It would appear appropriate to suggest that effort should be undertaken to shift a portion of the slaughter from the December/January/February period to March and April (for 1978/79 a similar movement would have been useful but commencing in December). If a target slaughter level of 275,000 lamb equivalents per month were accepted for 1979/80 this would have involved the movement of 192,000 lamb equivalents from the December to February slaughter to the March and April slaughter. A further 22,000 lamb equivalents would have been transferred from the May slaughter to June.

The range of absolute annual variability in the Taranaki slaughter is 2.8-38.7 per cent (Table 4) over the last 10 seasons. This is the highest variation of any region. To allow for this level of variation, a capacity margin of 880,000 lamb equivalents would be required (based on 1979/80 slaughterings). Spreading this over six months (December to May), a monthly capacity margin of 147,000 lamb equivalents is indicated. Total monthly capacity could therefore be set at 422,000 lamb equivalents, a reduction of 17 per cent from the present level of 508,400 lamb equivalents. Under these conditions, average utilisation for 1979/80 would have been 45 per cent (versus 37 per cent). This gain in average utilisation is not as great as for Auckland and Hawkes Bay as there is evidence of a greater variability in annual slaughter volumes therefore a greater capacity margin is required.

5.1.4 Wellington Region (Wellington to Feilding)

Maximum utilisation in the Wellington Region was 70.5 per cent in December 1978 and 57.0 per cent in January 1980 (Figure 15, Appendix 1). Average utilisation was 32.2 per cent in 1978/79 and 29.6 per cent in 1979/80. A similar temporal movement of stock to that suggested for the Taranaki Region would be appropriate in the Wellington Region. A target maximum monthly throughput of 350,000 lamb equivalents would require a transfer from December, January and February slaughter of 271,000 lamb equivalents (1979/80 slaughter). This transfer would be handled in March and April with some transfer from May to June.

The range of absolute annual variability over the past 10 seasons was 0.3-31.3 per cent (Table 4). The allowance of a 31.3 per cent capacity margin over the 1979/80 slaughter level results in the need for capacity to slaughter an additional 912,000 lamb equivalents

during the period from December to May (six months). The additional monthly capacity required is therefore 152,000 lamb equivalents. This would result in a total monthly capacity of 502,000 lamb equivalents, a reduction of 39 per cent from the present monthly capacity (825,200 lamb equivalents). Average utilisation in 1979/80 would have been 48 per cent under these conditions, versus the 29.4 per cent actual result. (Note: the closure of the Gear plant at Petone will raise the capacity utilisation for this region).

5.1.5 Canterbury Region (Nelson to Waitaki)

The seasonal pattern is much more significant in the South Island than in the North Island. From a farm management point of view, it is also more difficult to alter the production pattern. Therefore, although there is a large unused capacity area from June through October, it is considered that transfer of slaughter to this period is probably unrealistic. Some smoothing of the November to May pattern should be possible, however.

Figure 16, Appendix 1, depicts the Canterbury situation for 1978/79 and 1979/80. Peak monthly utilisation was 96.8 per cent in 1978/79 and 88.9 per cent in 1979/80 and average utilisation was 31.7 per cent in 1978/79 and 42.0 per cent in 1979/80.

The nature of the Canterbury situation (a high peak and negligible activity for five months) makes the option of bringing stock to slaughter earlier in the season appropriate. If a target capacity of 1,250,000 lamb equivalents per month was set, capacity for 320,000 lamb equivalents could have been utilised in November and December 1979. Almost all of this stock could have been transferred from the January 1980 slaughter. The remaining excess and those from February and March could be transferred forward to April when the 172,000 lamb equivalents moved from March (out of a March total of 1,338,000 lamb equivalents - 12.9 per cent) would be slaughtered.

The absolute annual variabilility range over the past 10 seasons was 2.3-33.9 per cent (Table 4). Allowance of a capacity margin to handle a 33.9 per cent increase over the 1979/80 slaughter level would involve an additional 3,093,000 lamb equivalents over seven months (November to May) or 442,000 lamb equivalents per month. (Note: an additional 258,000 lamb equivalents could have been slaughtered in April and May under a 1,250,000 lamb equivalent target monthly capacity under 1979/80 conditions). A total monthly capacity of 1,692,000 lamb equivalents is therefore indicated. This is a reduction of only 5.4 per cent from the 1979/80 capacity. Average utilisation in 1979/80 would have been 44.4 per cent under these conditions (compared with 42.0 per cent actual).

5.1.6 Southland Region (Burnside to Ocean Beach)

The Southland pattern (Figure 17, Appendix 1) is more seasonal than that for Canterbury. Peak utilisation was 94.0 per cent in March 1979 and 87.9 per cent in May 1980 with 98.5 per cent of the total slaughter occurring between December and June in the 1979/80 season (96.4 per cent in 1978/79). Significant potential exists for increased slaughter in November and December (over 1979/80 levels) and a smoothed pattern through to May with some increase in June slaughter. Farm feed conditions make increased slaughter from July through October impractical; the transfer of stock to earlier slaughter in November and December could only be achieved through the use of significant premiums.

A target capacity level of 1,250,000 lamb equivalents for December through May could be considered appropriate. In order to achieve this, an additional 1,140,000 lamb equivalents would need to be slaughtered in the November/December period (over 1979/80 levels). Of these, 405,000 would be added to the December slaughter to achieve

the 1,250,000 target and 735,000 would be added to the November slaughter, bringing the total November slaughter to 800,000 (based on 1979/80). This action would remove the high slaughter levels for January, February and March and also allow some reduction in the May peak. From the 1979/80 May slaughter, 405,000 lamb equivalents would be moved to June, bringing the June slaughter to 1,026,000 lamb equivalents (1979/80 base).

The absolute annual variability range over the past 10 seasons was 0.2-11.1 per cent (Table 4). A capacity margin of 11.1 per cent would require extra capacity for 1,044,000 lamb equivalents. Over a six month period (December to May) (assuming no more stock could be shifted to November or June) a monthly capacity increment of 174,000 lamb equivalents would be required. This would raise total monthly capacity to 1,424,000 lamb equivalents, a reduction of 33 per cent from the 1979/80 level (2,128,800 lamb equivalents). Average utilisation for 1979/80 total slaughterings would have been 55 per cent versus 37 per cent actual).

5.2 Summary and Conclusions

The changes suggested are summarised in Table 5. Based on this analysis, it is apparent that the Auckland region is the most significantly over-capacitised, with Wellington also experiencing a similarly low level of utilisation. The Southland, Taranaki and Hawkes Bay areas have a similar utilisation level (37-38 per cent). These levels could be substantially improved in Hawkes Bay and Southland through adjustments to the seasonal pattern and consequent reductions in capacity. In Auckland and Wellington, utilisation improvements could be achieved through capacity reductions without major seasonality changes.

The Canterbury region exhibits a relatively high level of utilisation and, unless large seasonality alterations (accompanied by capacity changes)are undertaken, this level of utilisation could not be improved very much.

TABLE 5

Summary of Suggested Capacity Changes

	Auckland		Hawkes Bay		Taranaki		Wellington		Canterbury		Southland	
	1979/80	Proposed	1979/80	Proposed	1979/80	Proposed	1979/80	Proposed	1979/80	Proposed	1979/80	Proposed
Monthly capacity (000 lamb equivalents)	1,372	675	1,078	676	508	422	825	502	1,789	1,692	2,129	1,424
Per cent capacity change		-50%		-37%		-17%		-39%		-5%		-33%
Per cent average utilisation	25%	50%	38%	61%	37%	45%	29%	48%	42%	44%	37%	55%
Number of months at >50% of capacity	1	7	4	9	4	7	4	6	7	7	5	8

CHAPTER 6

THE COST OF UNUTILISED CAPACITY - A CASE STUDY

6.1 Works Profile

The works chosen for the case study is one that only slaughters sheep. Over the 1979/80 season, the average ratio of adult sheep to lambs was 0.20:1. The arrangement of slaughter facilities means that the conversion of sheep to lamb equivalents for this works is via a multiplicative factor of 1.11. Therefore, the total lamb equivalents slaughter for 1979/80 of 1,039,364 was made up of 850,362 lambs and 170,272 adult sheep (189,002 lamb equivalents).

The weekly kill figures for the 1979/80 season indicate a significant degree of weekly variation and overall seasonality. The major points are a high lamb slaughter in December, an increased adult sheep slaughter from January to March and a continuing lamb slaughter through to May. The continuing lamb slaughter during the summer, with no obvious peaking, was a reflection of the favourable climatic conditions during that period (i.e. lack of a drought) and the consequent high level of grass growth. (It would be expected that a drought period would result in a higher level of slaughter in December and January).

The works has a three chain operation that results in a weekly capacity of 42,000 lamb equivalents (or 46,000 if a Saturday morning kill is undertaken). These capacity levels are a result of negotiations with the unions and therefore do not represent the maximum facility capacity (in terms of equipment capabilities). The operation policy of the works involves a delay of operation commencement until sufficient stock is available to run the three chains, and the closing of one chain late in the season when available volumes are beginning to decline. The operation of one chain only is not undertaken.

