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MILK PRODUCTION COSTS

IN NEW SOUTH WALES

1975-76

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Division of Marketing and Economics

NEW SOUTH WALES DEPARTMENT OF AGRICULTURE

New South Wales Department of Agriculture

Division of Marketing and Economics

MILK PRODUCTION COSTS IN NEW SOUTH WALES

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Miscellaneous Bulletin No. 29 June, 1978

PREFACE

This bulletin is a report of a study undertaken for the Dairy Industry Prices Tribunal. The report was presented at the public hearing of the Tribunal in June, 1978.

The study involved a survey of N.S.W. dairy farms, and the collection of data, through personal interviews, on production costs for the financial year 1975-76.

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1. INTRODUCTION

Under the Dairy Industry Authority Act, 1970, the Division of Marketing and Economics is required to provide, on a regular basis, information on the costs of milk production to the Dairy Industry Prices Tribunal. This report presents the final results of a survey of N.S.W. dairy farms conducted in 1977 by the Division of Marketing and Economics.¹ Preliminary results from a portion of this survey were presented to the Prices Tribunal in June, 1977.

The costs are calculated on the basis of information from personal interviews of 205 dairy farmers. The sample farms covered the range of farm sizes and seasonal production patterns experienced in the major dairying areas of N.S.W. The data relates to the financial year 1975-76.

The report can be outlined as follows. Section 2 details the survey procedure. Section 3 presents total per litre cost of production (calculated on the basis of two alternative allowances for non-paid labour) and short term costs, along with data on the statistical accuracy of the survey results, and on the significance of regional cost differences. Section 4 contains a number of other considerations relevant to the use of these costs for determining milk prices. Section 5 presents a concluding summary of the costs of production.

¹. *The authors would like to thank K.J. Munro, officers of the Division of Dairying and the Division of Marketing and Economics, staff of the Dairy Industry Prices Tribunal and the Dairy Industry Authority, and members of the N.S.W. dairy farming community, particularly the survey respondents, for their assistance and co-operation throughout the study.*

2. SURVEY PROCEDURE

2.1 Survey Coverage

The N.S.W. dairy farm population was defined as farms registered with the N.S.W. Dairy Industry Authority for the purpose of producing milk. In order to ensure only bona-fide, full-time dairy operations were included in the population, the definition excluded those farms which (i) produced less than 80,000 litres in the calendar year 1976, and (ii) supplied milk, for any purpose, for less than 26 weeks of the calendar year 1976. Dairy farms in "island"² areas were also excluded from the population. On this basis, 3,326 dairy farms were eligible for inclusion in the survey, out of a total of 4,120 farmers who supplied milk to N.S.W. factories in 1976. The eligible farms supplied 808.3 million litres of the New South Wales total production of approximately 920.1 million litres. (Precise figures were unavailable for the Bemboka, Bodalla and Kraft factories.) The excluded farms were primarily island area dairies and small, seasonal dairy farms in the Richmond-Tweed, Clarence/Hastings and Central Murray Regions.

2.2 Sample Selection

2.2.1 Stratification

The population was stratified on the basis of location, milk production and seasonality of production. All stratification was based on the records of the Dairy Industry Authority (D.I.A.).

(i) Location

New South Wales was divided into seven dairying regions based on differences in farming systems and on natural physical boundaries between regions. The regions were delineated on the basis of the statistical divisions of the Australian Bureau of Statistics as outlined below.

Richmond-Tweed	- the statistical sub-division of Richmond-Tweed of the North Coast statistical division.
Clarence/Hastings	- the statistical sub-divisions of Clarence and Hastings of the North Coast statistical division.
Hunter	- the statistical division of Hunter.
Outer Sydney	- the statistical division of Outer Sydney.
Illawarra	- the statistical division of Illawarra.
Lower South Coast	- the statistical sub-division of Lower South Coast of the South-Eastern statistical division.
Central Murray	- the statistical sub-division of Central Murray of the Murray statistical division.

². At the time of the survey, island areas were defined as distribution districts which have their own exclusive producing districts in surrounding or adjacent areas. These districts did not transfer liquid milk to or from other areas, except in cases of shortages, when milk was received to cover the shortfall. The areas included Orange, Tamworth, Armidale, Goulburn, Bathurst, Griffith, Wagga, Inverell, Dubbo, Albury and Mudgee.

A farm was located in a region on the basis of the location of the factory it supplied - it was assumed that factories received milk from dairies in their region only, and that farmers supplied factories within their region.

Table 1 indicates the number of eligible suppliers and the total intake of milk from these eligible suppliers in 1976. As outlined in Section 2.1, 794 suppliers, who delivered 111.8 m. litres of milk, were not eligible for inclusion.

TABLE 1
Regional Milk Production in N.S.W. - 1976

Region	Number of Eligible Suppliers	Production (m. litres)
Richmond-Tweed	413	56.4
Clarence/Hastings	925	158.5
Hunter	963	239.2
Outer Sydney	219	121.5
Illawarra	440	137.9
Lower South Coast	188	52.8
Central Murray	178	42.0

(ii) Seasonality of Production

The seasonality of production, notably the proportion of milk produced over the winter period, can affect the annual costs of milk production. Therefore, to isolate the impact of seasonal production on costs, the sample was stratified on the basis of the proportion of milk produced and supplied in the months of May-June-July. As the proportion of milk produced in these winter months approached 25%, the farm is classed as decreasingly seasonal.

Table 2 indicates the range of seasonality in N.S.W., the number of suppliers in each group, and their production. As outlined in Section 2.1, 794 suppliers, who delivered 111.8 m. litres of milk, were not eligible for inclusion.

TABLE 2
Seasonality of Production in N.S.W. - 1976

% of Milk Produced in Winter	No. Eligible Suppliers	Production (m. litres)
0 - 3	31	5.2
4 - 8	103	17.0
9 - 13	266	45.2
14 - 18	705	125.7
19 - 23	1,844	467.9
24 - 28	364	141.9
28+	13	5.4

(iii) Annual Milk Production

The population was also stratified on the basis of annual milk production in order to isolate the effect, if any, of economies of size in milk production. Dairies were classified into the following categories:

- (i) 80,000 - 239,999 litres per annum.
- (ii) 240,000 - 399,999 litres per annum.
- (iii) 400,000 litres and above per annum.

The divisions between these groups were designed to maintain a spread of production groups within each region.

The number and production of suppliers in each group is outlined in Table 3. As noted in Section 2.1, 794 suppliers, who produced 111.8m litres, were not eligible for inclusion in the survey.

TABLE 3

Annual Production of N.S.W. Suppliers - 1976

Production Range ('000 litres)	No. of Eligible Suppliers	Production (m. litres)
80 - 239.9	2,175	332.8
240 - 399.9	803	241.8
400+	348	233.7

2.2.2 Selection Procedure

As outlined above, all farms in the population were stratified on the basis of location, seasonality of production and milk produced. The smallest component of the stratification (e.g. Richmond-Tweed Region, 14-18% seasonality and 80-239.9 th.litres production) is described as a "cell".

