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## TRENDS IN DAIRYING (1933-54)

by

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### 1. SUMMARY

#### Productive Efficiency

(1) It seems likely that output per man in Australian dairying has failed to improve on the level of the early thirties. By contrast, output per man over the rest of Australian agriculture is now nearly 60 per cent higher than in the 1931-35 period. Over roughly the same period, output per unit of labour in New Zealand dairying nearly doubled.

(2) New South Wales is apparently the only one of the three important dairying States where labour productivity in dairying has increased over the past 20 years. This progress has been confined largely to the Milk Zone and the Far South Coast. It has resulted more from an increase in cows handled per man than in yield per cow.

(3) The lack of progress in output per man in Australian dairying has important implications for dairymen, consumers and taxpayers. Incomes in dairying have risen substantially, but remain relatively low. This rise in incomes has been obtained largely at the expense of consumers, whereas higher incomes in the rest of Australian agriculture have been achieved mainly through increased productivity. The industry has been largely shielded from the repercussions of higher retail prices by the use of an expensive consumer subsidy on butter and cheese.

(4) The average yield per cow in Australia has risen by 7 per cent since 1931-35. A considerable improvement in Victoria and a modest rise in New South Wales have been partly counterbalanced by a fall of 11 per cent in Queensland.

(5) Increased yields per cow have been completely offset by a surprising fall in the number of cows handled per man. This has occurred despite the widespread adoption of milking machines and other labour-saving plant and equipment. New South Wales is the only State in which cows per man have increased over the period, but even here the increase has been much smaller than would be expected.

(6) A diversion of labour to sidelines and the growing of more fodder crops and better pastures could help explain the fall in cows per man. However, there is no evidence that this development has occurred at all in New South Wales; it may have occurred in Queensland and Victoria, but can hardly be the major cause of the considerable fall in the cow-man ratio in these two States. If we dismiss the possibility of a fall in the efficiency of labour and management on dairy farms, apparently the only remaining explanation is the reduction that has occurred in the use of part-time family labour, and shorter working hours. This development was obviously desirable and justifiable on a number of grounds. The disturbing feature is that similar progress in working hours and conditions was achieved in the rest of the economy by greatly increased efficiency, being accompanied by a considerable *increase* in output per man.

(7) Whilst total employment in Australian agriculture fell by over 15 per cent between 1933 and 1954, the dairying industry's labour force rose by 15 per cent. This rise was confined to Queensland and Victoria and has occurred solely since the late war years. The use of less family labour and shorter working hours was partly responsible for this rise in the work force employed in the dairy industry. This trend towards shorter hours and some relief for family labour was made possible by, and to some extent was caused by, higher real incomes in post-war dairying. Average net family income on Australian dairy farms, adjusted to real terms, rose by 74 per cent between 1945-46 and 1952-53.

(8) Progress in research and the discovery of improved techniques have probably contributed less to dairying than to most other rural industries. There is also reason to believe that innovations are less quickly and less fully adopted in dairying than elsewhere in agriculture. A shortage of capital for farm investment, particularly marked in dairying, is partly responsible.

(9) In an economic sense, the industry is over-manned. The number of cows handled per man is an important determinant of net farm income, and more attention should be given to devising and publicising labour-saving methods. To date, research and extension has been almost solely concerned with increasing yields per cow. Labour is already a limiting factor on many dairy farms, and if technical progress enables the growing of more feed for more cows, labour economies will become even more important.

(10) The opportunity is available for a considerable improvement in labour efficiency. Amongst the main methods are improved shed and bail design; farm work simplification using the results of "time and

motion" studies as developed in industry; bulk handling of milk on the farm; and improvements in the principles and design of milking machines and other plant. It should be possible to benefit from economies of scale in labour—in large herds the cow-man ratio is double that of small herds.

### Marketing

(11) Long-term trends on the export market are not encouraging. In 1954 world exports of butter were 30 per cent lower than in 1938 because of reduced consumption of butter in the major importing countries. Not only has margarine replaced butter very considerably on overseas markets, but per capita consumption of table fats is showing a tendency to shrink in a number of important consuming countries. At the same time, the export market has become less important to Australian dairying.

Apart from the immediate post-war years, local prices for butter and cheese, under the home consumption price scheme, have always been set at a level considerably higher than export returns. This disparity between local and export prices has increased since the thirties.

(12) On the local market, considerable consumer resistance to recent increases in the retail price of butter is apparent.

It is likely that increasing population and a rise in the consumption of dairy produce other than butter will more than offset the effect of higher yields per cow and increasing competition from margarine, so that the industry will continue to become less dependent on unprofitable export outlets.

## 2. INTRODUCTION

A number of recent developments combine to make this an appropriate time for a review of trends in the Australian dairying industry. The United Kingdom Dairy Produce Export Contract terminated in June, 1955. At the end of the first year of open-market operations it seems that the overall trend on the London market has been downwards, and that prospects for a recovery in butter and cheese prices this season are not encouraging. The local butter market also weakened in 1955-56, as manifested by a fall in consumption per head of approximately six per cent compared with the previous year. In July, 1956, the Government-guaranteed price to dairymen was increased by 1.71d. per lb. of commercial butter, with a corresponding adjustment for cheese, following increases in the ascertained "average cost of efficient production". At the same time the Commonwealth Government's subsidy allocation was further lowered from £14.5 million in 1955-56 to £13.5 million in the current year, in keeping with that Government's announced policy of gradually reducing its subsidy commitment.

The position can be summarised as follows: rising production costs are adding to the losses being suffered on an increasingly competitive export market, and at the same time are reinforcing the effect of the reduced subsidy in raising local prices. Higher local prices and increasing competition from table margarine are affecting local consumption. This adds to the volume of unprofitable exports.

In total, these developments could be described as constituting a "marketing problem" for the industry, but certainly not in the sense of a crisis. The dairying industry has a more or less permanent marketing problem, in that it is unable to produce butter and cheese profitably at world prices. Almost continuously since 1926 it has relied upon various home-consumption price schemes under which high local prices, in effect, have subsidised exports. In this sense, the "marketing" problem resolves itself into one of productive efficiency. Improved efficiency would enable the industry to bring its costs into closer alignment with overseas prices, and would permit a reduction in local prices in an attempt to boost, or at least maintain, domestic consumption.

Increased efficiency is, of course, a counsel of perfection which is not easy to implement quickly. Theoretically, it can be achieved in two ways; higher productivity on existing farms, or the transfer of "marginal" dairy farms to other lines of production, but only the first method is likely to be used. Forcing inefficient dairy farms out of production through low prices, would be a painful process, politically, and to a certain extent economically. No Government is likely to carry through so cathartic a measure, particularly in view of the fact that marginal dairy farms appear to be amazingly viable. However, Government assistance for the consolidation of small inefficient farms remains a possibility.

Certain aspects of the problem of increasing the efficiency of the dairying industry are discussed below, together with an outline of trends in productive efficiency and in marketing since the thirties.

### 3. PRODUCTIVE EFFICIENCY

The reasons for inefficiency in Australian dairying are as varied as the conditions under which dairying takes place—climate and soil vary tremendously, and the farms range from large specialised dairying units in various stages of development to properties where dairying is a small sideline. A considerable number of farms are in areas not well suited to dairying, in terms of soil, rainfall, etc., and although they may be efficiently managed, they are inefficient by virtue of their environment. Others are too small, or under-capitalised, and some are badly managed.

The variation in production costs between Australian dairy farms is staggering. The fact that the farm cost of production, at "survey level", as revealed by the 1953 Commonwealth Dairy Survey, ranged from 9d. to 165d. per lb., indicates the magnitude of the inefficiency problem.<sup>1</sup> The Dairy Industry Investigation Committee adjusted costs at survey level to June, 1955, prices, eliminated farms not satisfying

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<sup>1</sup> A wide range of farm costs probably occurs in all rural industries, but particularly in dairying. Those not acquainted with the "average cost of production" concept in agriculture may wonder how the highest-cost producers survive. On the average, cash costs in dairying represent less than 30 per cent of total costs, as measured by the Bureau of Agricultural Economics. The bulk of costs are imputed, including allowances for the labour of the farmer and his family, for management and for interest on capital invested. Thus, a high-cost farmer may be earning nothing on his capital, no allowance for management, no allowance for family labour, and no return to cover depreciation, but a small return which can be attributed to his own labour enables him to continue farming. Such cases are by no means rare.

certain efficiency criteria, and determined a figure of 50d. per lb. as the average cost of efficient production. Over 70 per cent. of the farms surveyed had costs in excess of this figure. This preponderance of high-cost producers brought the industry's average return on capital invested down to a very low level—less than three per cent per annum in New South Wales (on market valuation), with a State average return for labour of £484 per annum per male labour unit.<sup>2</sup>

It is significant that labour represents about one-half of total costs in dairying. Dairying shares this characteristic of high labour costs with most of the other less profitable "intensive" industries in Australian agriculture, such as eggs and poultry, pigmeats and dried vine fruits. Australian agriculture features high labour costs and low land costs, relative to most agriculture overseas. Thus it is not surprising that our comparative advantage lies in the more extensive industries (sheep, wheat, beef cattle) which use large quantities of land in relation to labour.