This reflects the essentially fixed nature of the costs associated with the operation of a freezing works. Costs are variable as between the operation of incremental chains but the cost of operating freezers, by-product areas, and within each chain is not directly related to the throughput of the works. This means that a large proportion of the cost of freezing works operation is fixed. Therefore, the highest throughput possible is associated with lower per unit processing charges.

Even in the chain situation, costs cannot be considered directly variable. Once a chain is operating the employment of the chain personnel is fixed and cannot alter with the level of chain utilisation. In addition, the agreements reached with labour unions requires that the payment to chain personnel is based upon the hours employed and not the throughput of the chain. Union agreements also set the allowable chain throughput and, if the company cannot put sufficient stock up for slaughter to meet that throughput, wages are paid to the employees as if that throughput had been reached. In arriving at the calculation of the wages, the company must use a fixed number of hours associated with the agreed throughput maximum/minimum and pay the employees on that basis rather than the actual hours worked. In some agreements, this can mean that, in addition to the payment for eight hours when only six (or less) may have been worked, the company may also be required to pay a fixed amount at overtime rates, as this is what is included in the agreement. Therefore, any chain usage that is below the agreed rate results in a significant rise in per lamb equivalent processing costs.

As a result of this inflexibility in terms of chain operation, it is in the interests of the freezing works to delay chain opening until there is sufficient stock available to ensure operation at the maximum allowable level. This acts against the advantages of out of seasonal peak processing as lower stock availability means that

higher per unit processing costs are incurred as a result of the high fixed cost component of the operating costs of the freezing works.

The following section illustrates the degree of per unit cost variation resulting from the level of fixed costs associated with freezing works operations.

6.2 Operating Costs

The cost of operating freezing works is closely related to the labour cost.

The total wage cost for the period from November 1979 to June 1980 for the works selected was approximately $5 million. On a weekly per lamb equivalent basis, the cost ranged from $3.88 to $7.66, with an average cost over the season of approximately $5.53. Figure 10 presents an analysis of the weekly per lamb equivalent wage cost with respect to the weekly slaughter in lamb equivalents. Figure 11 presents the weekly wage cost versus weekly slaughter. Both Figures would indicate a continuous relationship between total wage cost and throughput, but this may not be the case. As the opening of a third chain is delayed until there is sufficient stock available to ensure a greater than 50 per cent utilisation of the third chain, data on labour costs at a low level of third chain utilisation are not available. It is probable that there would be a disjunction in the cost function at the throughput level associated with the introduction of the third chain for the reasons outlined in Section 6.1 A low level of third chain utilisation could therefore be expected to be associated with high per unit costs.

In order to assess the level of difference between the overall cost situation and the two chain and three chain cost situations, the relationship between throughput and per unit cost has been evaluated

using regression analysis. The fitted lines are given on Figure 10 and the lines derived from them (for total weekly cost) are presented on Figure 11.

The overall cost situation is explained by the curve $Y = 3.877 + 53.259/X$ ($R^2 = 0.91$, D.W. = 1.82, F = 247.89, where Y = per unit cost and X = weekly throughput). For the two chain data only, the equation is $Y = 4.421 + 43.505/X$ ($R^2 = 0.74$, D.W. = 2.07, F = 19.62) and for the three chain data only, $Y = 2.137 + 118.852/X$ ($R^2 = 0.79$, D.W. = 1.86, F = 56.38). The two and three chain calculations indicate the presence of a change in the cost function as the works operation moves from a two chain to three chain mode.

When the values derived using the above equations are used to calculate the total weekly wage costs, the line relationships shown on Figure 11 result. These would indicate that there is an implied weekly fixed cost level of $122,000 associated with the three chain operation, $45,000 associated with the two chain operation and, overall, $54,000. The extrapolation of the three chain relationship back to zero throughput is unrealistic but the two chain situation and the "overall" situation are useful indicators of the level of fixed costs, about $50,000, that could be considered to be associated with the weekly labour cost at this freezing works. This level of cost results from work practices, worker agreements and the use of fixed cost labour off the chain.

6.3 Cost of Utilisation

Average works utilisation for the 1979/80 season in Canterbury was 42 per cent. At that level for the case study works, throughput would have averaged 17,640 lamb equivalents per week. The average wage cost would have been approximately $6.89. At the suggested

Figure 10: Per Lamb Equivalent Wage Cost versus Slaughter Level

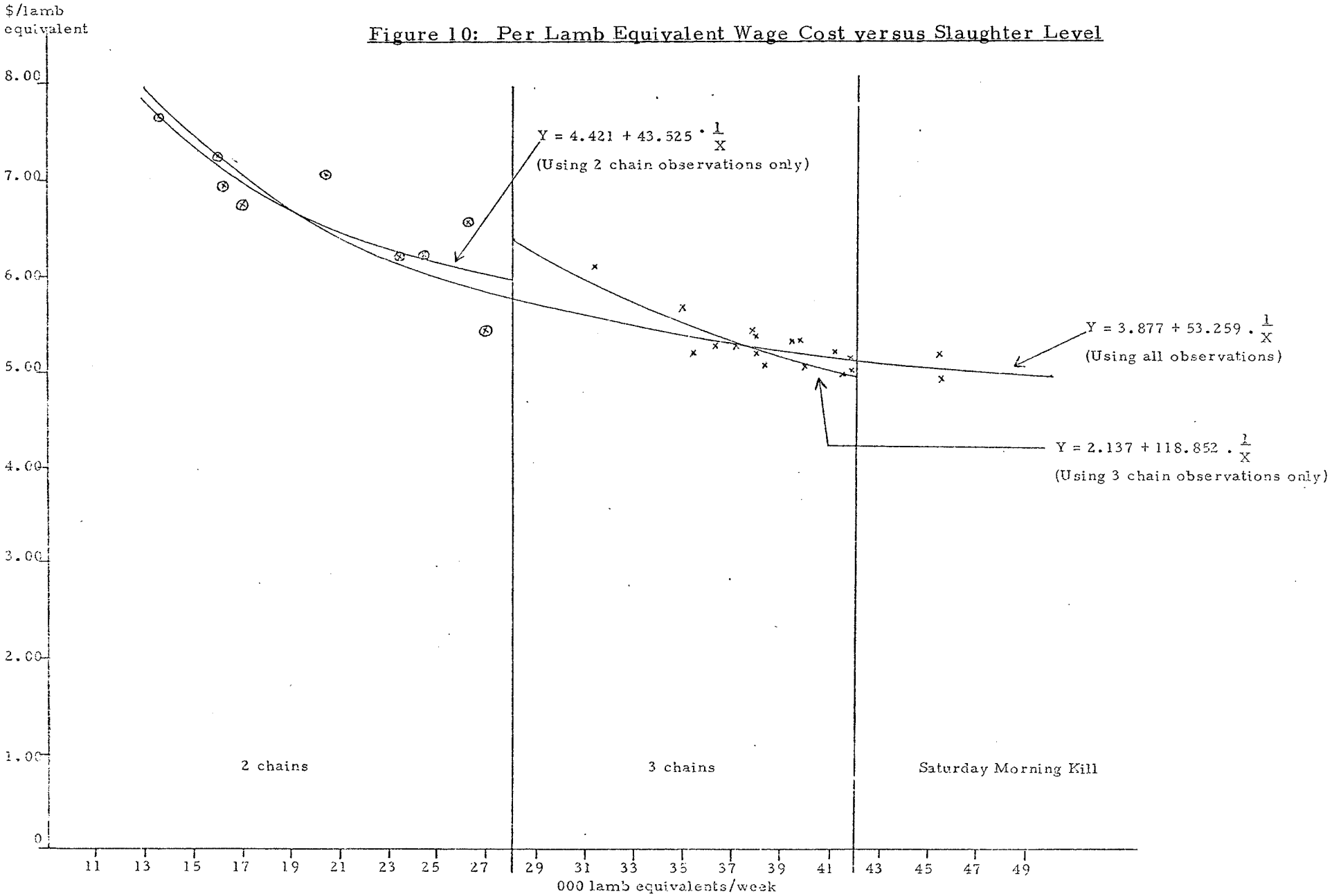
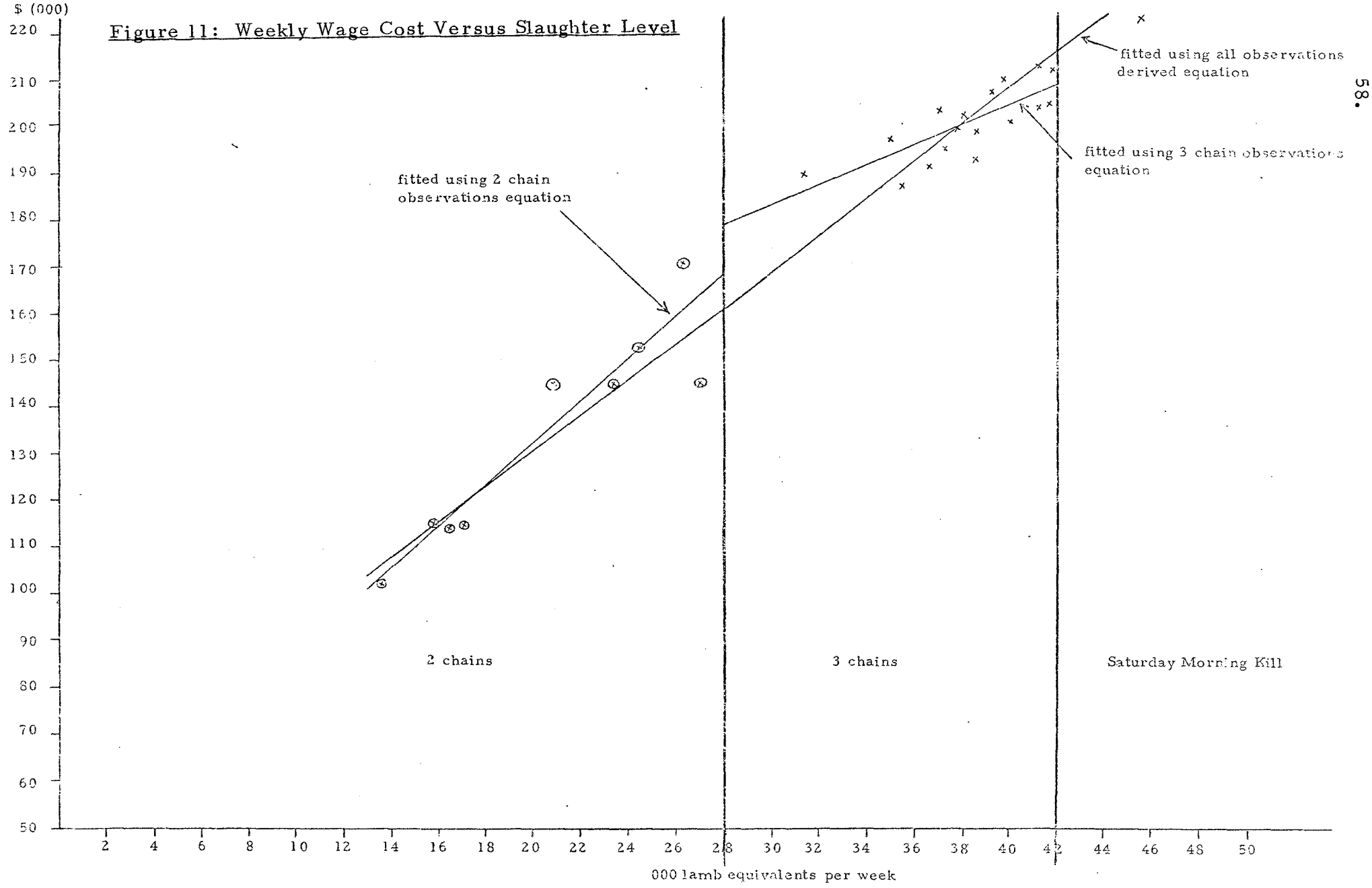