To determine the sample size for each cell a general proportional allocation method was used - i.e. the more farms in the cell population, the larger the sample size. This was qualified by (a) the desire to have at least three farms in each cell, and (b) the need to limit the total sample size. Where less than two farms per cell were sampled, these cells were amalgamated with adjacent cells during analysis.

Within each cell, the farms were listed in order of increasing milk production, and the actual farms to be surveyed were chosen by a systematic sampling procedure. This allows an unbiased estimate while ensuring that the range of farm sizes within each cell is covered.³

³. For further statistical details on the sample selection techniques see W.G. Cochran, Sampling Techniques, John Wiley and Sons, New York. Pp. 50-110, 160-187.

Sample farms were selected from lists compiled from D.I.A. records.

2.2.3 Treatment of Replacements

Attempts were made to replace all selected farms which could not be surveyed with similar dairies (same location, seasonality and similar production). After two replacements, if a suitable farm was not revealed, this procedure was discontinued, providing the sample size of the cell was not reduced below a minimum size (normally three farms).

Although a detailed record was not maintained throughout the survey, the major reasons for replacements included: data unavailability (new share-farmers etc.) non co-operation, and sampling error (dairy currently closed, change in ownership etc.).

2.3 Interview Procedure

Farmers selected in the sample received a letter from the Dairy Industry Prices Tribunal seeking their co-operation. These farmers were then contacted by either Senior Supervisors of the Dairy Industry Authority or the interviewers themselves to arrange interview dates and times. Personal interviews were conducted by officers of the N.S.W. Department of Agriculture, being drawn from both the Division of Marketing and Economics and the Division of Dairying, and by officers of the Dairy Industry Prices Tribunal. The interviews were generally completed in a single three hour session.

The questionnaire was a standard form designed by the Agricultural Business Research Unit (ABRI) and used as a basis for their whole farm business analysis. Financial and management information relating to the financial year ending June 30, 1976, was collected.

2.4 Treatment of Survey Data

2.4.1 Cash Costs

Financial information was obtained from taxation returns and other farm financial records (cash books etc.). The questionnaire design allowed the allocation of variable costs between enterprises conducted on the farm. No attempt was made to split overhead costs between enterprises.

2.4.2 Imputed Costs

As the survey is attempting to derive the cost of milk production, it is necessary to define a level for costs which are not explicitly paid (i.e. non-cash costs). The most significant of these costs are: interest on capital invested; non-paid operator (and family) labour; and depreciation.

(i) Capital

Capital assets can be divided into three main items - land and improvements, plant and equipment, and livestock.

The value of these items was based on estimates made by the farmer at the time of the interview. Farmers' estimates were used for the following reasons. Firstly, objective valuation is time consuming. It was estimated that objective

valuation would delay the completion of the report by at least six months, and this was considered unacceptable. Secondly, Bureau of Agricultural Economics investigations⁴ have indicated that, overall, farmer estimations of the market value of assets are not substantially different to professional objective valuation. Thirdly, the majority of interviews were conducted by local Departmental personnel. Any obvious anomalies were, as a matter of course, clarified by the interviewers. This procedure tended to reduce the errors of subjective valuation.

Investment in farm assets is a long term production cost for which an annual allowance must be made. An imputed return for capital, which is based on all assets used by the operator, is included in the cost of production. The imputed return covers the annual cost of assets owned by the operator, and the interest and lease/rent payments of the operator. Therefore, for the purposes of calculating the cost of production, interest paid on loans was not included in cash costs. Similarly, lease/rent payments were not included in cash costs, and the market value of leased land or equipment was included in the assets.

The method used to estimate an imputed return to capital employed on the dairy farm is outlined in Appendix A (Section A1).

(ii) Labour

An allowance for the cost of non-paid operator and family labour was calculated using two approaches. Firstly, labour was valued on the basis of opportunity cost, where the true value of labour was assessed as the return that would be received in alternative employment. Secondly, a synthesised value of labour was calculated on the basis of typical time allowances for farm jobs and the relevant award wages. Details of these methods of determining an allowance for the non-paid labour of the operator and his family are outlined in Appendix A (Sections A2 and A3).

(iii) Depreciation

A depreciation allowance was made because depreciation as calculated for tax purposes was not an accurate indication of depreciation for production purposes.⁵

The allowance covered depreciation on plant and equipment. Depreciation on capital improvements was not included because (i) land values are generally determined on a walk in/walk out basis and therefore it is debatable whether fixed improvements should be considered as a separate category. The depreciation of fixed improvements is partially accounted for in the imputed return for land. (ii) A proxy value of improvements may have been determined by calculating the difference between the current market value and the U.C.V. (as available from rate notices). This was not attempted because other (e.g. non-agricultural) influences on market values tend to over-estimate the value of improvements. (iii) Estimates of the value of improvements were unavailable for all survey farms.

⁴. Bureau of Agricultural Economics, *Personal Communication*, March 1977.

⁵. Longworth and Menz, "How Taxation Accounts Mislead Managers", *Farm Policy*, Vol. 16, No. 2 (Sept. 1976), P. 33.

However, using information from about half the survey farms, the impact of a full depreciation allowance on improvements was relatively unimportant (in the order of .1c/litre).

An allowance of 10% of the market value of plant and equipment (as estimated by the operator) was assumed to cover depreciation.

2.5 Calculation of the Cost of Production

The per litre cost of milk production was calculated as follows:-

TABLE 4

Method of Cost of Production Calculation⁶

	Total variable costs
+	Total overhead costs
+	Allowance for non-paid labour
+	Allowance for opportunity return on capital
-	Sideline costs
=	Total costs attributed to milk production
÷	Total milk production
=	Per litre cost of production of milk

Two underlying assumptions should be borne in mind when interpreting these costs.

(a) Sideline enterprises

Although variable costs were allocated to specific enterprises, it was not possible to allocate overhead costs between enterprises. Therefore, to isolate dairy costs from other enterprise costs it was assumed that the production costs of non-dairy enterprises was equal to the income received from the non-dairy enterprises. Total milk production costs were calculated by subtracting an amount equivalent to non-dairy income from total farm costs.

If non-dairy enterprises are very profitable or very unprofitable this assumption can affect the accuracy of the milk production cost estimates. Checks on multi-enterprise farms encountered in this survey revealed that the milk production costs of a few individual farms in the Central Murray Region were marginally influenced by profitable cropping enterprises. However, regional and state milk production costs were not affected by the profitability of non-dairy enterprises on dairy farms.

⁶ This procedure is detailed in -

Division of Marketing and Economics, New South Wales Department of Agriculture, "The On-Farm Costs of Producing Milk in New South Wales", Miscellaneous Bulletin 26, New South Wales Department of Agriculture, Sydney 1977. P. 22.