International comparisons of production per cow illustrate Australia's disadvantages in dairying, although it must be remembered that the high output achieved in some other countries is the result, not only of climate and soil advantages, but of an intensive system of dairy-farm management which would be uneconomic in Australia. Milk production per cow in Australia over recent years has been in the vicinity of 400 gallons per annum, compared with the following 1954 figures for other countries<sup>3</sup>:—

						Gallons.
United Kingdom	..	..	..	..	..	616
New Zealand	..	..	..	..	..	532
United States	..	..	..	..	..	535
Denmark	..	..	..	..	..	768
Netherlands	..	..	..	..	..	835

However, too much importance can be placed on production per cow. Production per man, the product of production per cow and cows handled per man, is a far more important measure of efficiency in dairying.<sup>4</sup>

### Trends in Labour Productivity

Table I shows movements in these three measures—yield per cow, cows per man and output per man (labour productivity) in Australian dairying as between the last three Census dates.<sup>5</sup> These figures are

<sup>2</sup> For further details of the survey results, see "The Cost Structure and Management Problems of the Dairying Industry in New South Wales", this *Review*, Vol. 23, No. 3 (September, 1955).

<sup>3</sup> *Dairy Produce* (Commonwealth Economic Committee, London, 1955), p. 2.

<sup>4</sup> Nor is production per man a perfect measure of technical efficiency in agriculture, though it is the best available from Australian statistics. Production per unit of input of all farm resources is the best measure.

<sup>5</sup> Census figures provide the only continuous series on total employment in Australian farming, by industry groups. The Statistician publishes an annual series, but dissection by the three major industry groups (Cultivation, Dairying and Pastoral) is available only up to 1940-41. Furthermore, annual figures for temporary employees (seasonal and casual workers) are not available prior to 1944.

also shown for the three States, Victoria, New South Wales and Queensland, which together produce 85 per cent of Australia's milk output.

The figures indicate that over Australia as a whole, the increase in yield per cow that has occurred since the 1931-35 period has been very largely counterbalanced by a fall in the number of cows handled per man, so that there has been very little, if any, improvement in labour productivity. There has been a significant improvement since the immediate post-war years, but productivity in the 1945-49 period was adversely affected by shortages of materials and equipment and the after-effects of wartime neglect of maintenance, as well as by the droughts of 1944-45 and 1946-47.

TABLE I  
*Productivity Trends in Australian Dairying—Intercensal Comparisons*

Census Year	Labour Force (Male Equivalents)†	Yield per Cow *‡	Cows per Man*	Output per Man*
		Number Gallons	Number	Gallons
AUSTRALIA				
1933 ... ..	92,016	378	32.0 (28.4)§	12,090 (10,750)§
1947 ... ..	101,507	370	30.2 (27.9)	11,190 (10,350)
1954   ... ..	106,055	405	29.8 (27.6)	12,090 (11,180)
NEW SOUTH WALES				
1933 ... ..	35,477	344	28.3 (25.2)	9,720 (8,640)
1947 ... ..	29,285	323	29.6 (27.4)	9,560 (8,840)
1954   ... ..	28,689	365	29.8 (27.6)	10,890 (10,070)
VICTORIA				
1933 ... ..	25,995	461	31.9	14,730
1947 ... ..	32,130	492	27.1	13,320
1954   ... ..	33,742	511	29.2	14,940
QUEENSLAND				
1933 ... ..	22,507	337	34.9	11,770
1947 ... ..	27,416	268	34.9	9,360
1954   ... ..	29,161	299	31.5	9,400

\* Average of four seasons surrounding census year, *i.e.* 1931-32 to 1934-35, 1945-46 to 1948-49, and 1952-53 to 1955-56. Averaging reduces the effect of variations in seasonal conditions on the figures.

† Female labour counted as one-half of a male equivalent. There has been no significant change in the sex composition of the labour force since 1933. The labour figures represent labour on farms classified as "dairy farms" in the Census, and thus do not include labour employed in sideline dairying. To this extent, cows per man and yield per man are over-stated (see §). On the other hand, a good deal of labour attributed to dairying is absorbed by sidelines on dairy farms.

‡ Yield per cow is based on the number of dairy cows which were in milk during any part of the year, and the figures are therefore below yields calculated on the basis of cows which were yielding during the greater part of the year.

§ Figures in brackets represent corrections to original figures after making maximum allowance for the fact that an unusually large quantity of milk was produced as a sideline in the thirties. The percentage corrections derived for New South Wales have also been applied to the Australian figures in the absence of Australian-wide data. (See Appendix.)

|| Based on preliminary figures and estimates for 1954-55 and 1955-56.

Source.—Adapted from figures provided by the Commonwealth Bureau of Census and Statistics.

Progress in New South Wales dairying is satisfactory only by comparison. Here the improvement in yield per man since 1931-35 is somewhat optimistically estimated at 12 to 15 per cent—a modest enough achievement. (A figure of 10 per cent or less would probably be more accurate allowing for favourable seasons.) This progress has resulted more from the increase in cows per man (six to nine per cent) than from the increase in yield per cow (six per cent). It should be noted that New South Wales was the only important dairying State where the industry's labour force declined and the cow-man ratio rose.

In Victoria, a considerable rise in yield per cow over the period was apparently almost completely counterbalanced by a fall in cows handled per man. Nevertheless, Victoria remained the State of lowest average cost of production, though by a very narrow margin over New South Wales. Queensland is the highest-cost State.<sup>9</sup> In Queensland, both yield per cow and cows per man fell considerably over the two decades, and labour productivity showed a decline approaching 20 per cent.

Before discussing these figures any further, it is advisable to consider their probable accuracy.

#### Difficulties of Measurement

Not a great deal of accuracy can be claimed for any of the figures in Table I as far as their absolute values are concerned. This is particularly true of the statistics on labour, production per man and cows handled per man in dairying, because of the limitations of the Census in supplying the required information. However, the figures do provide a reasonable basis for comparisons over time.

The Census does not attempt an objective classification of farms; farmers are asked to classify themselves as "dairymen", "wheat-growers", etc., but difficulties arise with the four categories "mixed farming", "farming", "rural" and "primary producer" as descriptions of occupation. These four categories totalled 144,842 or 32 per cent of Australia's farm labour in 1933, and a considerable proportion would have been engaged, to a greater or lesser extent, in dairying. We are driven to assuming that the error is constant, in order to make comparisons over time, and in doing so it is rather heartening to find that the four "loose" categories also represented 32 per cent. of the total in the 1947 Census (the 1954 figure is not yet available).

To the extent that labour engaged in sideline dairying is not thus classified in the Census, the industry's labour force is understated. However, this is offset to some extent by the fact that many of the farmers classified as dairymen devote a good deal of their time to sidelines such as pig-raising. Allowance must be made for the extent to which sideline dairying and dairying sidelines varied in importance as between the Census dates.

Varying seasonal conditions provide one of the main difficulties in interpreting agricultural statistics. No attempt has been made to adjust for this factor, but it can be pointed out that generally excellent

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<sup>9</sup>The production cost figures estimated by the Bureau of Agricultural Economics as at December 31, 1951, were: Victoria, 38.85d. per lb.; New South Wales, 39.00d. per lb.; Queensland, 49.94d. per lb. These figures exclude managerial allowance and cream cartage.



seasonal conditions ruled over the 1952-56 period, and from this viewpoint the figures in Table I overstate rather than understate progress in dairying.

These and other difficulties of measurement are discussed in more detail in the Appendix.

### **Yield per Cow**

In Victoria, selective breeding and better feeding combined to give a rise of 11 per cent in the average yield per cow. By contrast the rise in New South Wales was only six per cent, whilst the Queensland figure fell by 11 per cent. In Victoria, a sharp rise in the area of sown pastures and fodder crops, and in fertiliser usage, points to improved feeding.

In New South Wales, progress has been limited by a growing fertility problem on the red basaltic soils of the North Coast. Soil fertility is at least partly responsible for the decline in carrying capacity and yield per cow in this area.<sup>7</sup>

In most other dairying districts in the State, there has been a considerable rise in yields per cows. Accurate figures on milk production by Statistical Divisions are not available, but a rough estimate shows a rise of close to 60 gallons per annum (20 per cent) in the average yield per cow within the New South Wales Milk Zone. Over the rest of the State, there has been no improvement, the increase in yield per cow on the Far South Coast having been counterbalanced by the decline in the north.

In Queensland, the fall in average yield per cow suggests a soil fertility problem, perhaps related to the dominance of paspalum in pastures.

### **Cows per Man**

The most interesting fact brought out in Table I is that the number of cows handled per man in Victoria and Queensland dairying has fallen, despite a rapid increase in mechanisation on dairy farms in the form of milking machines, tractors and other farm machinery and implements. Even in New South Wales, the slight rise in the cow-man ratio is much less than might have been expected.<sup>8</sup> Five possible explanations present themselves:

- (i) There may have been an increase in the number of dairy farms carrying sidelines, and/or in the relative importance of those sidelines.
- (ii) Labour may have been diverted from milking cows towards better feeding and a reduction in purchased fodder, through an expansion of improved pastures and fodder crops.