Figure 11: Weekly Wage Cost Versus Slaughter Level



average utilisation of 44 per cent (Table 5), resulting from a reduction in seasonality, the average per unit wage cost would have been $6.77. This difference is only marginal, but in other areas, where a greater improvement in utilisation could be achieved, the cost difference is more significant.

Based on the case study works wage cost, the potential savings from improved utilisation for all regions are as given in Table 6.

Although it is a gross assumption to assume that the per unit costs for one works can be related to all works, the calculations do provide an indication of the magnitude of the savings possible.

In order to achieve these potential savings, it is necessary for a number of factors within the industry to change. Improved utilisation of the present facilities can only result from reduced capacity (the closing of works or the reduction of individual works capacity through the deletion of a chain(s) and the removal of consequent excess storage space and other back-up facilities including fixed cost labour) or increased stock throughput for the existing works. As, to a large extent, the costs associated with the operation of a works are fixed, there is a need to either reduce the fixed costs or better use them with increased throughput. It is suggested that reductions in capital invested through the reduction of capacity could lead to some savings in processing costs through the better utilisation of the remaining facilities. The spread of the slaughter away from the seasonal peak would allow more significant capacity reductions than otherwise and therefore may contribute to a lowering of per unit processing costs. In a situation of increasing demand on slaughtering facilities from increasing stock numbers, it is suggested that this stock be used to improve the works utilisation in the off season (at least in the non-peak months) to achieve improved utilisation of facilities.

TABLE 6

Potential Wage Cost Savings

	Present Utilisation %	Suggested Utilisation %	Potential Wage Saving/ lamb equiv.[a] ($)	1979/80 Throughput (000 lamb equivs)	Total Potential Wage Saving $ (000)
Auckland	25	50	2.07	4,068	8,420.8
Hawkes Bay	38	61	1.03	4,985	5,134.6
Taranaki	37	45	0.50	2,274	1,137.0
Wellington	29	48	1.41	2,915	4,110.2
Canterbury	42	44	0.12	9,025	1,083.0
Southland	37	55	0.92	9,406	8,653.5
TOTAL				32,673	$28,539.1

[a] Note: these savings have been calculated by using the two chain equation for the case study works and solving for the cost per unit at levels of throughput equivalent to the utilisations at "present" and "suggested" and calculating the difference.

6.4 The Impact of "Fixed Costs"

The present industry situation reflects a lack of flexibility in processing arrangements that leads to a high per unit cost structure. Agreements reached with the unions have created a situation where an apparently variable cost (hourly wages for operators on the chain) has been converted into a fixed cost where a set number of hours must be paid for regardless of the actual hours worked or the actual throughput. The only flexibility left to the freezing companies is the decision as to whether a chain should be opened or closed. Once running, a chain cost is a fixed cost that can only be altered by the closure of the chain. This means that each chain must be run at its maximum daily throughput in order to minimise the cost per unit of throughput.

As increases in throughput involve the movement from a two chain operation to a three chain operation and an expected increase in per unit costs at a low level of third chain operation (Figure 10) it is apparent that a freezing works, faced with the need to open a third chain, will endeavour to move as quickly as possible to a high level of third chain utilisation in order to achieve the lowest possible per unit costs. This means that additional costs incurred through transporting stock to other works to ensure an even level of utilisation can be offset against the per unit costs saved by not operating an additional chain at a low level of chain utilisation.

In the case study, assuming that a disjunction in the cost function exists at the move from two chain to three chain operation, a per unit wage cost differential between maximum two chain utilisation and minimum third chain utilisation of $0.41 is indicated ($6.38-$5.97) (Figure 10). It is not until at least 3,000 lamb equivalents per week are available for the third chain that

per unit wage costs are reduced to the two chain maximum utilisation level. This means that, on a weekly basis, $615 is available from wages to offset against increased transport costs incurred prior to the achievement of a sufficient weekly volume to open the third chain. Such a situation will result in a stepwise increase in production levels as more chains are brought into operation. Also, as the lowest cost per unit is achieved at utilisations approaching the maximum, it is probable that a freezing works will not commence production for the season until a sufficient volume of stock is available to ensure a high level of throughput. This could have disadvantages where attempts to bring lambs forward for earlier slaughter only result in limited numbers being available for particular works. It may be that a threshold level would need to be achieved before freezing works would be willing to open.

The lack of flexibility in the operation of large existing freezing works therefore tends to act against the concept of a spread of the seasonal kill as a result of the need to incur substantial fixed costs when getting a works operating. This is emphasised more when the impact of support staff fixed costs is considered. The number of employees required to operate the by-products and freezer areas is not directly related to the number of chains operating and, therefore, low throughputs result in higher per unit costs from this area as well as the chain operators.

In order to attempt to overcome these problems, companies are now looking to the establishment of small works with high technology input. They are therefore converting labour fixed costs into capital fixed costs, these types of costs having proven to be lower than the labour based cost, and, through the smaller size of the works and the consequent need for less labour in the servicing areas, they are likely to be able to process smaller

throughputs at maximum utilisation levels and, as a consequence, achieve lower per unit processing costs. Labour costs have proven to be non-competitive with capital costs once the variable nature of the labour cost is removed, and this must result in the steady replacement of labour by capital in those areas where technology has proven to be effective in handling previously manual tasks. The likely trend over the future is therefore toward small, high technology freezing works, using low levels of labour, achieving a high level of utilisation and therefore increased processing efficiency. Such operations will tend to be able to encourage out-of-season production as they will be fully utilised at lower throughput levels than the large existing works. This will reduce the need for large capacity plants geared to handling seasonal peaks leading to a lower level of utilisation of them and their eventual closure.

Employment opportunities may not be reduced by this movement, however, as the development of small slaughtering plants could lead to the expansion of further processing operations associated with those plants so increasing employment in this area.

CHAPTER 7

CONCLUSIONS

Animal slaughter facilities in New Zealand have a low level of average utilisation. This results partly from the seasonality of animal supply and an over-capacity situation. This low level of average utilisation leads to a higher processing cost per animal than would be the case if utilisation levels were higher. Although this study has not examined in depth the situation with regard to fixed capital costs, it is apparent that the spread of fixed capital costs associated with lower capacity, would result in lower processing costs per animal.

In addition to the fixed capital cost element, it is apparent that "variable" wage costs are not in fact variable with regard to throughput. Lower levels of utilisation therefore result in higher per unit costs. This is a consequence of both work practices and labour agreements. The use of a chain system for stock processing means that labour is added to the cost structure in discrete portions. This results in higher per unit labour costs at low individual chain utilisation. In addtion, labour agreed maximum/minimum daily throughputs result in the conversion of a variable wage cost to a fixed cost once a chain has started. A low level of chain utilisation therefore again results in higher unit costs.