(b) Seasonal Conditions

Costs derived from data from a single year may be unrealistic if abnormal seasonal conditions (such as widespread flooding or drought) prevailed in that year. However, the general usage of cultural practices which partially protect milk producers from non-typical seasonal conditions (e.g. irrigation, the use of off-farm feed), and district reports that the 1975-76 season was broadly "normal" suggest that the costs presented below were not affected by unusual seasonal conditions.

3. COSTS OF PRODUCTION

The costs of producing milk in N.S.W. are presented in this section.

In addition to deriving the costs of production of all milk, it would be useful if the costs associated with the production of milk for wholemilk purposes could be isolated. Current policy requires that milk for wholemilk purposes must be produced throughout the year. It was assumed that the costs of production on farms producing 19% or more of their annual production in the winter months would provide an indication of the costs of production of milk for wholemilk purposes. Therefore, costs are presented for all farms, and for those farms producing at least 19% of their annual milk production in the months of May, June and July (19% + seasonality group).

Imputed values form a very significant component of total costs of production. The total costs presented in this report are calculated on the basis of two approaches to the derivation of the imputed returns to the labour of the operator (and the operator's family) where an explicit cash wage is not paid for such labour. Section 3.1 presents the total costs of production with returns to non-paid labour (operator and family) based on the concept of opportunity cost. Section 3.2 presents total costs derived on the basis that all time spent on farm work by the operator (and family) is valued at 1.1.76 award rates. This is a synthesised labour allowance. Section 3.3 presents the short term costs of production.

All costs are weighted averages. The weighting is based on the production of the farms in the cell as a proportion of the production of all farms in the strata (region or state).

3.1 Total Costs of Production - Opportunity Cost Labour Allowance

Table 5 presents total costs of production based on imputed values of 10% return to investment in plant/equipment and livestock, 5% return to investment in land, and an allowance of \$9,318 per operator unit for the non-paid labour of the operator(s) and family. Operator units were defined as financially independent full time family work units. For example, an owner who works the property, his wife and school age children were one operator unit; a partnership of two brothers and their families were two operator units; a father and adult son partnership were two operator units. The operator unit is relevant only to labour which is not paid an explicit cash wage.

This labour allowance is based on the opportunity cost of the labour of the operator and his family, and reflects the likely earnings of the labour if not employed on the dairy. The reasoning behind the selection of these values for return to capital invested and to non-paid labour is outlined in Appendix A (Section A1 and A2).

TABLE 5

Total Cost of Production - Opportunity Cost
Labour Allowance (cents/litre)

Region:	Total Cost of Production	
	All Farms	19% + Seasonality Group
Richmond-Tweed	13.00	13.56
Clarence/Hastings	15.66	15.28
Hunter	15.32	15.09
Outer Sydney	18.62	18.62
Illawarra	16.54	16.59
Lower South Coast	12.25	11.98
Central Murray	10.87	-
N.S.W.	15.50	15.92

3.1.1 Accuracy of the Estimates

Cost estimates derived from a sample can differ from the actual costs derived if all farms are surveyed. The potential variation between survey estimates and the true values can be expressed in terms of a confidence interval. The smaller the confidence interval, the more accurate the survey estimate as an indication of actual milk production costs.

Confidence intervals can be interpreted as follows. The 95% confidence interval for the Richmond-Tweed Region (all farms) was between 11.17 and 14.83 cents per litre. This means there is a 95% probability that the actual regional average cost per litre (i.e. the cost calculated if all the farms were surveyed) is between 11.17 and 14.83 cents per litre.

The 95% confidence intervals are shown in Table 6.

TABLE 6

Total Cost of Production Confidence Intervals -
Opportunity Cost Labour Allowance (cents/litre)

Region:	Confidence Interval	
	All Farms	19% + Seasonality Group
Richmond-Tweed	11.17 - 14.83	10.54 - 16.58
Clarence/Hastings	13.71 - 17.61	18.20 - 12.36
Hunter	13.59 - 17.05	12.97 - 17.21
Outer Sydney	16.45 - 20.79	16.45 - 20.79
Illawarra	14.40 - 18.68	14.26 - 18.92
Lower South Coast	10.27 - 14.23	7.92 - 16.04
Central Murray	8.37 - 13.37	-
N.S.W.	14.67 - 16.33	14.89 - 16.95

3.1.2 Significance of the Results

To compare the costs between regions, it is important to establish whether the costs are truly different, or whether the apparent difference in costs is due to the particular sample selected.

The significance analysis presented below can be interpreted as follows - if the difference between the cost averages of two regions is judged significant (s), it is 95% probable that the true production cost of one region is more (or less) than, the true cost of the other region. If the difference in the cost averages is not significant (ns), both cost estimates could have been derived from samples drawn from the same region - the difference may have been due to the particular sample selected rather than due to a true difference in regional costs.

The analysis is based on a one-tail test at 5% significance.

TABLE 7

Significance of Cost Differences - Opportunity Cost
Labour Allowance - All Farms

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray
Richmond-Tweed	-	s	s	s	s	ns	ns
Clarence/Hastings	s	-	ns	s	ns	s	s
Hunter	s	ns	-	s	ns	s	s
Outer Sydney	s	s	s	-	ns	s	s
Illawarra	s	ns	ns	ns	-	s	s
Lower South Coast	ns	s	s	s	s	-	ns
Central Murray	ns	s	s	s	s	ns	-

TABLE 8

Significance of Cost Differences - Opportunity Cost
Labour Allowance - 19% + Seasonality Group

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast
Richmond-Tweed	-	ns	ns	s	s	ns
Clarence/Hastings	ns	-	ns	s	ns	s
Hunter	ns	ns	-	s	ns	s
Outer Sydney	s	s	s	-	ns	s
Illawarra	s	ns	ns	ns	-	s
Lower South Coast	ns	s	s	s	s	-

3.2 Total Cost of Production - Synthesised Labour Allowance

Table 9 shows the costs of production based on imputed values of a 10% return to investment in plant/equipment and livestock, a 5% return to investment in land, and a synthesised labour allowance for the non-paid labour of the operator and his family. The synthesised labour allowance was based on the award wage (current at 1.1.1976) for all time worked on the farm. Time worked was based on "typical" time allowances for farm tasks. The details of these imputed values are outlined in Appendix A (Sections A1 and A3).

TABLE 9

Total Cost of Production - Synthesised Labour Allowance (cents/litre)

	Total Cost of Production	
	All Farms	19% + Seasonality Group
Region:		
Richmond-Tweed	18.12	18.10
Clarence/Hastings	18.63	17.62
Hunter	16.54	16.18
Outer Sydney	19.67	19.67
Illawarra	17.77	17.84
Lower South Coast	14.98	14.62
Central Murray	14.66	-
N.S.W.	17.53	17.36

3.2.1 Accuracy of the Estimates

As outlined in Section 3.1.1, confidence intervals indicate the precision of the estimates of the true per litre cost of milk production. It is 95% certain that the actual regional cost per litre (i.e. the cost calculated if all farms were surveyed) is within the confidence interval. For example, in the Richmond-Tweed Region (from Table 10) there is a 95% probability that the actual regional cost per litre for all farms is between 16.28 and 19.96.