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<sup>7</sup> Alison M. Kingsland, "An Economic Survey of the Productivity of Dairy Farms on the Red Basaltic Soils of the Far North Coast of New South Wales", this *Review*, Vol. 18, No. 1 (New Series) (March, 1950).

<sup>8</sup> Colin Clark quotes United States figures showing that in herds of 29 cows or more, milking time is reduced by close to 50 per cent by the use of milking machines. (See Colin Clark, *Conditions of Economic Progress* (2nd edition, London, Macmillan and Co., 1951), p. 243). The saving of labour in Australian dairying would be of a similar order.

- (iii) Under-employment may have increased in dairying.
- (iv) The efficiency of labour and management may have fallen.
- (v) The total hours worked on dairy farms, relative to the size of the labour force, has undoubtedly fallen.

There has been a reduction in the use of the part-time labour of wives and children and possibly in the hours worked by farm operators. The reduction in award hours for hired labour is of minor importance, since hired labour is comparatively rare in dairying. The use of contract labour has probably increased, but this too is of little importance.

These five possible explanations will be considered separately for New South Wales and the other two States.

*New South Wales.*

(i) There is no evidence to suggest that sidelines have become more important on New South Wales dairy farms since 1933. The New South Wales Bureau of Statistics and Economics over the 1933-46 period, classified dairying holdings as dairying only, and dairying with agriculture and/or grazing. Over this period the proportion of farms producing milk in association with other enterprises (one-third) did not alter. Sidelines could have become more important on this one-third of farms, but departmental officers have not noticed any such trends. In coastal divisions of New South Wales where dairying predominates, there was an increase of 32,000 acres in sideline crops (crops other than fodder crops) between 1933 and 1954—less than three acres per holding. On the other hand coastal pig numbers dropped over this period by 43,000 (see Table II).

TABLE II  
*Factors Affecting Labour Requirements in New South Wales Dairying Intercensal Comparisons*

Year*	Coastal Divisions						Milking Machines Stands
	Area Under Sown Grasses	Area Under Fodder Crops†	Area Under Other Crops	Total Area Cropped	Pig Numbers	Tractors	
1933	Acres 2,170,033	Acres 246,121	Acres 79,663	Acres 325,784	Number 266,483	Number 895‡	Number 18,365§
1947	1,506,672	249,791	119,172	368,963	231,186	3,024	28,861
1954	1,846,664	195,677	112,018	307,695	223,498	9,218	39,917

\* Average of surrounding financial years, e.g. 1932-33 and 1933-34 for 1933.

† Wheat for hay and green feed, maize, oats, barley (except malting), rye, sorghum, lucerne, other green fodder crops.

‡ Earliest collection 1937.

§ Earliest collection 1943.

Source.—N.S.W. Bureau of Statistics and Economics.

(ii) Nor is there much reason to believe that labour on New South Wales dairy farms has been diverted from milking cows to growing more feed. Table II shows that the area under fodder crops in coastal divisions has fallen by 50,000 acres (20 per cent) since 1933, whilst the area under sown pastures (including paspalum) has declined by 323,000 acres (15 per cent). The coastal divisions are the only part of the State, apart from the dry western areas, where the acreage of

sown pasture has not risen markedly over the past 20 years. This fall in the acreage under sown pastures on the coast since 1933 needs some comment. Omitting shires in the coastal division where sheep-raising is predominant, there has been an estimated fall of 550,000 acres under paspalum, and a rise of 180,000 acres in the acreage under other sown grasses, which can be truly described as "improved" pasture. Paspalum, however, is an introduced grass which spread naturally and rapidly in coastal areas, and is not soil-building. The rise in the acreage of improved pasture, which has occurred mainly since 1947, would involve additional labour requirements in sowing, top-dressing, etc. On the other hand the large-scale reversion of paspalum to inferior natural grasses would not have reduced labour requirements, since relatively very little labour is expended on the maintenance of paspalum pastures.

(iii) The previously-mentioned soil fertility problem on the North Coast of New South Wales has lowered production per acre, through a fall in carrying capacity and cow yields. This raises the possibility of an increase in under-employment on northern dairy farms. On many farms, particularly one-man farms, the area and the labour force are relatively fixed, so that declining soil fertility could lead to a situation in which the farmer cannot carry sufficient cows for full employment. This possibility can be dismissed as far as the far North Coast is concerned; on Kingsland's figures there has been no marked decline in output per man, since lower output per acre has been counter-balanced by an increase in farm size and a reduction in the farm labour force.

For the State as a whole, and for the rest of Australia, there is reason to believe that under-employment in the dairying industry declined rather than increased between 1933 and 1954. It is a well-known (but unmeasured) fact that the dairying industry and farming generally, served as a refuge for a considerable number of unemployed relatives in the depression years.

(iv) There is little reason to suspect a decline in the efficiency of labour and management in New South Wales or Australian dairying since 1933. Expert opinion favours the opposite conclusion: as a result of research, extension and better education, to-day's dairyman has more and better technical knowledge than his counterpart of the thirties, and he is more mechanised. However, it is of some interest to note that the average age of dairy farmers is apparently increasing—a trend also evident in other primary industries.<sup>9</sup> A survey made in 1952 showed that about three-quarters of the dairy farmers on the lower North Coast were over 40 years of age.<sup>10</sup> An analysis of the 1953 Dairy Cost Survey indicated that the age of the dairy farmer is very definitely related to his efficiency and enterprise. In the Richmond-Tweed area, the younger farmers (20-39 years) earned double the average "labour income" of farmers over 60 years.<sup>11</sup>

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<sup>9</sup> This trend is much more marked in dairying than in the rest of agriculture. According to Census figures the percentage of the dairying industry's total labour force under 40 years of age fell from 64.1 per cent in 1933 to 55.1 per cent in 1947. (The figures for 1954 are not yet available.)

<sup>10</sup> J. Rutherford, "Further Aspects of Dairy Farming on the Lower North Coast", this *Review*, Vol. 20, No. 1 (March, 1952), p. 60.

<sup>11</sup> F. H. Gruen, "Incomes of Dairy Farmers in the Richmond-Tweed Region", this *Review*, Vol. 23, No. 3 (September, 1955), p. 196.

A related problem is that of "talent erosion", though here the evidence is less clear-cut. On many dairy farms, particularly those supporting large families, reasonable education has, in the past, been the privilege of the more gifted children, who usually leave the farm for business and the professions.<sup>12</sup> This factor would tend to lower the average ability of the farm work force. Again, "talent erosion" is not confined to dairying, but it is probably of more importance in dairying than in other more prosperous primary industries. This subject would be an interesting one for rural sociologists.

(v) It seems, then, that the major cause of the relative lack of progress in cows handled per man in dairying in New South Wales must have been a reduction in hours of labour. Dairying has always depended more on unpaid, part-time family labour than any other Australian industry, especially in the depression years of the thirties. Apart from the burden imposed by necessity on dairymen's wives, the hours worked by their school-age children would, in many cases, have been an offence against even mid-Victorian child labour laws. That this situation has changed since the thirties can only be regarded as progress. Nor can dairymen themselves be begrudged a share in the general reduction in working hours and improvement in working conditions that has occurred, particularly as most dairymen still work very long hours. The disturbing feature, however, is that this reduction in working hours has been effected elsewhere in the economy without any reduction in output per man—in fact, labour productivity has improved almost universally since the thirties.

#### *Other States.*

The writer has no first-hand knowledge of dairying in Victoria and Queensland, nor are the official statistics as helpful as in New South Wales. However, the figures that are available do not suggest any significant increase in the relative importance of dairying sidelines in these States, nor any increase in under-employment in dairying. Labour has been diverted towards growing more fodder crops and improved pasture in Victoria, but there is little evidence for Queensland dairying areas, where a large proportion of milk output comes from mixed farms.

If we reject the possibility of a fall in the efficiency of labour and management in Victorian and Queensland dairying, we are left with the fifth possible explanation listed—that a reduction in part-time family labour and shorter working hours has necessitated a higher labour force and has lowered the cow-man ratio in these States. Whilst this trend has probably operated just as strongly in Queensland and Victoria as in New South Wales, it forms a much more tentative conclusion when applied to the former two States, where alternative explanations can be less firmly dismissed. Furthermore, whilst this may be a plausible explanation for the lack of a significant *rise* in cows per man in New South Wales, it is less convincing as the sole reason for a considerable *fall* in the cow-man ratio in the other two States. Further investigation by persons better acquainted with Queensland and Victorian dairying seems necessary.

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<sup>12</sup> J. Rutherford, *op cit.*, p. 61.

### Rising Labour Force

The fact that the dairying industry's labour force has expanded since 1933, despite relatively low returns to labour, is an interesting subject for speculation. By contrast, the total labour force in primary industry fell quite significantly over this period—a continuation of a long-term decline. Broadly speaking, a declining labour force in agriculture is an indication of increasing agricultural efficiency.