In this situation, it is essential that freezing works should attempt to operate as close as possible to full capacity in order to minimise per unit processing costs. Where there is insufficient stock to enable a high level of utilisation, it is appropriate that capacity should be reduced so as to ensure that remaining facilities are utilised to a high level so reducing per unit processing costs. The existence of a significant level of excess capacity in the New Zealand meat industry means that higher processing costs are

incurred than would be applicable if the capacity was better utilised.

The seasonality of the supply of livestock is a major factor in the historical establishment of excess capacity in the processing industry and the consequent low level of average utilisation. Spreading the demand for killing space over a longer period would result in a reduced requirement for peak capacity and so allow further reductions in the industry capacity. The development of an industry which is able to persist in operating at low utilisation levels and high per unit costs has been greatly assisted by the existence of a protective licensing system. This has enabled a high cost situation to persist as other types of operation have been excluded from competing with the existing industry. Labour costs have been allowed to escalate under the protective umbrella of the licensing system and the agreements entered into by the present companies have converted variable labour costs into fixed costs. The recent delicensing of the industry is therefore likely to result in significant changes in the structure of the industry as the older freezing works face up to competition from new, more capital intensive, smaller plants. Labour arrangements in these plants are likely to be substantially different from those in the existing works.

The present industry structure has allowed the development of a high level of operating fixed costs. This means that low levels of throughput are associated with high per unit costs. Labour costs are such that, having lost their variable nature, they are not competitive with capital costs. This will result in the replacement of labour by capital in the form of labour replacing technology. In order to achieve some flexibility in their operation, companies are likely to construct small plants that can operate at a high level of capacity utilisation and so achieve an effective spread of fixed costs over maximum throughput. This flexibility will allow for the handling of stock in the present off-season (at least away from the seasonal peak) in lower numbers than are presently needed by the large works

while still maintaining a high utilisation level and effectively reducing costs.

Efficiencies gained through the replacement of labour by capital and an improved utilisation level will probably result in the availability of premiums for "out-of-season" stock supply. This study has, however, not attempted to quantify the level of availability of any such premiums but has indicated some areas where potential savings are possible and it remains to decide whether the savings would off-set the additional costs so resulting in adequate premiums to farmers.

It is therefore probable that the further cost-effective development of the meat processing industry is dependent upon the reduction of costs through the replacement of labour fixed costs by capital fixed costs and the improvement of facility utilisation by the establishment of smaller more flexible processing plants and the closure of the larger, high fixed cost operations. Such movement would lead to a spread of the kill away from the seasonal peak as well as a possible movement of the present industry labour force into further processing operations based on the smaller slaughtering plants.

Present industry experience suggests that the carrying out of further processing in smaller plants is desirable from the point of view of quality control, flexibility and labour relations. It is likely, therefore, that movement toward more use of smaller slaughtering facilities would result in an expansion of further processing associated with those facilities and a consequent expansion in the labour employed on those operations. Such a labour movement could be used to off-set reductions in labour requirements from removal of the present highly seasonal nature of the industry.

Before any definitive statement can be made concerning the best path for the industry to follow in the future, it is essential that more research be carried out to accurately identify the level of potential savings available from making adjustments to the seasonality aspects of the industry. The areas that require further investigation include the on-farm aspects of an alteration of the seasonal production pattern. Such research would need to identify the various cost structures associated with different production systems for similar and dissimilar products in different regions. The level of savings available to the freezing works from a reduction in seasonality needs to be more closely examined. The potential for savings in this area has been identified by this research but more in-depth analysis is essential. In order to make recommendations on reductions in seasonality, it is necessary for there to be a clear understanding of the type of products required by the markets for New Zealand meat. Seasonality can be reduced by the production of different products. However, potential demand for these products must be identified before production is undertaken. Associated with this area of research is the need to identify any market price changes that might result from a less seasonal production system and/or production of different products. A further area for research is the transport sector. Cost savings may be possible in this area through the reduction of the transport capacity required to move both livestock and processed product where these items are being transported on a more even basis over the year. The effect of seasonality reductions on road transport and shipping operations therefore requires further consideration.

The New Zealand meat industry is based on a highly seasonal operation - the seasonal production of livestock. This means that resources are used in a seasonal way resulting in periods of very

low utilisation and periods of near capacity utilisation. The most effective use of resources commonly occurs where utilisation is maintained at a high and constant level. Seasonality works against this concept. The research reported in this publication identifies the extent of seasonality in the meat production system and identifies areas of potential savings from seasonality reductions. It remains for further work to quantify the level of savings possible in all affected areas, the level of potential market price alteration that may be achieved, examine the ability of the industry to pass on savings and price premiums to farmers and to identify the costs involved in on-farm alterations to seasonality before a definite move toward seasonality reductions should be implemented.

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APPENDICES

APPENDIX 1

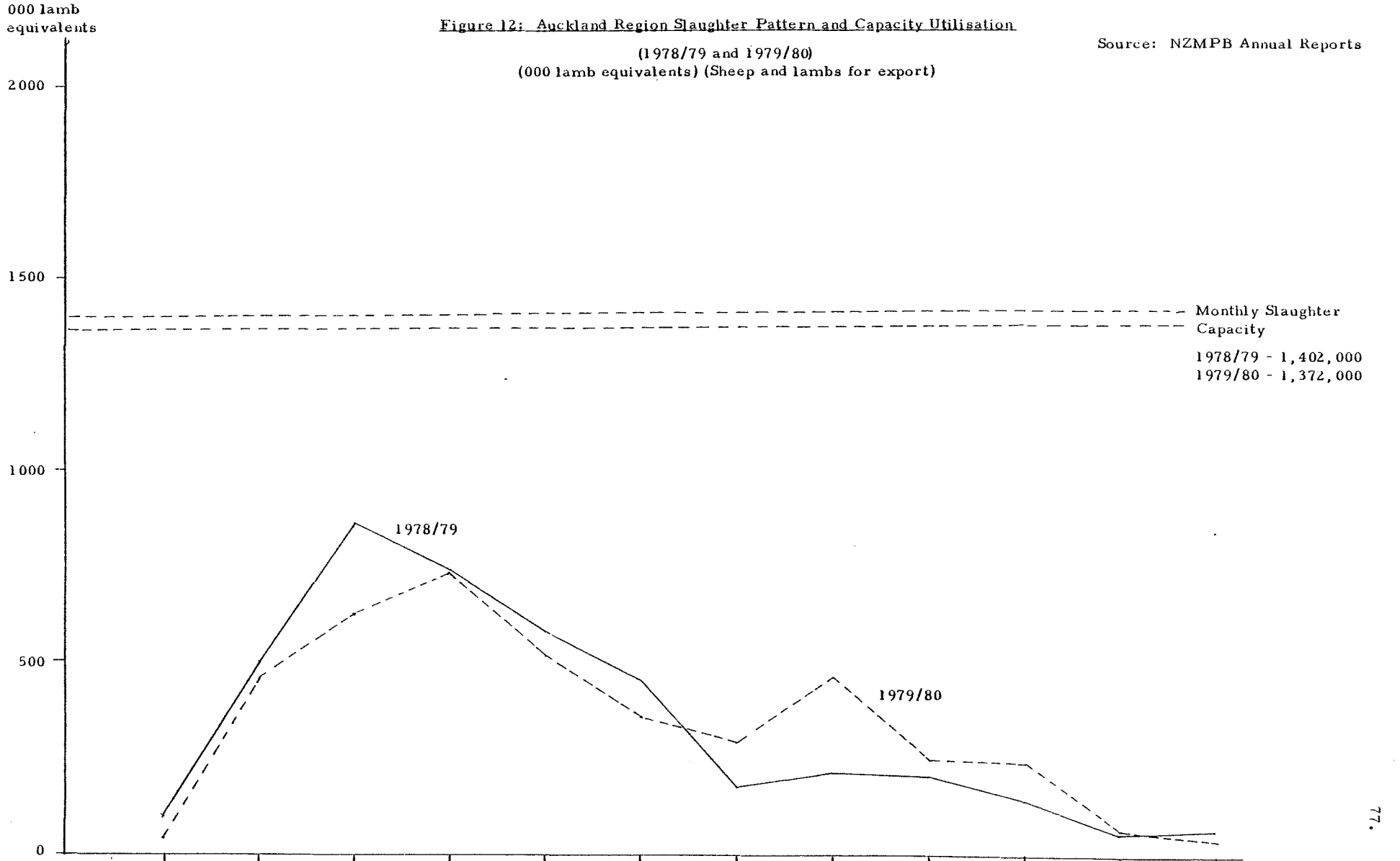
Sheep Slaughter by Region

(1978/79 and 1979/80)

Figure 12: Auckland Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/80)
(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports



	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
	6.8	34.7	60.7	52.4	41.4	32.9	12.6	15.6	14.1	9.4	3.4	4.3 % Utilisation 1978/79
	3.1	38.6	45.6	53.6	37.7	25.8	20.8	34.0	18.1	17.2	3.9	3.1 % Utilisation 1979/80

Figure 13: Hawkes Bay Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/80)