TABLE 10

Total Cost of Production Confidence Intervals - Synthesised Labour Allowance (cents/litre)

	Confidence Interval	
	All Farms	19% + Seasonality Group
Region:		
Richmond-Tweed	16.28 - 19.96	13.89 - 22.33
Clarence/Hastings	16.77 - 20.49	14.56 - 20.68
Hunter	14.74 - 18.34	14.15 - 18.21
Outer Sydney	15.65 - 23.69	15.65 - 23.69
Illawarra	15.91 - 19.63	15.81 - 19.87
Lower South Coast	13.10 - 16.86	10.91 - 18.33
Central Murray	12.09 - 17.23	-
N.S.W.	16.58 - 18.48	16.17 - 18.55

3.2.2 Significance of the Results

As detailed in Section 3.1.2, it is important to establish whether the costs were truly different, or whether the apparent differences in costs were due to the particular sample selected. The following tables indicate whether the regional costs were significantly different at the 5% level. For further clarification of the interpretation of these tables, see Section 3.1.2.

TABLE 11

Significance of Cost Differences - Synthesised Labour
Allowance - All Farms

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray
Richmond-Tweed	-	ns	ns	ns	ns	s	s
Clarence/Hastings	ns	-	ns	ns	ns	s	s
Hunter	ns	ns	-	ns	ns	ns	ns
Outer Sydney	ns	ns	ns	-	ns	s	s
Illawarra	ns	ns	ns	ns	-	s	s
Lower South Coast	s	s	ns	s	s	-	ns
Central Murray	s	s	ns	s	s	ns	-

TABLE 12

Significance of Cost Differences - Synthesised Labour
Allowance - 19% + Seasonality Group

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast
Richmond-Tweed	-	ns	ns	ns	ns	s
Clarence/Hastings	ns	-	ns	ns	ns	s
Hunter	ns	ns	-	s	ns	ns
Outer Sydney	ns	ns	s	-	ns	s
Illawarra	ns	ns	ns	ns	-	s
Lower South Coast	s	s	ns	s	s	-

3.3 Short Term Cost of Production

Short term costs are the cash costs directly attributed to the dairy enterprise. Non-cash costs (depreciation, imputed returns to operator labour and capital invested) and overhead expenses are not included in short term costs.

Short term costs may serve as an approximation of marginal costs. Marginal costs are the extra costs incurred in the production of an additional litre of milk. If the price is above the marginal cost, it is profitable to produce additional milk in the short run.

An approximate breakdown of the short term costs shown in Table 13 is presented in Appendix B.

TABLE 13
Short Term Cost of Production (cents/litre)

	REGION							N.S.W.
	Richmond- Tweed	Clarence/ Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray	
All farms	3.45	4.23	4.42	7.98	5.01	3.43	2.62	4.81
19% + Seasonality Group	4.65	4.45	4.47	7.98	5.03	3.50	-	5.23

3.3.1 Accuracy of the Estimates

As outlined in Section 3.1.1, confidence intervals indicate the precision of the estimates as an approximation of the true cost of production. For example, in the Richmond-Tweed Region (all farms) there is a 95% probability that the actual regional short term cost per litre (i.e. the cost if all farms were surveyed) is between 2.78 and 4.12 cents.

The 95% confidence intervals are presented in Table 14.

TABLE 14
Short Term Cost of Production Confidence
Intervals (cents/litre)

	Confidence Interval	
	All Farms	19% + Seasonality Group
Region:		
Richmond-Tweed	2.78 - 4.12	3.55 - 5.75
Clarence/Hastings	3.29 - 5.17	3.07 - 5.83
Hunter	3.79 - 5.05	3.70 - 5.24
Outer Sydney	6.45 - 9.51	6.45 - 9.51
Illawarra	4.17 - 5.85	4.11 - 5.95
Lower South Coast	2.78 - 4.08	2.21 - 4.79
Central Murray	2.12 - 3.12	-
N.S.W.	4.43 - 5.19	4.60 - 5.54

3.3.2 Significance of the Results

As outlined in Section 3.1.2, it is important to establish whether the regional short term costs were truly different, or whether the apparent differences were due to the particular sample selected. The following tables indicate whether the costs were significantly different at the 5% level. For further clarification of the interpretation of these tables, see Section 3.1.2.

TABLE 15

Significance of Short Term Cost Differences - All Farms

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray
Richmond-Tweed	-	ns	s	s	s	ns	s
Clarence/Hastings	ns	-	ns	s	ns	ns	s
Hunter	s	ns	-	s	ns	s	s
Outer Sydney	s	s	s	-	s	s	s
Illawarra	s	ns	ns	s	-	s	s
Lower South Coast	ns	ns	s	s	s	-	s
Central Murray	s	s	s	s	s	s	-

TABLE 16

Significance of Short-Term Cost Differences - 19% +
Seasonality Group

Region	Richmond-Tweed	Clarence/Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast
Richmond-Tweed	-	ns	ns	s	ns	s
Clarence/Hastings	ns	-	ns	s	ns	ns
Hunter	ns	ns	-	s	ns	s
Outer Sydney	s	s	s	-	s	s
Illawarra	ns	ns	ns	s	-	s
Lower South Coast	s	ns	s	s	s	-

4. OTHER CONSIDERATIONS

4.1 Transport to Sydney

When comparing regions as alternative sources of milk for the Sydney market, it should be remembered that the cost of transport from the regional factory to Sydney is not included in the regional costs presented in this report. The cost of transport to Sydney will vary depending on the location of the factory within the region. A general indication of these costs based on Dairy Industry Prices Tribunal findings⁷ and the relevant approximate costs per litre delivered to Sydney, are shown in Table 17. The figures are based on the costs of the 19% + seasonality group.

TABLE 17

Approximate Freight Cost Incurred in the Transport of Wholemilk to the Sydney Market and the Approximate Per Litre Cost of Milk Delivered to Sydney

Source Region	Freight Costs (c/l)	Cost Delivered Sydney (c/l)	
		<u>Opp. cost labour allowance</u>	<u>Synth. labour allowance</u>
Richmond-Tweed	2.43	15.99	20.53
Clarence/Hastings	1.62	16.90	19.24
Hunter	.77	15.86	16.95
Outer-Sydney	.24	18.86	19.91
Illawarra	.52	17.11	18.36
Lower South Coast	2.10	14.08	16.72

4.2 Production Costs Covered at Various Prices

Table 18 presents the amount of milk produced with the total costs of production covered given various prices of milk. As this is of interest primarily for wholemilk pricing purposes, the information relates to the 19% + seasonality group only.

⁷ Notification of Order Under the Dairy Industry Authority Act, 1970 - Minimum Prices Payable to Dairymen, Wholesale Prices and Maximum Retail Prices, N.S.W. Government Gazette, No. 111, 30th September, 1977.