This increase in numbers employed in Queensland and Victorian dairying since 1933 is confined to the late war years and early post-war years. (The New South Wales labour force has fallen since 1933.) The annual figures for persons permanently employed reveal no significant rise in any State between 1933 and the outbreak of war. During the early war years, it is believed that the industry's work force fell sharply. Following a shortage of dairy produce and a revision of manpower priorities, there was a steady flow of manpower into dairying in 1944 and 1945, which apparently continued in the early post-war years, for the 1946 Census figures show an increase of ten per cent over 1933.<sup>18</sup> A further increase occurred between 1947 and 1954.

Looking at the figures for all rural industry, there was no marked trend between 1933 and the outbreak of war, but there was a sharp decline during the war in persons permanently employed in agriculture. There was a partial recovery in the immediate post-war years, but permanent labour remained at seven and one half per cent below the 1933 figure, and has stabilised at about this level.

The decline in rural labour that has occurred since 1933 has been confined to the cropping industries, where mechanisation is most important, grazing and dairying both having exhibited an increase in manpower. In grazing, this has almost certainly been accompanied by a significant increase in output per man (no measure is available). An expanding market at very attractive prices has induced intensive development involving more labour, as well as heavy capital investment. The factors associated with the rise in employment in the dairying industry in Queensland and Victoria are quite dissimilar.

It is rather difficult to explain this particular trend in Queensland and Victorian dairying in the post-war period. In both States, there was an estimated rise in the labour force of close to 30 per cent between the late war years and 1954. Admittedly, cow numbers were rising in Victoria over this period, and more labour was being devoted to growing feed, but one would have expected that these changes would have been largely counterbalanced by the rapid adoption of machine milking. In Queensland, cow numbers actually *fell* over this period, and less labour was devoted to producing pigmeats in dairying districts.

It hardly seems likely that shorter hours worked by hired labour and farm operators and less use of part-time family labour was the sole "cause" of this increase in employment, but apparently it was a major contributory factor.

If the higher labour force was caused by the "demand" for shorter hours, etc., what caused the demand for shorter hours? This demand could have been a result of, *inter alia*, higher real incomes, or it could have been a prime cause, allowed to operate by higher real incomes.

<sup>18</sup> See J. G. Crawford *et al.*, *Wartime Agriculture in Australia and New Zealand, 1939-50* (Stanford: Stanford University Press, 1954), Chapter 4.

Did changed attitudes towards working hours and family labour, resulting from broad social changes and improved working hours and conditions outside dairying, "necessitate" a rise in the industry's labour force? If we take this view, higher prices for dairy products were largely a result of the higher labour force. From 1947 the guaranteed price to butter and cheese producers was based on the ascertained average cost of production, and provided a mechanism by which an increased labour force could be financed.

Alternatively, was the fact that dairying could *afford* a higher work force merely a reflection of the considerable rise in prices paid to butter and cheese producers over the post-war period, when most of the increase in employment occurred? Higher real incomes not unusually have the effect of making shorter working hours more desirable and more practicable.<sup>14</sup>

The guaranteed price to producers for butter rose from 1s. 7½d. per lb. in 1945 to 4s. 1¼d. per lb. in 1952. Of course, costs also increased sharply, but net family incomes on Australian dairy farms, adjusted to real terms by the "C" Series Index, showed an average rise of approximately 74 per cent between 1945-46 and 1952-53.<sup>15</sup>

It was in this period that butter was rationed in both Australia and the United Kingdom. The acute world shortage of fats and oils was such that over most of this period, export prices exceeded local prices for the first and only time since the inception of the home-consumption price system in 1926. It would be rather surprising if the determination of "average cost of production", which is to a very considerable extent an arbitrary process, did not reflect the apparent need for an incentive price in such a situation. This pressure on prices from the demand side would have occurred regardless of cost increases resulting from a higher labour force.

To the extent that this is true, the larger work force and the accompanying fall in working hours and use of family labour, was at the expense of, and alternative to, higher real incomes in dairying, rather than a result of higher real incomes.

Almost certainly, both processes operated. Higher real incomes in dairying caused and made possible shorter working hours, etc; but the demand for shorter hours would have occurred, and found some expression, even in the absence of higher incomes.

We should perhaps consider the possibility that shorter working hours and less use of family labour was a result, not a cause, of the increase in the numbers engaged in the industry. This possibility calls to mind a problem quite common in some overseas economies. In the agriculture of a number of countries, excess labour is viewed as a barrier to higher agricultural incomes, and policy aims at speeding up farm

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<sup>14</sup> In the extensive milk zone of New South Wales, real incomes were possibly higher, and part-time family labour less important, than in other States, prior to 1945. This point, and the fact that the State's cow numbers fell by six per cent between 1945-46 and 1952-53, are the only explanations the writer can find for the fact that New South Wales dairying did not share in the post-war expansion of the industry's labour force.

<sup>15</sup> T. H. Strong, "Trends in the Net Family Incomes of Dairy Farmers", *Quarterly Review of Agricultural Economics*, Vol. VIII, No. 3 (July, 1955).

migration. This is a particularly important problem in a number of under-developed countries, but the low-income farming areas of the United States also provide a well documented example. Poverty, lack of education and lack of local employment opportunities are amongst the factors making for low mobility of labour in such areas, and the problem is usually accentuated by high rural birthrates, and sometimes by the system of inheritance. Australia has been notably free of this problem, but if it applies anywhere in this country it applies in dairying. It is of some interest to consider the proposition that the dairying industry's labour force has been increasing because of inadequate migration from the industry, and that this factor has contributed to low incomes per head.

This could be true for backward "pockets" of the dairying industry—areas where an obvious surplus of labour can be observed, with under-employment either in the form of fragmented holdings or holdings supporting large adult families with no outside employment. However, there is certainly no reason to assume that it is true for Australian dairying as a whole. Satisfactory statistics are not available, but there is no evidence of a long-term fall in farm size, or of an increase in persons per holding in the Australian dairying industry. Under-employment is no doubt present on some holdings, but is not a serious problem. It is much more likely that lack of progress in labour productivity has limited the rate of migration, rather than that inadequate migration has depressed labour productivity.

### Output per Man

Over Australia as a whole, output per man in dairying is likely to have increased by no more than four per cent since 1933, on the evidence available. What improvement there has been has occurred since 1947, and is largely if not wholly attributable to the unprecedented run of good seasons since then.

TABLE III  
*Labour Force and Indices of Gross Output per Man—Australian Farming—Intercensal Comparisons*

Census Year	Agriculture	Grazing	Dairying		All Farming	
	Labour Force—Male Units	Labour Force—Male Units	Labour Force—Male Units	Index—Output per Man*	Labour Force—Male Units	Index—Output per Man*†
1933 ...	353,623	90,228	92,016	100	535,867	100
1947 ...	254,030	91,800	101,507	96	447,337	123
1954 ...	226,282	119,519	106,055	104	451,856	151

\* Derived by averaging the Commonwealth Statistician's index numbers of Gross Farm Output for the four seasons surrounding each census year, dividing by the Census figures for the total farm labour force, and adjusting to a base of 1931-35 = 100. Apart from other reasons, the change in weights used in the Statistician's index for 1936-37 and later years means that the above figures on output per man can only be regarded as very approximate.

† Based on the adjusted output per man figures shown in brackets in Table 11.

In New South Wales, the rate of progress has been more satisfactory, and has probably averaged between one and a half and two per cent per annum since 1947. On Gruen's estimate, this is roughly comparable with the average rate of growth in labour productivity in the first three decades of the century, when the industry was spreading and developing rapidly.<sup>16</sup>

The fact that a relatively high percentage of New South Wales dairy-men produce for the liquid milk trade has contributed to some extent to the greater progress in this State. About one-third of the milk output is sold as fresh milk in New South Wales, compared with only 15 per cent in Victoria and 13 per cent in Queensland.

Producing for the fresh milk market is generally more profitable than producing milk for butter, cheese and processed milk, particularly in New South Wales since 1932, when the formation of an effective Milk Board greatly strengthened the marketing position of Milk Zone producers. Judging by trends in cow yields, most of the improvement in output per man in New South Wales dairying since 1933 has occurred within the Milk Zone. Higher incomes within the Zone have facilitated higher farm investment, and thus contributed to increased efficiency. Probably this is part of the explanation of the fact that in New South Wales, a reduction in working hours and part-time family labour has been achieved at the same time as an increase in output per head.

The term "labour productivity", as used in this article, obviously does not connote "labour efficiency". Labour efficiency is more appropriately measured in terms of output per man-hour, and it seems most likely that there has been a significant increase in milk produced per man-hour since 1933.

However, insofar as we are concerned with the level of incomes in dairying, and with production costs and retail prices, it is output per man that is of prime importance. The fact that Australian dairying is much more prosperous to-day than in 1933 is due, not to increased labour productivity, but to higher prices. The purchasing power of butterfat more than doubled between 1933 and 1954.