(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports

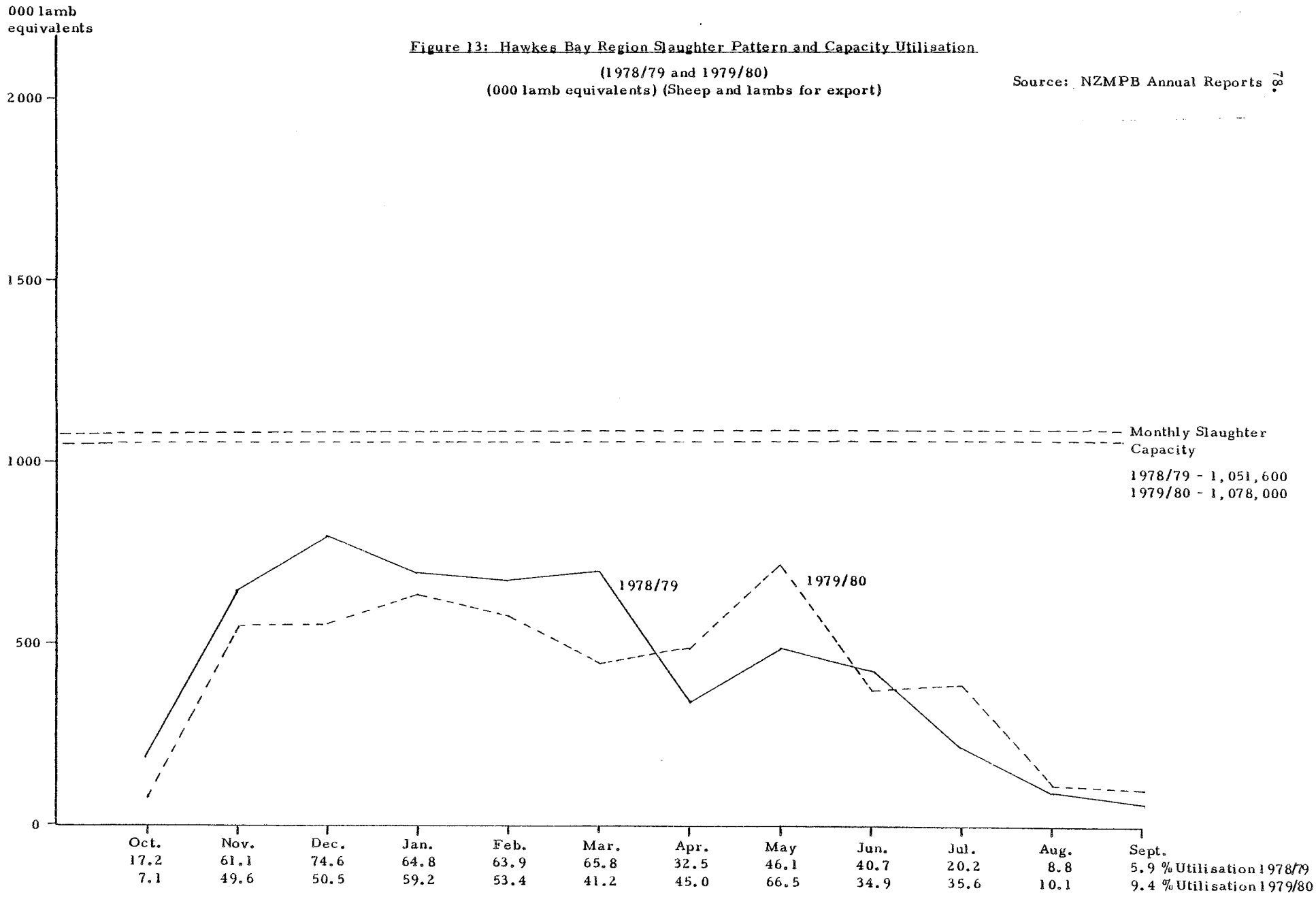
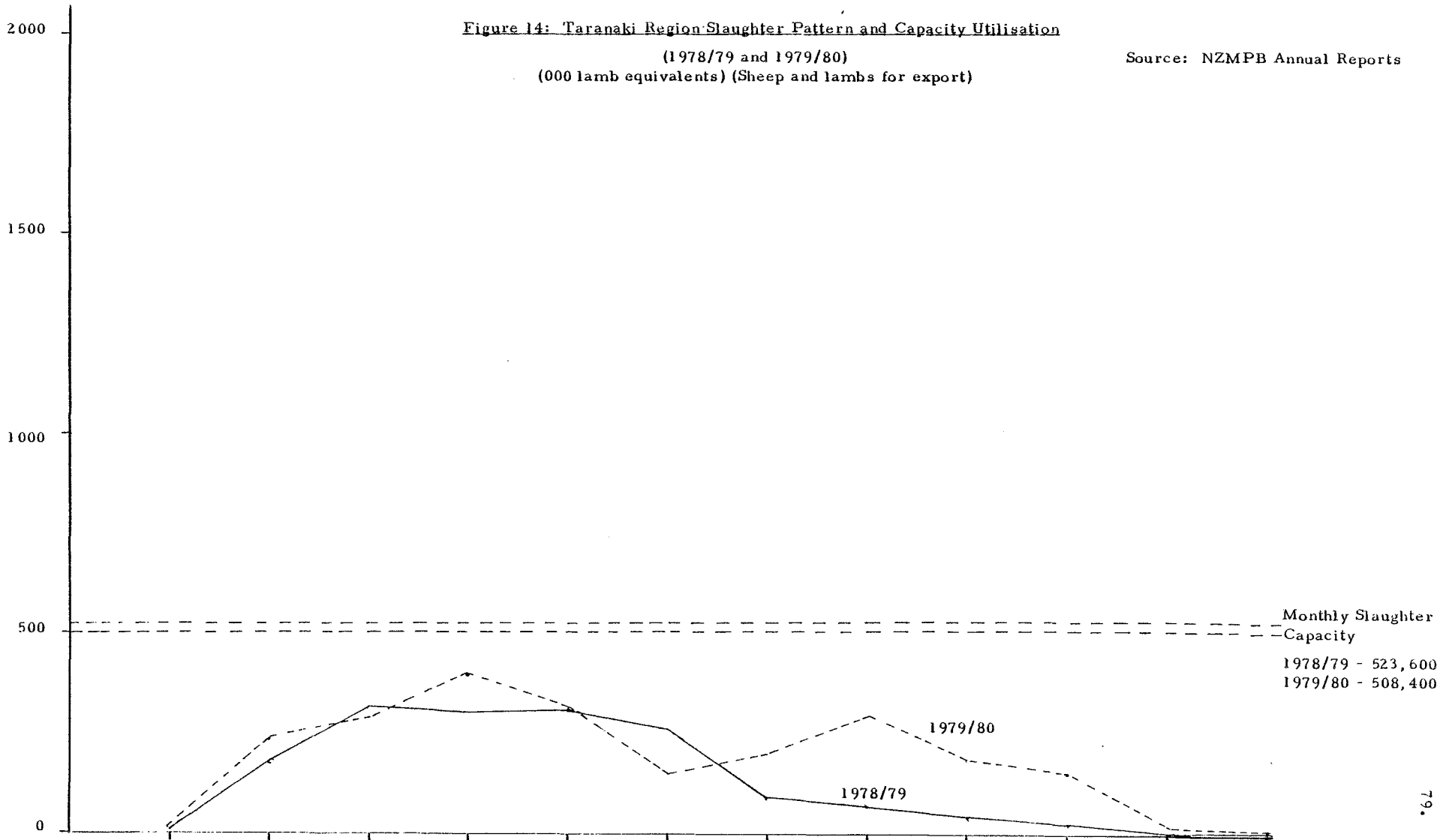


Figure 14: Taranaki Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/80)
(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports

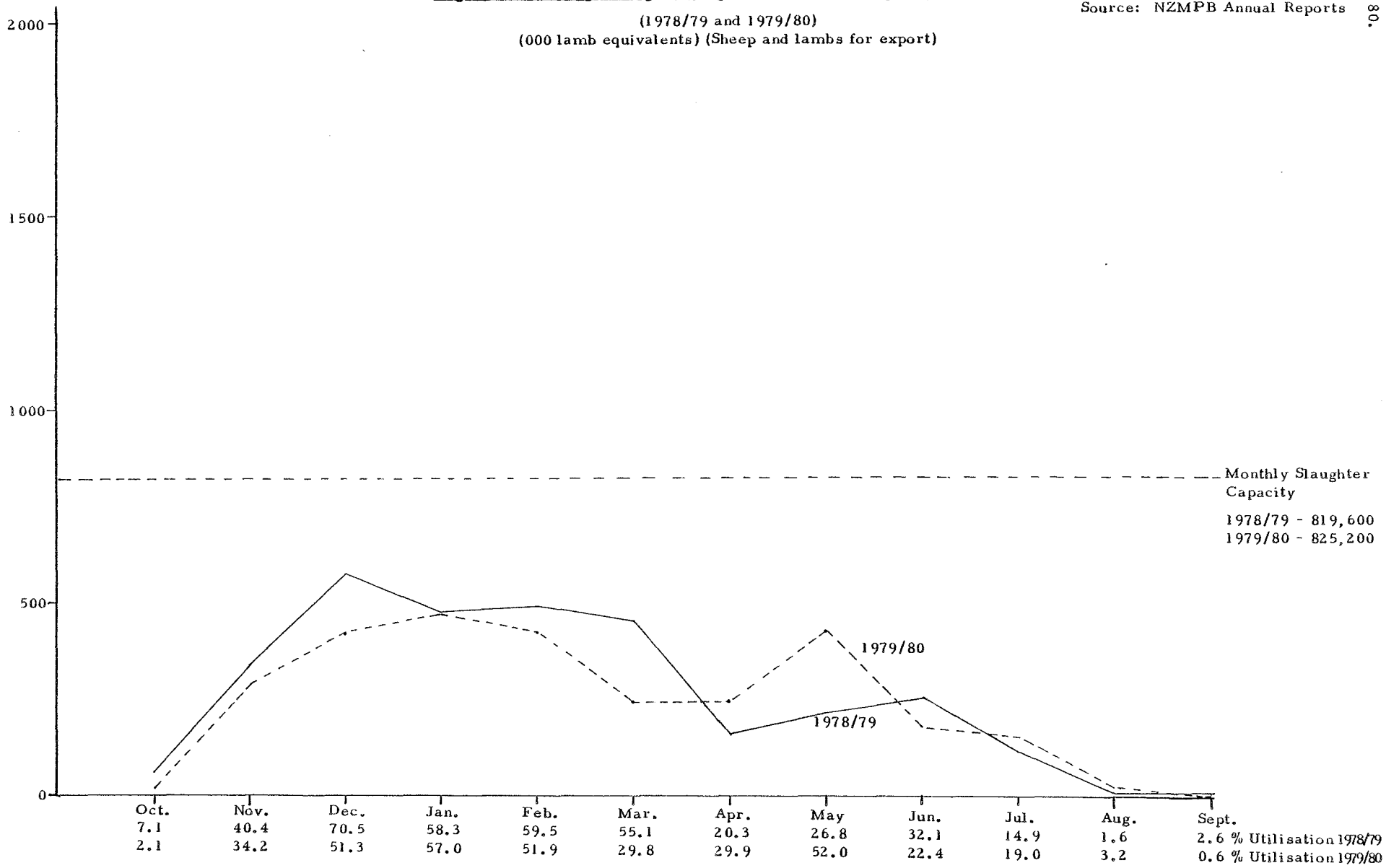


Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
1.9	34.4	60.4	58.1	60.2	49.9	17.8	18.0	8.6	6.5	2.1	0.4 % Utilisation 1978/79
1.2	46.7	58.1	79.1	63.0	30.3	40.0	58.5	36.8	32.3	1.4	0.4 % Utilisation 1979/80

Figure 15: Wellington Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/80)
(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports

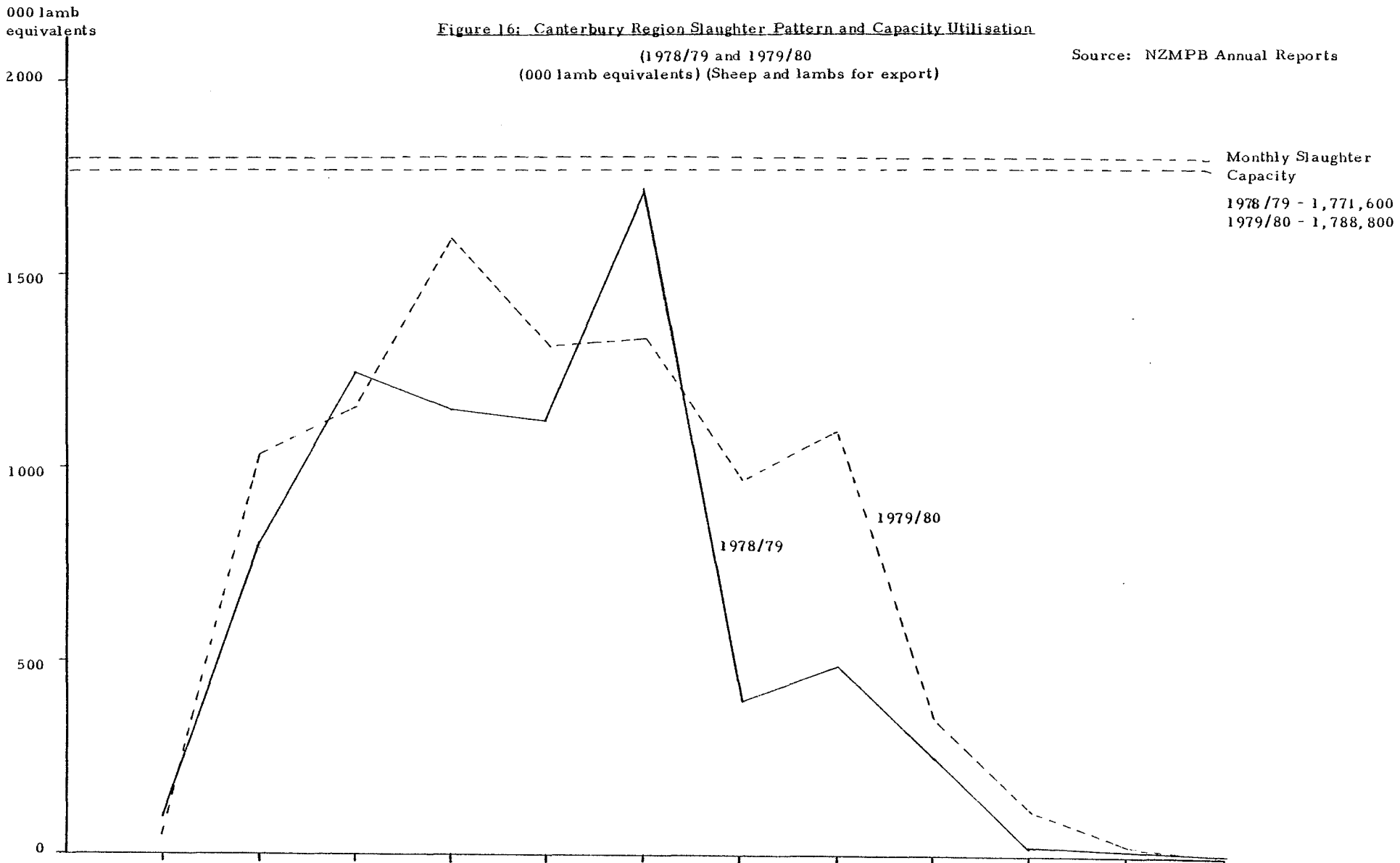


	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
1978/79	7.1	40.4	70.5	58.3	59.5	55.1	20.3	26.8	32.1	14.9	1.6	2.6 % Utilisation 1978/79
1979/80	2.1	34.2	51.3	57.0	51.9	29.8	29.9	52.0	22.4	19.0	3.2	0.6 % Utilisation 1979/80

Figure 16: Canterbury Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/80
(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports



	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
1978/79	5.4	44.3	70.2	64.4	63.3	96.8	22.5	27.2	14.5	1.1	0.9	0.6 % Utilisation 1978/79
1979/80	2.8	57.2	64.6	88.9	78.4	74.5	54.4	61.3	19.7	6.3	0.7	0.3 % Utilisation 1979/80