TABLE 18

Amount of Milk Production with Total Cost of Production
Covered Given Various Prices to the Producer

<u>Price to Producer</u> (cents/litre)	<u>Production Covered (m. litres)</u>	
	<u>(Opportunity Cost</u> <u>Labour Allowance)</u>	<u>(Synthesised Labour</u> <u>Allowance)</u>
10	0	0
11	27.6 (4.6%)	0
12	38.2 (6.3%)	0
13	50.9 (8.4%)	15.1 (2.5%)
14	124.2 (20.6%)	27.6 (4.6%)
15	243.1 (40.2%)	88.6 (14.7%)
16	407.3 (67.4%)	150.7 (24.9%)
17	462.7 (76.6%)	328.1 (54.3%)
18	508.1 (84.1%)	394.7 (65.3%)
19	514.2 (85.1%)	474.1 (78.5%)
20	546.2 (90.4%)	500.6 (82.9%)
21	546.2 (90.4%)	541.3 (89.6%)
22	597.1 (98.9%)	545.0 (90.2%)
23	597.1 (98.9%)	592.2 (98.0%)
24 - 27	597.1 (98.9%)	597.4 (98.9%)
27	604.0 (100.0%)	597.4 (98.9%)
29		604.0 (100.0%)

4.3 Comparison with Preliminary Results

For a number of reasons the costs of production detailed in this report are different to the costs shown in the preliminary report of the survey which was presented to the Tribunal in June 1977.⁸

Firstly, the costs calculated in this report are based on different imputed returns for operator labour and capital investment. In the preliminary report, cost calculations were based on a \$5,000 non-paid operator allowance

⁸ *Division of Marketing and Economics, N.S.W. Department of Agriculture, Regional Milk Production Cost for N.S.W., Unpublished Preliminary Report to the Dairy Industry Prices Tribunal, June, 1977.*

and a 10% return on all capital. This final report imputes a number of returns to non-paid labour, 10% return on non-land capital investment and 5% return on investment in land for the cost of production calculations.

Secondly, the sample used in the preliminary report was drawn from only part of the N.S.W. dairy farm population - those who produced in the 19-23% seasonality group.

Thirdly, the costs presented in the preliminary report were the average costs of production of the farms surveyed. These costs were not intended to be representative of the actual regional costs. The cost averages presented in this report were weighted during calculation to provide an accurate indication of the true cost of production.

4.4 Survey Cost Estimates and Administered Pricing

As indicated in a previous report to the Tribunal,⁹ caution must be exercised if cost of production estimates are used as a basis for pricing. In addition to the practical marketing problems associated with tying prices to the cost of production, cost based pricing can be questioned on circularity grounds. The price of the final product affects the amount that can and will be paid for the inputs used in the production process (i.e. the cost of production), which, in turn, is reflected in the final product price.

The impact of administered pricing on the value of land, an important productive input, has been the subject of some research.¹⁰ Attempts to guarantee a "fair" return to investment in land can have a substantial effect on future land values. If prices are set above operating costs, then, *ceteris paribus*, land values will be greater than would be expected in a normal market situation. Further, depending on how much above operating costs the product price is set, the price of land may plateau at an "above normal" price, or spiral upwards indefinitely.¹¹

Therefore, if the costs presented in this report are used as a basis for pricing, it must be remembered that (a) these costs are, in part, a result of previous pricing decisions, and (b) if the milk price is set above current operating costs, this will ultimately be reflected in the price of inputs and, while some short term gain from a large price rise may accrue to current dairy farmers, the overall profitability of milk production is unlikely to change in the long run.

⁹. Division of Marketing and Economics, N.S.W. Department of Agriculture, "Survey Cost Estimates and Administered Pricing". Attachment to, Division of Marketing and Economics, N.S.W. Department of Agriculture, Regional Milk Production Cost for N.S.W., Unpublished Preliminary Report to the Dairy Industry Prices Tribunal, June 1977.

¹⁰. For example, see:

Harris, D.G., "Inflation-Indexed Price Supports and Land Values", American Journal of Agricultural Economics, Vol. 59, No. 3 (August 1977). Pp. 489-495.

Harriss, C.L., Government Spending and Land Values, University of Wisconsin Press, Madison, 1973.

¹¹. Harris, D.G., op.cit. Pp. 492.

4. CONCLUSION

This report presents an estimate of the costs of producing milk in N.S.W. in 1975-76. The costs are based on data collected from farm accounts in a survey undertaken in 1977, and on an estimate of the value of non-cash or imputed costs.

Two methods of determining the imputed returns to the non-paid labour of the operator and his family were used. The opportunity cost labour allowance was based on the notion that the true cost of the operator (and family) labour is the return it would obtain if not working on the farm. The synthesised labour allowance was based on typical time estimates for farm tasks, valued at award rates.

Costs were calculated for the production of milk on all farms, and for the production of milk on farms which produced at least 19% of their annual production in May-June-July (as an indication of the production cost of milk produced for the liquid milk market). The costs are summarized below.

TABLE 19

Cost of Production in N.S.W. - 1975-76
(cents/litre)

<u>Total Costs</u>	
(i) All Farms	
. Opportunity Cost Labour Allowance	15.50
. Synthesised Labour Allowance	17.53
(ii) 19% + Seasonality Group	
. Opportunity Cost Labour Allowance	15.92
. Synthesised Labour Allowance	17.36
<u>Short Term Costs</u>	
(i) All Farms	4.81
(ii) 19% + Seasonality Group	5.23

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APPENDIX A

IMPUTED VALUES

A1. Imputed Return to Capital Invested

To obtain a cost for the employment of capital, several factors were considered.

- (a) The opportunity cost of capital is important. As farming is normally a long term investment, the long term government bond rate provides an alternative investment. In 1975-76, the return on longer term bonds was in the order of 9-10%. Therefore, 9-10% could be regarded as an alternative return to capital.
- (b) An analysis of the survey results showed that if all net farm income was considered as return to capital (i.e. no net farm income was considered as a return to the labour of the operator), the average return to capital was 7%. That is, 7% was the maximum average return to capital experienced by survey respondents.
- (c) In a significant proportion of dairy farms, the value of land¹² is determined by factors unrelated to milk production - most notably urban and hobby farm uses. In these cases, the increasing value of land is also potential income in the form of capital gains. Producers may be willing to operate with a low current return on capital invested in land in anticipation of future capital gains. This hypothesis is supported by the fact that the average maximum return to capital (i.e. no operator labour allowance) in the Sydney region is 4.25%. In setting an imputed return to capital, it may be unrealistic to include the full opportunity cost of investment in land as an element in the cost of milk production - a portion of the land cost could be treated as an investment for potential capital gains, rather than an investment for milk production.

Based on these considerations, investments were divided into two types - land, and plant/livestock. A return of 5% was chosen for investment in land, and a return of 10% was selected for investment in plant and livestock.

¹². For the purposes of this survey, "land" includes all non-movable items (i.e. fences, buildings etc. are included in "land").