Broadly speaking, higher incomes in the rest of Australian agriculture have been achieved mainly through increased productivity, rather than at the expense of consumers. In the case of dairying, however, the "real" price of butter (the price paid to producers, relative to the general level of wages) rose by more than 60 per cent over the period—about double the average rise in the "real" price (thus computed) for other farm products in Australia.

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<sup>16</sup> F. H. Gruen, "Farm Size and Factors Influencing Changes in Farm Size, With Special Reference to New South Wales (1902-1948)", this *Review*, Vol. 17, No. 1 (March, 1949), p. 44.

Gruen has constructed an index of milk production per person permanently employed in New South Wales dairying for the period 1902-40. He points out that over this period, there was a considerable change in the sex composition of the industry's labour force (the proportion of women in the labour force fell from 45 per cent to 16 per cent) and the proportion of holdings specialising in dairying increased greatly, so that no great accuracy can be claimed. However, it appears that over the 1902-40 period there was an increase of more than 50 per cent in milk produced per person permanently employed.



For farming as a whole (including dairying), the figures in Table III indicate a rise of approximately 51 per cent in gross output per man since 1933. Excluding dairying, the rise in gross output per man over the rest of Australian agriculture was close to 60 per cent.<sup>17</sup>

Details of labour productivity trends in overseas dairying are difficult to obtain. However, the following reference provides a striking contrast to the Australian picture.

“In the last 20 years New Zealand’s total butterfat production increased by 40 per cent while *output per unit of labour nearly doubled* (author’s italics). The greater application of research, better ‘cowmanship’ and a continuation of work on artificial insemination will be essential to maintain progress at the rate of two-three per cent per year”.<sup>18</sup>

### Factors Limiting Progress

Here, it is not proposed to do more than to touch upon the main determinants of technological progress in primary industries, a subject that has already attracted a good deal of attention in recent years. Broadly speaking, progress depends upon the rate of discovery in agricultural research, and the rate of adoption of these discoveries on farms. With reference to these two factors, how has Australian dairying fared?

There are many others more competent to judge, but the writer’s opinion is that progress in the discovery of new techniques has contributed somewhat less to dairying than to most of our other primary industries. Dairying has benefited to some extent from myxomatosis, but wool-growing and fat-lamb raising have profited far more. Similarly, the most important developments in pasture improvement techniques over recent years have been of considerably more benefit in inland regions than in coastal dairying areas, especially northern dairying areas.

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<sup>17</sup> This estimate of 51 per cent for the increase in labour productivity in agriculture since 1933 is based on Census figures. A check is provided by using the Statistician’s annual series on *permanent* employment in agriculture. After deducting 8,567 male units from the labour figures for the 1932-34 period, to allow for an alteration in the series in 1936-37, it is estimated that permanent full-time employment in farming fell by 7.4 per cent between 1932-34 and 1953-54, whereas total employment based on Census figures, fell by 15.7 per cent. Consequently, output per male unit *permanently* employed shows an increase of only 37 per cent, compared with a figure of 51 per cent based on total employment. It could be alleged, from this disparity, that the estimated increase in productivity based on the Census figures is an over-estimate, on the grounds that the Census figures overstate the decline in the labour force. It might be argued that part-time family labour has become less important in farming but might still be included in Census figures to the same extent.

It does not appear necessary to concede this point. The “disparity” between the two estimates disappears if we assume a decline of 37 per cent over the period in casual and seasonal labour employed in agriculture. There is some reason for believing that a decline of this order did, in fact, occur.

<sup>18</sup> “Notes on Production and Trade”, *The Agricultural Review*, Vol. 2, No. 2 (July, 1956), p. 65.

There is also reason to believe that innovations are less quickly and less fully adopted in dairying than in most of our other primary industries. The rate of adoption of improved techniques depends not only on farmers' knowledge and attitudes, but on their possession of sufficient capital for farm investment. In the opinion of many, conservatism and inertia, ignorance of technical possibilities and unwillingness to use developmental credit (where available) is more marked in "marginal" dairying areas than in most other sectors of our agriculture. But of major importance is the fact that dairying is and has been a "Cinderella" industry, in which large-scale farm investment cannot be financed from current income. Inadequate farm size is probably an important contributing factor to low incomes and therefore under-investment.<sup>19</sup> Another point of some importance is that dairying experienced no post-war bonanza comparable to the boom in most other major primary industries, whereby capital was derived for much efficiency-improving investment.

It is widely recognised that dairying is probably the most under-capitalised of our major rural industries. It is less widely realised that the industry is over-manned. Using Cobb-Douglas production functions, Dillon has shown that in the Richmond-Tweed, an important dairying district in New South Wales, the marginal productivity of labour on the average farm (the returns to be expected from additional labour employed) was about one-half of the wage rate.<sup>20</sup> The annual return on additional operating capital, on the other hand, was close to 50 per cent. Similar results have been obtained for dairying on the Far South Coast. The Cobb-Douglas approach in this type of application has well-known limitations, but here, as in many other cases, it serves to verify broad conclusions based on other evidence.

### Measures to Increase Cows per Man

Gruen found that "differences in the number of cows looked after per farmer seemed to be the most important single factor in accounting for the wide variation in labour incomes which was found among survey farmers"<sup>21</sup>. The relationship between net incomes and yield per cow was found to be very tenuous. Although it is pointed out that this finding is not open to any simple interpretation, it does indicate the importance of the cow-man ratio.

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<sup>19</sup> See F. H. Gruen, "Incomes of Dairy Farmers in the Richmond-Tweed Region", this *Review*, Vol. 23, No. 3 (September, 1955) p. 205. Also *Costs, Incomes and Management Problems on Dairy Farms in Victoria* (1953 *Dairy Survey*) (Canberra; Bureau of Agricultural Economics, 1956) p. 2.

<sup>20</sup> J. L. Dillon, "Marginal Productivities of Resources in Two Farming Areas of N.S.W.", Economic Society of Australia and New Zealand (N.S.W. Branch) *Economic Monograph* No. 188 (May, 1956).

<sup>21</sup> F. H. Gruen, "Incomes of Dairy Farmers in the Richmond-Tweed Region", this *Review*, Vol. 23, No. 3 (September, 1955) p. 144.

Participating in a recent forum in Sydney with Professor Boutflour, who was stressing the importance of production per cow, D. S. M. Phillips of the Ruakura Research Station, New Zealand reported that "Some of the work we are doing at Ruakura suggests that, feeding grass entirely, with no concentrates and little crop . . . it appears to be better to feed more cows at a low level than fewer at a high level"<sup>22</sup>.

In the past, the emphasis in dairying research and extension in Australia has been on increasing yields per cow. That cow yields are of considerable importance is hardly open to debate, but it might be nevertheless true that increasing the number of cows handled per man is a rather under-rated method of progress.

This is hardly surprising. To the dairy husbandryman, the fact that a cow is yielding less than its maximum appears as so much wasted potential. And the conservationist is anxious that over-stocking should not result in a long-run depletion of "soil capital". Yet there is a sense in which a cow can be over-fed well before it reaches its maximum milk yield—over-fed in relation to a fixed quantity of feed available and the alternative of distributing that feed amongst more cows.

The relationship between feed intake and milk yield follows the law of diminishing returns. As a cow consumes more feed above the ration necessary for body maintenance—about eight lb. of total digestible nutrients (T.D.N.) per day, the response, in terms of milk yield, falls off. The stage is eventually reached where for example, an additional half lb. of T.D.N. per cow per day consumed by say 30 cows, will yield less milk than would result from the addition of another cow to the herd consuming 15 lb. of T.D.N. per day, even after allowing for the fact that the first eight lb. or so of T.D.N. consumed by the extra cow yields no return.

However, there will be additional costs involved, such as in breeding or purchasing, and in milking the extra cow. This is one of the two major factors operating in the opposite direction to the law of diminishing (physical) returns. Milking labour per unit of output is minimised (not necessarily "economised") by handling less, but higher-yielding cows. The other major factor is the feed "overhead" (body maintenance ration) demanded by each cow before yield commences.

The data is not available for Australian conditions, to determine whether there are many farms where "over-feeding", in this specialised sense, is practised. Certainly, over-feeding in the more general sense of additional feed costs exceeding additional returns, is rare. In fact, it is generally held that under-feeding is a serious problem. However, there are probably many farms where an increase in the feed supply through, say improved pasture, could be better exploited by aiming at higher stocking rates rather than higher yields. The point is worth raising that on such farms, an indiscriminate pursuit of "blue ribbon" yields, coupled with a disinclination to incur additional labour costs, might not be economic.

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<sup>22</sup> *Report of Proceedings of the Milky Way Convention and Exhibition, 1955*, (Sydney; N.S.W. Milk Board, 1955) p. 87.