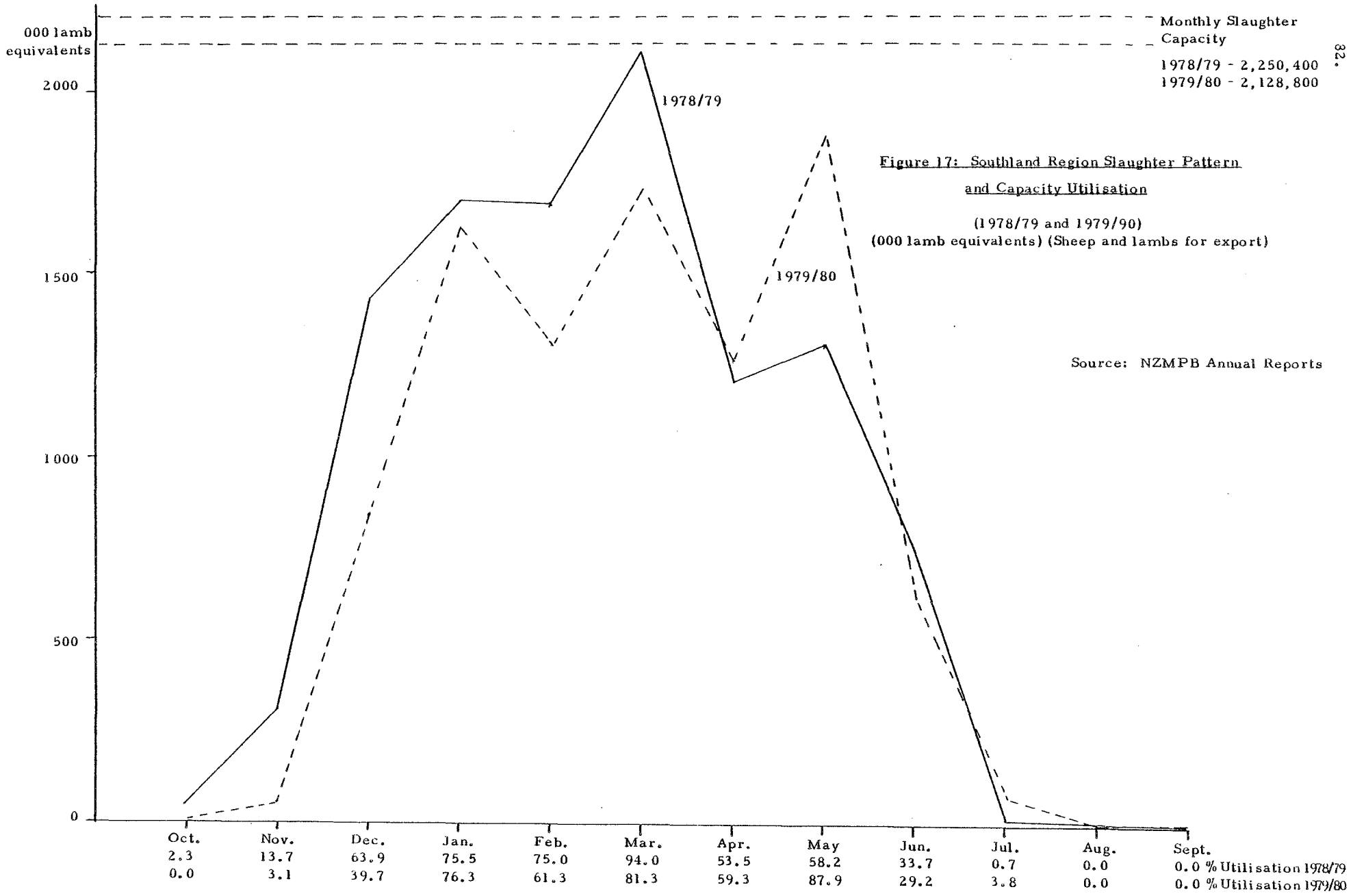


Figure 17: Southland Region Slaughter Pattern and Capacity Utilisation

(1978/79 and 1979/90)
(000 lamb equivalents) (Sheep and lambs for export)

Source: NZMPB Annual Reports

APPENDIX 2

Cattle Slaughter by Region

(1978/79 and 1979/80)

Figure 18: Auckland Region Cattle Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 Cattle) (For export)

Source: NZMPB Annual Reports

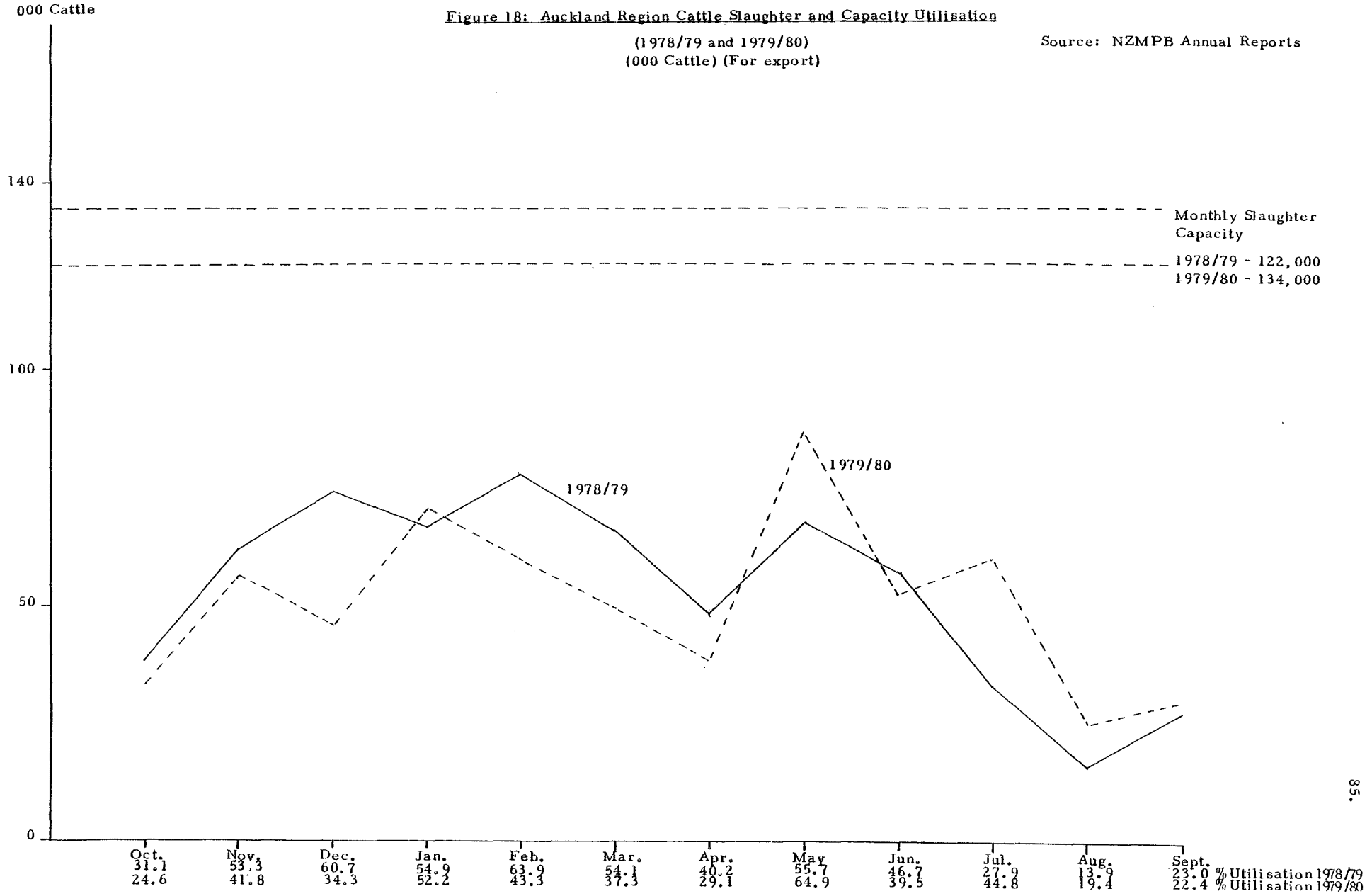


Figure 19: Taranaki and Hawkes Bay Regions Cattle Slaughter and Capacity Utilisation

(1978/79 and 1979/80)
(000 Cattle) (For export)