A2. Labour Allowance - Opportunity Cost Approach

When determining a means of valuing non-paid labour for deriving costs of production, the concept of opportunity cost is most correct from an economic point of view. Opportunity cost refers to the notion that the most accurate reflection of the true cost of an input is the return that input would receive in its next best alternative use - the real cost of an input is what could be obtained if it was used elsewhere. For example, "...in the case of a farm owner-manager who is paid no explicit salary, the cost of his services is to be reckoned at the best price which they will fetch elsewhere in the economy".¹³

Following this principle, the value of the labour of the owner-operator of a dairy farm, and that of his family, if an explicit wage is not paid should be valued at the return that could be expected if they were not working on the dairy.

When considering an opportunity cost for the farmer and his family (the farm labour unit) it was not possible, on the basis of the information available to differentiate between farm labour units. That is all dairy farmers were assumed to have the same alternative job prospects. Similarly, the family labour units of all farms were assumed to have identical alternative job opportunities.

The opportunity cost of the operator was set at the N.S.W. average male earnings current at 1.1.76. Average earnings were considered a more accurate indication of take-home pay than wages (i.e. earnings include overtime etc.) The 1.1.76 earnings were taken as the mid point of the December 1975 and March 1976 quarterly average earnings. Average male earnings were \$171.30 per week (\$8,932 per annum).

Family labour is often significant in the operation of the dairy farm. To obtain an indication of the opportunity cost of family labour, it is necessary to look at (a) whether family members would seek alternative employment if they were not working on the farm, and (b) the likely returns from alternative work. In the case of the operator's wife, data from the survey indicated that around 54% of farmers were assisted by their wife on the farm, primarily during milking. It was estimated that if these women were relieved of their farm duties, approximately 10% would seek alternative employment. With adult female earnings 80% of male earnings, \$386 was estimated as the annual opportunity cost of the labour of the operator's wife on a dairy farm. The second major element of the family labour unit was school children who worked after school and on weekends. It was considered that an insignificant proportion of school children would seek an alternative job if not assisting on the farm. Therefore, the labour of school children was assumed to have no opportunity cost.

In summary, the opportunity cost of the operator unit (farmer and his family) where no explicit wages are paid was as follows:-

¹³.
Tisdell, C.A., Microeconomics: The Theory of Economic Allocation, John Wiley and Sons, Australasia, Sydney, 1972, P. 155.

TABLE A2.1

Opportunity Cost of the Operator Unit

	\$
Operator	8,932
Operator's wife	386
Total Annual Opportunity Cost	<u>\$9,318 per operator unit</u>

A3. Synthesised Labour Allowance

A3.1 Calculation of a Synthesised Labour Measure

The calculation of the synthesised labour measure was based on the previous report "On Farm Costs of Producing Milk in New South Wales" and on information derived from the survey.

The operations on a dairy farm along with the estimated labour requirements used to calculate a synthesised labour measure are as follows:-

(1) Dairy Herd Management

(a) Milking

A throughput figure of 22 cows per man hour was estimated from survey data. This resulted in a yearly labour commitment of 25.5 man hours per cow.

(b) Cleaning

An allowance of 30 minutes twice a day for cleaning of yards and one hour per day for cleaning of equipment was made. This gave a total daily commitment of 2 man hours and a yearly allowance of 730 man hours.

(c) Feeding

An allowance of 3.5 hours per cow milked was allowed for feeding. This included an allowance for heifers and calves.

(d) Breeding and Calving

An allowance of 2.4 man hours per cow milked was made.

(e) General Husbandry

4 man hours per head of cows milked were allowed for general husbandry.

(2) Beef Herd Management

The beef herd was allowed 20 man hours per head of adult cattle per year.

(3) Pig Management

An annual allowance of 10 hours per head of pigs (excluding piglets) was allowed.

(4) Crop and Pasture Activities

An annual allowance of 3.85 man hours per hectare of pasture was allowed. This included consideration of the general incidence of natural and irrigated pasture.

An additional allowance of 2.6 man hours per tonne of fodder grown for stock was made.

(5) General Farm Activities

In addition to the above labour allowance, and allowance for the following activities was made:-

(a) General Farm Maintenance

- fencing	60
- Water supply	24
- road access	18
- weed control	24

126 man hours/year

(6) Summary

For a hypothetical farm of 150 ha, milking 95 cattle over the year and growing 50 tonnes of feed for stock, the labour commitment based on the above assumptions is as follows:-

	<u>Man Hours</u>
Dairy Herd (95 Head)	
- Milking	2,423
- Cleaning	730
- Feeding	333
- Breeding/calving	228
- General husbandry	380
Crop and pasture activities (150 ha)	578
General Farm Activities	634
Fodder grown for stock (50 tonnes)	130
	<hr/>
TOTAL:	5,436

Man Hours per week - 104 man hours

In calculating the labour cost, the average wage component was calculated and then converted to a yearly wage equivalent. Annual, sick, long service, and bereavement leave were then calculated in accordance with award provisions. Penalty rates for time worked on public holidays were also taken into account. Work done on public holidays was at the rate of double time and a half.

Nine public holidays were assumed to fall during the year, namely New Year's Day, Australia Day, Good Friday, Easter Monday, Anzac Day, Queen's Birthday, Eight Hour Day, Christmas Day and Boxing Day. The leave loading on labour cost for these nine public holidays were calculated as follows:-

- 31 hours per week of ordinary working hours each for the operator and the F.L.U. (40 hours less 4.5 hours at time and a half on Sunday and 4.5 hours at time and a quarter on Saturday).
- 6.2 hours per day of ordinary working hours each for the operator and the F.L.U. ($31 \div 5$).
- 55.8 hours normally worked on days corresponding to public holidays (9×6.2).
- only milking and tending to stock done on public holidays at double time and a half, i.e. 40.5 hours each by the operator and the F.L.U. (9×4.5).
- remaining 15.3 hours ($55.8 - 40.5$) done as overtime on days that are not public holidays at time and a half.
- work done on public holidays has already been costed at ordinary time hence the loading for public holidays becomes 40.5 hours at time and a half and 15.3 hours at half time.

Table A3.1 outlines the calculation of the value of the operator and F.L.U. components of the synthesised labour measure during the survey.

A3.2 Calculation of Imputed Labour Cost

To calculate the imputed labour cost the synthesised labour measure was valued at the wage rates laid down in the Dairying Employees (State) Award, current for December, 1975. The amount actually paid for hired labour was deducted from the value of synthesised labour. The balance has been used as the imputed labour cost.

In valuing the synthesised labour measure it was assumed the total hours worked according to the synthesised labour measure was broken up as follows:-

- (1) the first 40 hours was assumed to be worked by the operator and valued at farm control hand rates.
- (2) the second and subsequent 40 hour units was assumed to be undertaken by the family hence the term Family Labour Unit (F.L.U.). The F.L.U. was valued at general hand class I rates.
- (3) the balance costed at the casual hourly rate.