However, this is not the main point to be made in this connection. On a majority of our problem farms, the choice is not between apportioning an increase in the feed supply between the two alternatives of more cows or higher yields. Rather, it is a question of finding the means to do either, or perhaps more commonly, a little of both. The common problem in "marginal" dairying areas is to achieve a not-too-costly increase in the feed supply in order to carry safely more higher-yielding cows. Frequently, an associated problem is to provide the labour necessary to handle the additional cows as well as to grow the increased feed (to be economic, the additional feed must usually be produced on the farm). The contemplated increase in output seldom justifies an additional permanent hand, and suitable part-time labour often is not available when required. The happiest solution is, of course, an increase in labour efficiency—a higher cow-man ratio.

It is not proposed in this article to discuss the problems of providing the additional feed, which seems to be the more common limiting factor. Apart from increasing the size of the farm, the main avenues here are pasture improvement, irrigation, rotational grazing and subdivision, fodder crops, and the conservation of seasonal feed surpluses. To date, these methods have monopolised attention, and will continue to do so, since there are many answers yet to be found. They will almost certainly be the main avenues of progress. In the meantime, it might be profitable to give some consideration to the relatively neglected aspect of labour efficiency. With additional feed available, labour would become the main limiting factor on many farms.

Apart from the contributions of farm machinery firms, there has been little progress in this field as far as dairying is concerned. In the United States, "farm work simplification" has attracted some attention in recent years. This subject is the counterpart of what is termed "methods engineering" in industry, and aims primarily at saving labour. It involves detailed analysis of routine jobs in relation to such things as the type and positioning of equipment, and the movements and effort involved in packing, processing and transport. Time and motion studies have moved from the factory to the farm, to study the elements of picking operations, the design and placement of feeding and watering facilities, and barn lay-out. It would appear that this type of investigation might uncover important labour economies in an industry like dairying, where much of the work is of a routine nature. Of course, a good deal in this direction can be done by the farmer himself, if he is critically "labour-conscious".

Some farmers have more success than others in reducing milking time by the careful training of their cows to induce quick let-down and reduce handling. The adoption of machine stripping on many New South Wales farms over recent years has resulted in some reductions in milking times, though hand-stripping is still practised in some circumstances. In the field of shed and bail design, Phillips claims that the "herringbone" race-bail system can increase milking efficiency to 80 cows per man-hour compared with 30 cows per man-hour with the "tandem" system, 48 cows with the common "single bail walk-through" type and 64 with the "double bail walk-through" system.<sup>23</sup> Bulk handling of milk on the farm through

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<sup>23</sup> *Ibid.*, p. 58.

the use of farm refrigeration and road tankers could be one important source of labour-saving in some dairying areas, as could elevated bails. There has been no significant advance in the principles of operation of the milking machine in Australia since its inception, and it is possible that there are significant potential labour economies in this direction. Phillips claims that the use of a well-designed sight glass (a recent innovation) could reduce milking time by one-half in many sheds.<sup>24</sup> In aggregate, these factors offer the opportunity for a dramatic improvement in efficiency. The detailed examination of these and many other possible sources of labour economies, and the wide publication of results would be very valuable.

On dairy farms, there appear to be economies of scale in labour costs. The report on New South Wales following the 1953 Dairy Cost Survey states "The evidence . . . suggests that the efficiency of use of the resources available on the farm—the labour force, the cows, the plant and the land—tended to increase as the scale of operations on the farm increased".<sup>25</sup>

Calculations based on Table VI of that report show that the cow-man ratio on large farms (production over 15,000 lb. commercial butter per annum, average cow numbers 103) was 45, compared with 22 cows per man on the smaller farms (production less than 5,000 lb. commercial butter per annum, average cow numbers 31). The improvement in the cow-man ratio was consistent through the range of farm size.<sup>26</sup> The survey results for Victoria published by the Bureau of Agricultural Economics illustrate the same point.<sup>27</sup> Here, the cow-man ratio improved from 16 to 35 over the same (production) size ranges, whilst production per cow rose consistently from 181 lb. to 279 lb. of commercial butter. Even allowing for a certain amount of under-employment on some of the smaller farms, these apparent economies of scale are striking.

Some of the reasons for labour economy on large dairy farms are fairly obvious. Labour generally has the assistance of larger, more expensive and more efficient machinery and equipment on the larger farms—machinery and equipment that could not be used to capacity on small properties. In addition, some farm jobs are in the nature of a "labour overhead", in that the time involved is not significantly increased even if cow numbers are doubled. (For instance, the twice daily movement of stock and the servicing of plant and equipment). Where more labour is employed there is greater scope for specialisation and division of labour. This allows for the development of a higher degree of skill in routine jobs, and considerably reduces the time lost in changing from job to job, especially where the preparation and movement of machinery and equipment is involved.

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<sup>24</sup> *Ibid.*, p. 57.

<sup>25</sup> "The Cost Structure and Management Problems of the Dairying Industry in New South Wales", *op. cit.*, p. 134.

<sup>26</sup> We cannot ascribe the whole of this difference to economies of scale. For one reason, the harder-working farmers and those who were naturally more efficient in labour management would have larger herds.

<sup>27</sup> *Ibid.*, p. 47.

#### 4. MARKETING.

##### The Marketing System

The historical evolution of the dairying industry's highly organised marketing system and a detailed description of the existing framework, are subjects which have been dealt with elsewhere.<sup>27</sup> For present purposes, a brief description of the existing position will suffice.

Under the Equalisation Scheme, which commenced in 1934, returns for butter and cheese from the local and export markets are pooled, the local price normally being set at a level considerably higher than export values. Superimposed on this system have been two Government-sponsored Stabilisation Schemes covering butter and cheese. Under the current Scheme (1952-57), a price is guaranteed to dairymen for all factory butter and cheese produced, plus 20 per cent. Thus a substantial proportion of exports, close to 50 per cent of butter exports in a normal season, is covered by the price guarantee. "Losses" on guaranteed exports (i.e., the extent to which export returns fall short of the guaranteed price) are met by Commonwealth Government subsidy.<sup>28</sup> Losses on unguaranteed exports are met by producers, being reflected in the average price paid to factories by the Commonwealth Dairy Produce Equalisation Committee Ltd. Subsidy is also paid on locally consumed butter and cheese, though at a diminishing rate over recent years, as retail prices have been raised. The guaranteed price is determined annually on the recommendations of the Dairying Industry Investigation Committee, which takes evidence on movements in production costs, demand and other factors.

Casein is subject to an equalisation scheme, but not condensed and powdered milk and other milk products. Fresh milk is marketed under varying State legislation by statutory milk boards. These boards possess vesting powers enabling them to set prices for fresh milk independent of and higher than the prices paid to producers for milk for processing.

##### Overseas Trends

No detailed review of developments in the overseas market for Australian dairy products is here attempted, but the main trends which appear to have particular relevance to the future will be briefly mentioned.

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<sup>27</sup> See a series of annual reports entitled *The Dairy Situation*, published by The Commonwealth Bureau of Agricultural Economics, Canberra. Also—A. G. Lloyd "The Marketing of Dairy Produce in Australia", this *Review*, Vol. 18, No. 1 (March, 1950).

A. G. Lloyd "The Marketing of Milk in New South Wales", this *Review*, Vol. 18, No. 3 (September, 1950).

A. G. Lloyd "Table Margarine in Australia", this *Review*, Vol. 19, No. 1 (March, 1951).

A. G. Lloyd "Competition Between Table Margarine and Butter", this *Review*, Vol. 24, No. 1 (March, 1956).

<sup>28</sup> To a very limited extent, losses are also met from the Dairying Industry Stabilisation Fund, set up in 1947.

One major development is the diminishing importance of the export market to Australian dairying. In the three immediate pre-war years, exports of dairy produce in all forms (mainly butter) absorbed 40 per cent of Australia's milk output, compared with 25 per cent over the past five seasons (1951-52 to 1955-56). This trend is largely a result of Australia's increased population. The effect of this reduced dependence on unprofitable exports is to raise the return to the producer and/or reduce the burden imposed on Australian consumers of butter and cheese.

The disparity between local and export returns for butter and cheese is a measure of the artificial assistance obtained by the industry through the operation of the home-consumption price system. This disparity has increased rather than diminished since the immediate pre-war years. In 1934, when the Equalisation Scheme commenced, the local butter price was raised to 70 per cent above export parity. However, this abnormal position was purely temporary, and from 1935 to 1939 the local price averaged 23 per cent higher than export parity.

During the immediate post-war years, when there was a serious world shortage of fats and oils, overseas returns were considerably higher than local prices, and that part of the export price in excess of the guaranteed return to dairymen was paid into a Stabilisation Fund to help meet possible future losses on exports. As the world market reverted to normal, the pre-war situation returned. In 1951-52, the local butter price was approximately 19 per cent higher than export parity.<sup>29</sup> Since 1952, the local price has been set at an average of nearly 30 per cent above export parity.

As far as the overseas demand for butter is concerned, long-term trends are not re-assuring. Comparing 1938 and 1954, "world" exports fell by 30 per cent, largely as a result of reduced consumption in the major importing countries, principally the United Kingdom.<sup>30</sup>

Increased consumption of margarine in importing countries accounts for most of the fall in butter consumption. In most important consuming countries, the price of margarine relative to butter has fallen since the thirties and, by all reports, its quality has improved. As a result, margarine has displaced butter on a large scale, and this trend is generally expected to continue.