Source: NZMPB Annual Reports

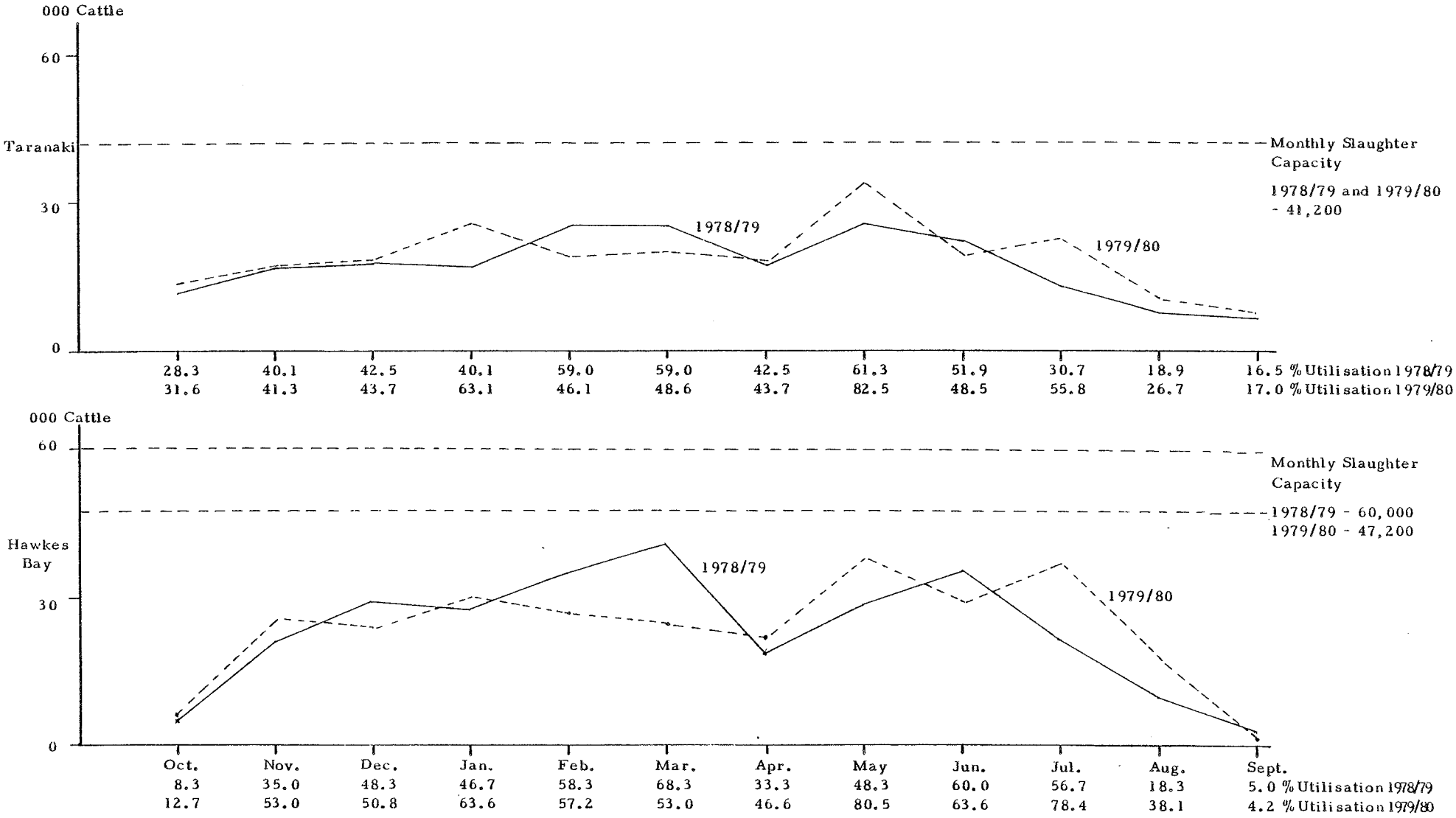
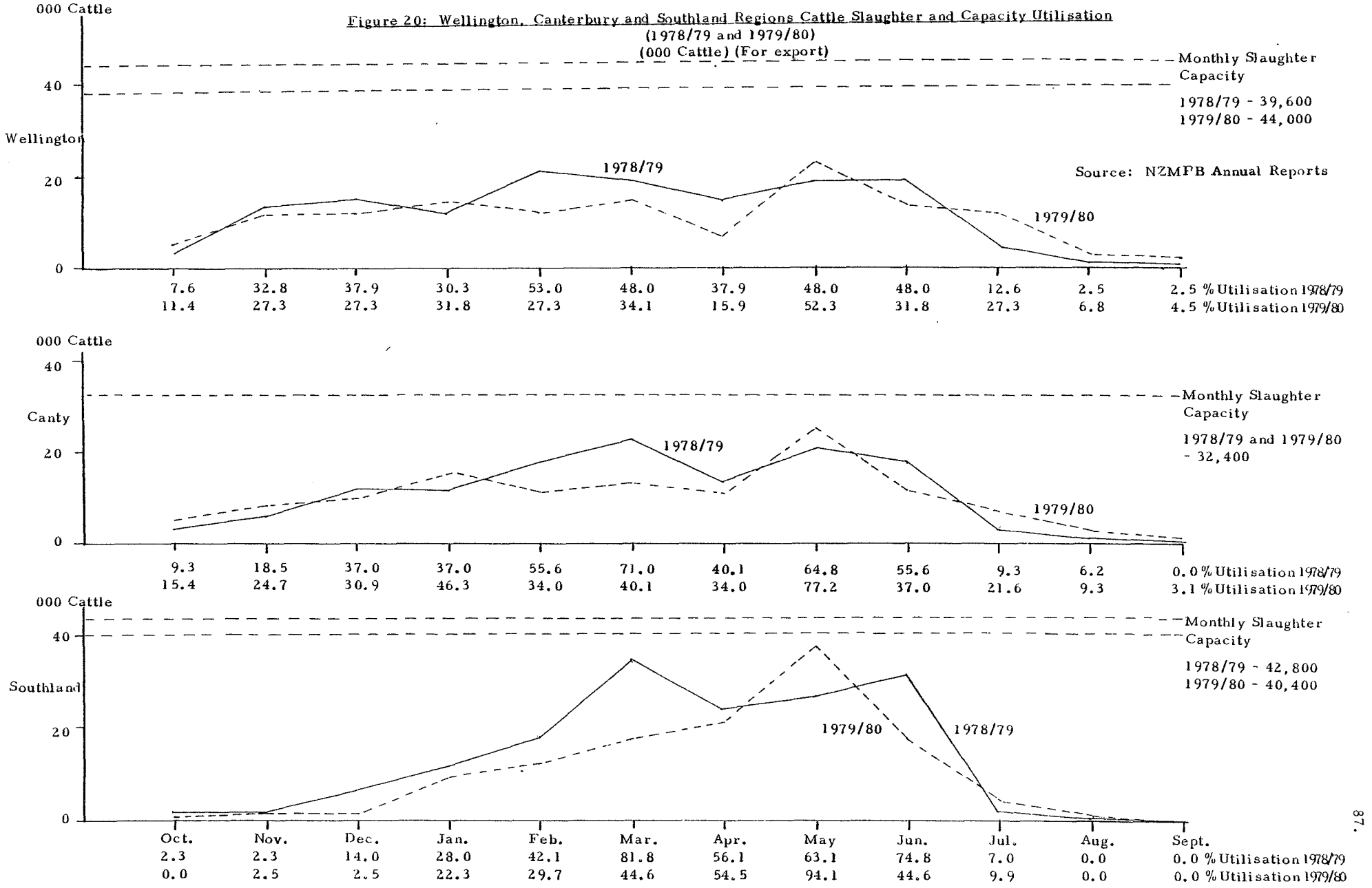


Figure 20: Wellington, Canterbury and Southland Regions Cattle Slaughter and Capacity Utilisation
(1978/79 and 1979/80)
(000 Cattle) (For export)



APPENDIX 3

Impact of Increased Sheep Supply

over 1978/79 and 1979/80

TABLE 7

1978/79 North Island Sheep Slaughter (Export Only)

(000 lamb equivalents)[a]

Month	Actual Slaughter	+3%	+5%	+10%	+15%	+20%
October	344	354	361	378	396	413
November	1,640	1,689	1,722	1,804	1,886	1,968
December	2,529	2,605	2,655	2,782	2,908	3,035
January	2,197	2,263	2,307	2,417	2,527	2,636
February	2,055	2,117	2,158	2,261	2,363	2,466
March	1,866	1,922	1,959	2,053	2,146	2,239
April	777	800	816	855	894	932
May	992	1,022	1,042	1,091	1,141	1,190
June	934	962	981	1,027	1,074	1,121
July	500	515	525	550	575	600
August	165	170	173	182	190	198
September	145	149	152	160	167	174
TOTAL	14,144	14,568	14,851	15,560	16,267	16,972

Note: Monthly North Island capacity was estimated at 3,797,200 lamb equivalents in 1978/79

[a] 1 sheep = 1.25 lamb

TABLE 8

1979/80 North Island Sheep Slaughter (Export Only)

(000 lamb equivalents)[a]

Month	Actual Slaughter	+3%	+5%	+10%	+15%	+20%
October	141	145	148	155	162	169
November	1,515	1,560	1,591	1,667	1,742	1,818
December	1,887	1,944	1,981	2,076	2,170	2,264
January	2,246	2,313	2,358	2,471	2,583	2,695
February	1,841	1,896	1,933	2,025	2,117	2,209
March	1,198	1,234	1,258	1,318	1,378	1,438
April	1,220	1,257	1,281	1,342	1,403	1,464
May	1,910	1,967	2,006	2,101	2,197	2,292
June	997	1,027	1,047	1,096	1,147	1,196
July	941	969	988	1,035	1,082	1,129
August	195	201	205	215	224	234
September	151	156	159	166	174	181
TOTAL	14,242	14,669	14,955	15,667	16,379	17,089

Note: Monthly North Island capacity was estimated at 3,784,000 lamb equivalents in 1979/80

[a] 1 Sheep = 1.25 lamb

TABLE 9

1978/79 South Island Sheep Slaughter (Export Only)

(000 lamb equivalents)[a]

Month	Actual Slaughter	+3%	+5%	+10%	+15%	+20%
October	147	151	154	162	169	176
November	1,093	1,126	1,148	1,202	1,257	1,312
December	2,680	2,760	2,814	2,948	3,082	3,216
January	2,840	2,925	2,982	3,124	3,266	3,408
February	2,808	2,892	2,948	3,089	3,229	3,370
March	3,288	3,387	3,452	3,617	3,781	3,946
April	1,604	1,652	1,684	1,764	1,845	1,925
May	1,790	1,844	1,880	1,969	2,059	2,148
June	1,016	1,046	1,067	1,118	1,168	1,219
July	35	36	37	39	40	42
August	16	16	17	18	18	19
September	10	10	11	11	12	12
TOTAL	17,327	17,845	18,194	19,061	19,926	20,793

Note: Monthly South Island capacity was estimated at 4,022,000 lamb equivalents in 1978/79

[a] 1 sheep = 1.25 lamb

TABLE 10

1979/80 South Island Sheep Slaughter (Export Only)
(000 lamb equivalents)[a]

Month	Actual Slaughter	+3%	+5%	+10%	+15%	+20%
October	50	52	53	55	58	60
November	1,089	1,122	1,143	1,198	1,252	1,307
December	2,001	2,061	2,101	2,201	2,301	2,401
January	3,214	3,310	3,375	3,535	3,696	3,857
February	2,620	2,699	2,751	2,882	3,013	3,144
March	3,069	3,161	3,222	3,376	3,529	3,683
April	2,235	2,302	2,347	2,459	2,570	2,682
May	2,969	3,058	3,117	3,266	3,414	3,563
June	973	1,002	1,022	1,070	1,119	1,168
July	193	199	203	212	222	232
August	13	13	14	14	15	16
September	5	5	5	6	6	6
TOTAL	18,431	18,984	19,353	20,274	21,195	22,119

Note: Monthly South Island capacity was estimated at 3,918,000 lamb equivalents in 1979/80

[a] 1 sheep = 1.25 lamb

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