Under the conditions of the Award, ordinary working hours could not exceed 40 hours per week. Ordinary working hour rates applied from Monday to Friday (except Public Holidays) with Saturday attracting an overtime rate of time and a quarter. The milking and attending of livestock on Sundays was paid at time and a half through the survey period.

In valuing the labour on the dairy farm it was assumed that the operator would keep overtime payments to a minimum so only the milking and attending of stock was allowed for on Saturdays, Sundays and Public Holidays. The time needed for milking and tending to stock is approximately 9 hours per day. It has been assumed that this will be divided equally between the operator and the F.L.U., for each Saturday, Sunday and Public Holiday. This meant that 31 hours each was worked by the operator and the F.L.U. from Monday to Friday on the average dairy farm during the survey period.

According to the synthesised labour measure and the above assumption on Saturday and Sunday work the pattern of hours worked by each category of labour on the hypothetical farm would be:-

	<u>Operator</u> hours	<u>F.L.U.</u> hours	<u>Casual</u> hours	<u>Total</u> hours
Sundays	4.5	4.5	-	9.0
Monday-Friday	31.0	31.0	24.0	86.0
Saturday	<u>4.5</u>	<u>4.5</u>	<u>-</u>	<u>9.0</u>
	<u>40.0</u>	<u>40.0</u>	<u>24.0</u>	<u>104.0</u>

TABLE A3.1

Calculation of the Synthesised Labour CostOperator (\$141.60 Basic Weekly Rate)

		\$
Monday-Friday	31.0 hrs @ \$3.54	109.74
Saturday	4.5 hrs @ \$4.43 (1½ T)	19.94
Sunday	4.5 hrs @ \$5.31 (1½ T)	23.90
	40.0 hrs	\$153.58
Annually	52.14 wks @ \$153.58	8,008
Public Holidays	40.5 hrs @ \$5.31 (1½ T)	215
	15.3 hrs @ \$1.77 (½ T)	27
Annual Leave	3 weeks @ \$153.58	461
	(+17½%)	74
Sick Leave	1 week @ \$153.58	154
Long Service Leave	0.867 wks @ \$153.58	133
		\$9,072

F.L.U. (\$99.70 Basic Weekly Rate)

		\$
Monday-Friday	31.0 hrs @ \$2.49	77.19
Saturday	4.5 hrs @ \$3.11	14.00
Sunday	4.5 hrs @ \$3.74	16.83
	40.0 hrs	\$108.02
Annually	52.14 wks @ \$108.02	5,632
Public Holidays	40.5 hrs @ \$3.74 (1½ T)	152
	15.3 hrs @ \$1.25 (½ T)	19
Annual Leave	3 weeks @ \$108.02	324
	(+17½%)	52
Sick Leave	1 week @ \$108.02	108
Long Service Leave	0.867 wks @ \$108.02	94
		\$6,381

Over the period 1975-76, the award allowed for a 15% loading on ordinary wage rates for casual labour, and a further 2 cents per hour in lieu of accident pay. This was used to calculate the value of the balance of the labour allowance.

Table A3.2 indicates the synthesised labour cost for the hypothetical farm outlined previously.

TABLE A3.2

Calculation of the Imputed Labour Cost - An Example

<u>Item</u>	<u>\$</u>
Operator (40 hrs/week)	9,072
F.L.U. (40 hrs/week)	6,381
Casual (24 hours/week @ general land class I plus 15%)	3,604
Total Synthesised Labour	<u>19,057</u>
Less Typical Hired Labour Cost	<u>4,816</u>
Imputed Labour	<u>\$14,241</u>

APPENDIX B

CHARACTERISTICS OF THE FARMS SURVEYED

TABLE B1

Short-Term Costs Per Litre - Unweighted Averages (cents/litre)

	<u>REGION</u>							<u>N.S.W.</u>
	Richmond -Tweed	Clarence/ Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray	
Animal health- chemicals	.07	.08	.05	.09	.12	.08	.12	.09
Contract services	.11	.16	.31	.23	.26	.11	.18	.19
Feedstuffs and agistment	1.44	1.15	1.32	4.53	2.47	1.26	.38	1.79
Casual labour	.05	.08	.12	.15	.18	.05	.05	.10
Freight & cartage	.92	.66	.50	.52	.57	.59	.12	.55
Fuel & lubricants	.24	.23	.34	.24	.15	.17	.17	.22
Dairy requisites	.09	.11	.18	.17	.25	.13	.18	.16
Selling costs	.01	.01	.00	.02	.02	.01	.01	.01
Sundry supplies and services	.04	.06	.01	.01	.03	.02	.05	.03
Home grown feed	.78	1.55	1.85	1.41	1.02	.84	1.40	1.26
Water charges	.01	.01	.00	.00	.00	.02	.00	.01
Insurance	.01	.01	.00	.00	.17	.01	.02	.03
Total:	3.89	4.20	4.79	7.48	5.17	3.35	2.67	4.51

TABLE B2

Short-Term Cost Per Cow - Unweighted Averages (\$/cow)

	<u>REGION</u>							<u>N.S.W.</u>
	Richmond -Tweed	Clarence/ Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray	
Animal health- chemicals	1.63	2.30	1.83	3.58	4.46	2.29	3.00	2.73
Contract services	2.82	4.51	11.31	8.79	9.85	3.05	4.53	6.41
Feedstuffs and agistment	33.20	33.23	49.02	174.54	92.75	34.78	9.81	61.05
Casual labour	1.08	2.34	4.48	5.69	6.83	1.51	1.29	3.32
Freight and cartage	21.16	19.03	18.45	19.89	21.55	16.42	3.17	17.10
Fuel and lubricants	5.59	6.55	12.60	9.21	5.45	4.63	4.39	6.92
Dairy requisites	2.17	3.09	6.51	6.69	9.27	3.71	4.53	5.14
Selling costs	.21	.24	.06	.59	.58	.17	.25	0.30
Sundry supplies and services	1.00	1.67	.46	.42	1.25	.49	1.16	0.92
Home grown feed	18.10	44.72	68.55	54.45	38.20	23.14	35.95	40.44
Water charges	.14	.15	.00	.09	.09	.55	.00	0.15
Insurance	.33	.21	.00	.08	6.21	.17	.60	1.09
Total:	89.76	121.20	177.24	288.53	193.88	92.83	68.65	147.44

TABLE B3

Characteristics of the Survey Farms
(Unweighted averages)