Consumption of margarine as a table fat is closely related to income levels, and leaders of the dairying industry are hopeful that rising living standards overseas will retard this trend.

However, this relationship between incomes and margarine consumption is based on existing quality differences and subjective quality preferences, both of which may change. Consumption trends in the more prosperous countries where living standards have risen appreciably since pre-war give the dairying industry no cause for optimism.

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<sup>29</sup> These percentage figures for post-war are based on a comparison of f.o.b. export prices with the aggregate of the guaranteed price to farmers, average factory costs and f.o.b. costs. A comparison of retail prices and export prices is misleading because of the use of consumer subsidies to reduce retail prices over the post-war years.

<sup>30</sup> "World" exports here means the total of exports from the principal exporting countries, as reported in *Dairy Produce* (Commonwealth Economic Committee, London, 1955) pp. 26-27.

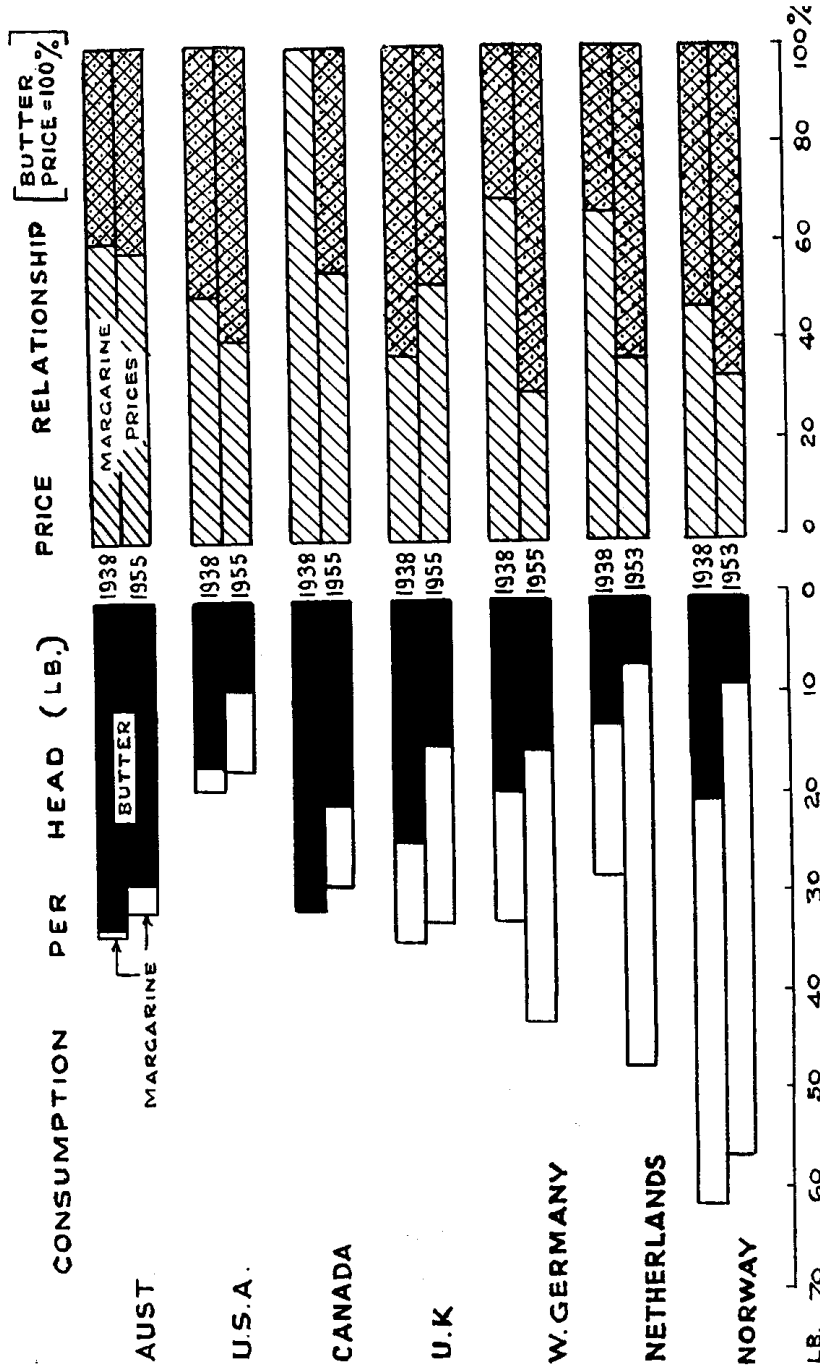


Fig. 1.—Trends in Consumption and Relative Prices — Butter and Margarine  
 Source.—Figures obtained from, 1. Commonwealth Economic Committee, *Intelligence Bulletin*, Vol. VIII, No. 12 (May, 1956) page 23. 2. H. Gollnick, "Langfristige Tendenzen der Butternachfrage", *Agrarwirtschaft*, Vol. 3, No. 11, (November, 1954) page 331.



A possibility not generally appreciated, is that the per capita demand for table fats may fall at high levels of income. Of the seven countries listed in Figure 1, five show a fall in the combined consumption of margarine and butter per head since pre-war. However, one would not expect rising incomes to have this effect in countries where real incomes per head are low.

### The Domestic Market

The three main trends to consider on the local market are increasing population; increasing competition from margarine; and trends in consumption per head of butter, fresh milk and other dairy products.

(i) Australia's rapidly increasing population dwarfs all other trends in its effect on the domestic market for dairy produce. Of course, virtually all Australian industries receive benefit from the expansion of their domestic market, but this is particularly important for dairying, because increased population means that a higher proportion of output is sold on the much more remunerative local market. In the present situation, each increase of one million in population increases the equalised return for butter by nearly two per cent—a considerable amount over a long term.

Over the past six years Australia's population has increased at an average rate of 212,000 per annum, partly as a result of immigration. The rate of natural increase of population rose from 112,000 per annum to approximately 127,000 per annum over this period and an assumption of an annual population increase averaging 200,000 per annum for some time to come would not appear unreasonable, unless migration is drastically reduced.

(ii) The increased competition from table margarine on the local market over recent years is reflected in the figures shown in Table IV. Protective quota legislation limits the production of table margarine in every State, the total of current quotas being approximately 16,000 tons. Although butter consumption has fallen by 3.1 lb. per head (ten per cent) since 1951-52, probably only one-quarter of this decline can be ascribed to increased consumption of margarine. Table margarine consumption has increased by 1.8 lb. per head per annum over this period, but at most only 0.9 lb. of the increase would have displaced butter.<sup>31</sup>

In the absence of protective legislation, at what rate would table margarine displace butter on the local market? On overseas experience it would appear unlikely that margarine consumption in Australia would expand faster than 2,400 tons per annum (0.5 lb. per head), about one-half of which might displace butter.<sup>32</sup> Since an annual increase in population would add an estimated 2,500 tons a year to the local butter market, margarine would be taking about one-half of that increase. Since 1951, table margarine consumption has risen at an average rate of approximately 2,000 tons per annum (0.5 lb. per head).

<sup>31</sup> On the basis of market research surveys, which provide figures on purposes for which table margarine is used, it has been assumed that *no more than* 50 per cent of margarine consumed displaces butter. This is a limiting assumption—the error could be considerable but is almost certainly in the direction of an overstatement of displacement.

<sup>32</sup> For a fuller discussion of these estimates see A. G. Lloyd, "Competition Between Table Margarine and Butter", this *Review*, Vol. 24 No. 1 (March, 1956).

(iii) Apart from competition from margarine, *per capita* consumption of butter, and other dairy produce, will be determined largely by retail prices and income levels.

Butter consumption is not generally considered to be very sensitive to price, but the fact remains that between 1951-52 and 1952-53 a 40 per cent rise in the retail price (Australian average) was followed by a fall in demand of approximately 4 lb. per head (12 per cent). Only a small part, at the most, one-tenth of this fall in butter consumption could be attributed to increased consumption of margarine.

Between 1954-55 and 1955-56 a seven per cent rise in the retail price of butter was followed by a fall of 2.2 lb. per head (seven per cent) in consumption. Increased competition from margarine was probably responsible for only 0.3 lb. of this fall, and it is rather difficult to explain this sharp reduction in demand in terms of such a small rise in price (3½d. per lb.). If future price rises, resulting from cost increases or subsidy reductions, provoke such a sharp consumer response, it will indicate that the industry is approaching the limit in its exploitation of the home-consumption price system.

As far as butter is concerned, improved farm efficiency may make possible a reduction in the retail price, and thus stimulate consumption; on the other hand, the consumer subsidy on butter, a survival from wartime controls, can hardly be regarded as permanent. The elimination of the subsidy on the local market would currently raise the retail price by approximately 7½d. per lb., to 5s. 2½d. (N.S.W. price). A significant increase in *per capita* butter consumption as a result of higher incomes can hardly be relied upon. Thus there appears to be no compelling reason to expect higher incomes or possible reductions in the retail price to offset the potential threat from margarine.