	Richmond- Tweed	Clarence/ Hastings	Hunter	Outer Sydney	Illawarra	Lower South Coast	Central Murray	N.S.W.
Total Area (ha)	117.43	127.00	190.99	195.97	212.61	199.20	193.27	176.64
Effective Area (ha)	107.58	106.26	163.10	174.47	181.32	164.10	181.65	154.07
Total Man Years	1.81	1.75	2.36	2.85	2.36	2.01	1.71	2.12
Effective Area/Man Year (ha)	59.62	62.59	75.14	60.90	68.82	84.89	102.97	73.56
Land Value (\$)	86,955	123,136	184,673	431,997	311,896	106,720	102,005	192,483
Total Assets (\$)	110,115	156,158	228,902	483,746	363,808	139,849	136,812	231,341
Overheads (\$)	4,447	6,009	13,047	21,468	17,428	10,005	7,350	11,393
<u>Dairy</u>								
Number of Breeding Cows	100	89	93	115	109	122	110	105
Total Butterfat (kg)	9,788.71	10,537.58	12,985.02	15,887.92	14,571.67	16,117.27	12,890.05	13,254.03
Milk/Cow (ℓ)	2,310.13	2,884.65	3,699.67	3,855.30	3,751.28	2,769.85	2,568.34	3,119.89
Quota/Cow (ℓ)	432.26	1,261.20	2,251.28	2,980.65	2,434.10	423.08	225.68	1,429.75
Butterfat/Cow (kg)	104.30	120.99	150.16	150.54	148.60	136.15	113.00	131.96
Short Term Cost/Dry Sheep Equivalent (\$)	6.14	7.96	10.98	17.46	11.28	6.36	5.68	9.41
Av. value of cattle sold (\$/hd)	19.09	21.16	31.72	22.09	26.82	15.75	18.57	22.17

APPENDIX C

COSTS OF PRODUCTION -
DETAILED CELL RESULTS

Note: The figures in parenthesis beneath the costs are standard errors.

Richmond-Tweed

Seasonality (% winter production)	Production Range (th.litres)	Cell Popul- ation	Cell Production (m.litres)	Sample Size	Sample Production (m.litres)	Total Cost (Opp. Cost Labour) (c/L)	Total Cost (Synth. Labour) (c/L)	Short- Term cost (c/L)
9-13	80-239	98	10.3	4	.68	13.92 (1.60)	20.45 (1.35)	2.33 (0.20)
	240-399	6	1.7	2	.61	10.57 (0.52)	14.66 (.05)	2.52 (0.97)
14-18	80-239	160	22.4	6	.99	13.60 (1.48)	18.72 (1.41)	3.36 (0.62)
	240-399	20	5.9	3	.85	8.39 (1.76)	12.88 (2.29)	2.69 (0.05)
19-23	80-239	86	12.0	11	1.81	14.30 (0.90)	19.00 (1.27)	4.48 (0.34)
	240-399	14	4.0	4	1.28	11.34 (1.00)	15.40 (1.28)	5.17 (0.27)
Other		29	.1					

Clarence/Hastings

Seasonality (% winter production)	Production Range (th.litres)	Cell Popn.	Cell Production (m.litres)	Sample Size	Sample Production (m.litres)	Total Cost (Opp. Cost Labour) (c/L)	Total Cost (Synth. Labour) (c/L)	Short- Term cost (c/L)
9-13	80-239	78	11.3	3	.34	19.10 (2.68)	22.39 (3.07)	3.24 (0.76)
	240+	21	6.6	3	.99	9.93 (0.56)	12.30 (1.35)	3.42 (0.99)
14-18	80-239	270	39.3	4	.50	17.63 (2.39)	22.02 (2.04)	4.53 (1.19)
	240+	32	10.3	5	1.56	11.20 (0.69)	14.15 (0.49)	2.98 (0.63)
19-23	80-239	388	56.1	6	.91	15.86 (1.36)	18.25 (1.35)	4.47 (0.66)
	240-399	62	18.4	5	1.30	13.52 (1.04)	15.20 (1.68)	4.22 (0.25)
	400+	12	6.6	4	2.17	11.70 (1.33)	14.05 (1.40)	4.92 (0.44)
24-28	80-239	54	5.2	4	.56	19.68 (1.17)	23.79 (1.96)	4.07 (0.65)
Other		8	4.7					

Hunter

Seasonality (% winter production)	Production Range (th.litres)	Cell. Popn.	Cell Production (m.litres)	Sample Size	Sample Production (m.litres)	Total Cost (Opp. Cost Labour) (c/L)	Total Cost (Synth. Labour) (c/L)	Short- Term cost (c/L)
14-18	80-239	95	14.4	3	.50	18.23 (1.92)	21.52 (4.86)	4.02 (0.82)
	240+	26	7.3	4	1.19	16.29 (2.32)	17.47 (2.93)	3.65 (0.38)
19-23	80-239	412	69.3	5	.87	14.83 (1.18)	16.27 (1.18)	3.82 (0.37)
	240-399	217	66.2	5	1.53	15.72 (0.73)	16.37 (1.11)	5.50 (0.42)
	400+	72	41.9	5	2.48	15.08 (3.04)	16.00 (2.53)	4.80 (1.05)
24-28	80-239	64	11.2	3	.57	14.30 (2.47)	17.24 (2.39)	2.58 (0.44)
	240+	61	26.4	5	2.02	14.53 (1.15)	15.25 (0.98)	3.88 (0.45)
Other		16	2.4					

Outer Sydney

Seasonality (% winter production)	Production Range (th.litres)	Cell. Popn.	Cell Production (m.litres)	Sample Size	Sample Production (m.litres)	Total Cost (Opp. Cost Labour) (c/L)	Total Cost (Synth. Labour) (c/L)	Short- Term cost (c/L)
19-23	80-239	52	9.3	5	.90	21.89 (1.57)	22.13 (1.96)	6.86 (0.71)
	240-399	45	14.4	4	1.32	17.68 (1.97)	19.22 (2.16)	6.60 (0.39)
	400+	33	26.8	5	2.82	19.62 (2.19)	20.55 (3.20)	6.43 (0.72)
24-28	80-239	17	6.6	4	.80	26.33 (2.37)	28.14 (2.28)	6.08 (0.90)
	240-399	20	6.1	4	1.13	18.92 (1.11)	20.02 (1.18)	8.90 (1.03)
	400+	44	55.4	5	6.90	16.88 (1.31)	17.90 (2.88)	9.40 (1.21)
Other		8	2.8					

Central Murray

Seasonality (% winter production)	Production Range (th.litres)	Cell Popn.	Cell Production (m.litres)	Sample Size	Sample Production (m.litres)	Total Cost (Opp. Cost Labour) (c/L)	Total Cost (Synth. Labour) (c/L)	Short- Term cost (c/L)
0-3	80-399	24	4.5	4	.87	11.12 (2.75)	16.37 (5.02)	2.18 (0.66)
4-8	80-239	44	7.1	3	.60	14.99 (4.25)	18.54 (3.79)	3.34 (0.95)
	240+	28	9.1	5	1.73	8.60 (0.84)	11.69 (1.19)	1.98 (0.29)
9-13	80-239	31	5.4	4	.84	10.17 (1.27)	14.13 (1.53)	2.61 (0.26)
	240-399	16	4.7	3	1.00	11.85 (0.89)	15.21 (1.31)	2.83 (0.22)
	400+	10	4.9	3	1.67	5.19 (1.01)	8.27 (0.71)	2.30 (0.10)
14-18	80+	21	5.3	4	.78	14.15 (4.34)	19.05 (3.65)	3.25 (0.47)
Other		4	.93					