TABLE IV  
*Consumption of Dairy Products—Australia*

Year Ended June—	Milk and Milk Products other than Butter		Butter		Table Margarine		Margarine Price as a Percentage of Butter Price (N.S.W.)
	Per Head	Total	Per Head	Total	Per Head	Total	
	Gallons	Million Gallons	lb.	'000 tons	lb.	'000 tons	Per cent
Av. 1937-39 ...	31.7	219	32.9	101	0.9	2.8	61
1950 ...	42.0	338	25.3*	91*	0.7	2.6	82
1951 ...	42.4	352	30.9	115	0.5	1.7	84
1952 ...	40.8	348	31.2†	119†	1.2	4.7	76
1953 ...	38.4	335	29.4	115	1.6	6.2	61
1954 ...	40.6	361	30.6	122	2.4	9.6	61
1955‡	38.9	354	30.3	123	2.4	9.7	64
1956§	41.0	382	28.1	117	2.9	11.9	59

\* Butter rationing in Australia ended in June, 1950.

† The demand for butter in 1951-52 was probably as high as 33.5 lb. per head,—considerably higher than the actual consumption, since there was a serious shortage of butter in New South Wales in that year.

‡ Subject to Revision.

§ Based on preliminary figures for the first ten months.

Source.—Commonwealth Bureau of Census and Statistics.

There is more reason to hope for an increase in consumption per head of dairy products other than butter, which make up 40 per cent of local sales, in terms of milk. Fresh milk is by far the most important outlet within this group, with cheese, condensery products and cream following in that order. Over the past 40 years, per capita consumption of dairy produce other than butter has increased by approximately 50 per cent in the United States, though it should be remembered that new outlets have been developed in this period (e.g., processed milks).

In Australia, fresh milk consumption has shown a steady rise since the war, and consumption per head is now approximately 23 per cent above the pre-war level. (The trend towards a higher proportion of domestic consumption taking the form of fresh milk will tend to increase the average price to producers). Per capita consumption of cheese and processed milk products has also risen considerably since pre-war, and in total, consumption per head of dairy products other than butter has increased by 30 per cent since the late thirties. However, it would be unwise to project this considerable trend, since there has been no rise in per capita consumption since 1950 (see Table IV). A future rise in consumption per head averaging one per cent per annum, is perhaps the most that can be expected for this group of products. This would be slightly less than the rate of growth of real incomes per head in Australia since the immediate post-war years.

### Projected Trends

Having assembled these trends it is rather tempting to put them together to see the net result, even though it has been well demonstrated in the past that economic forecasting of this nature is seldom a profitable occupation. This has been done in Table V, which should be construed as showing what would happen if the following assumptions, based on the trends discussed, were fulfilled over the next ten years.

TABLE V  
*Possible Future Utilisation of Milk—Australia*  
(million gallons)

	1955-56 "Normal"	1965-66	
		Assumption (a)	Assumption (b)
Production ... ..	1,300*	1,430	1,430
Domestic Consumption—			
As Butter ... ..	546	648	601
As Other Forms ... ..	382	451	451
Total ... ..	928	1,158	1,111
Exports ... ..	370	272	319
Percentage Exported ... ..	29	19	22

\* To use the 1955-56 figure for milk production (over 1,400 million gallons) would be misleading, since it exceeds the record production of the previous year by over 6 per cent. Seasonal conditions somewhat less favourable than those experienced in 1954-55 and 1955-56 can be expected in the future, and a figure of 1,300 million gallons is probably more realistic.

(1) As far as milk production is concerned, it would be rather too ambitious to attempt a forecast of cow numbers, but there is some justification for forecasting higher yields per cow. It has been assumed that a rise of ten per cent in the average yield per cow be achieved over the next ten years—a rate of progress equal to that of the post-war years, allowing for seasonal conditions.

(2) It has also been assumed that Australia's population will rise at an average rate of 200,000 per annum.

(3) It has been assumed that per capita butter consumption will not vary considerably from the 1955-56 level, except insofar as it is affected by increased consumption of margarine. Two alternative assumptions have been made about margarine consumption:—

(a) That it will stabilise at the maximum per capita level permitted by current quotas (3.8 lb. per annum).

(b) That it will rise at an average annual rate of 0.5 lb. per head, thus displacing 0.25 lb. of butter annually.

(4) The perhaps over-optimistic assumption has been made that per capita consumption of other dairy produce, in terms of whole milk, will rise by ten per cent over the ten year period.

On these figures, a considerable rise in domestic consumption can be expected, despite the possibility of a fall in the per capita consumption of butter. Unless cow numbers increase considerably, this should more than outweigh increased milk production, and the trend towards less dependence on unprofitable export outlets should continue.

## APPENDIX

### Difficulties of Measurement

The census figures do not include labour used in sideline dairying, but do include labour absorbed by other sidelines on dairy farms. There is no alternative but to assume that the resultant error is fairly constant over time.

However, in the case of New South Wales, if not for other States, there is at least one good reason for believing that the proportion of milk output contributed by sideline dairying has declined. Since the early thirties, a sharp decline has occurred in the milk production of inland areas of New South Wales. During the depression years many inland farms, particularly in wheat areas, adopted dairying as a sideline to supplement falling incomes, and discontinued dairying prior to or during the war years.<sup>88</sup>

Few, if any of these farmers would have classified themselves as "dairymen" in the 1933 Census, which therefore understated employment in the dairying industry relative to later years. Since the number

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<sup>88</sup> See F. H. Gruen, "Trends in Dairying in New South Wales", *Agricultural Gazette of New South Wales*, Vol. 63, Part 3 (March, 1952).

of cows on these farms and their milk output are included perforce in dairying statistics, but the labour involved is omitted, figures derived from the 1933 Census overstate production per man and cows per man relative to later years. To what extent does this factor explain the apparent lack of progress in production per cow and cows handled per man in Australian dairying since 1933?

No precise measurement of this error is possible, but we can estimate its maximum, though only for New South Wales. The figures in brackets in Table I are those obtained after making the *maximum* possible allowance for this error.

A series exists over the years 1933-46 showing a classification of New South Wales farms by type, and reveals that in 1933 there were 1,478 farms outside coastal divisions classified as "dairying only". Making reasonable assumptions about cows per farm on these specialist farms, and assuming that only ten per cent of the balance of cows in inland areas were on farms classified under dairying in the Census, it can be estimated that, in inland areas a maximum of 62 per cent of cows-in-milk (and therefore of inland milk production) can be ascribed to farms not classified as "dairying" in the Census. In 1933, inland Divisions provided 17.9 per cent of the State's milk production (with 21.4 per cent of the State's cows-in-milk) so that we can estimate that 11.1 per cent (62 per cent of 17.9 per cent) of the State's milk output came from those farms. Thus, cows per man and yield per man for 1933 could be overstated by a maximum of 11.1 per cent.

In 1946, inland farms carried 15.4 per cent of the State's cows-in-milk, from which it is estimated that inland divisions produced 12.9 per cent of the State's milk output. The number of specialist dairy farms in inland areas had fallen to 1,082 by 1946. Making similar adjustments, it can be estimated that inland farms not included as dairy farms in the 1947 Census carried 58 per cent of inland cows-in-milk, and therefore produced about 7.5 per cent of the State's milk output. This correction factor has been applied to the 1947 figures, and also, in the absence of later statistics, to the 1954 figures. Although the drift away from sideline dairying in inland areas *may* have continued after 1947, this possibility receives no support from the fact that the proportion of the State's milk output coming from inland areas increased between 1947 and 1954 to about 14.6 per cent.

The error for Australian dairying may have been greater or less than for New South Wales (the latter seems more likely) but it is worth noting that applying the *maximum* correction factor for New South Wales to the Australian figures or to the Victorian and Queensland figures separately still does not provide statistics indicating any significant progress in production per man or in cows per man since 1933.<sup>84</sup>

<sup>84</sup> This error is likely to be at its maximum for Queensland figures, where a great deal of milk is produced on mixed farms. If we assume that output per man is overstated by as much as 35 per cent in the 1931-35 period, and that a possible decline in sideline dairying and an increase in dairying sidelines in Queensland reduced this overstatement to only 10 per cent for the 1952-56 period, the figures thus corrected would still show a fall in output per man.

Comparison of results over the three four-year periods also involves consideration of seasonal conditions. From this viewpoint too, the figures in Table I overstate rather than understate the progress in yield per cow and yield per man since 1933 and 1947, particularly in New South Wales and Victoria. In these two States seasonal conditions over the past four years have been far more favourable than in the 1931-35 and 1945-49 periods, even allowing for the effects of floods in some New South Wales dairying areas. For example, if the 1951-55 period were taken for New South Wales, instead of 1952-56, the average yield per cow and per man would be reduced by eight per cent.

Another possible source of error is the replacement of unpaid part-time family labour with hired labour, since the thirties. Since much of the former category is not included in Census figures, this would result in a misleading increase in the labour figures. However, this is unlikely to be important. The figures for 1954 are not yet available, but hired labour fell from 27,507 in 1933 to 24,509 in 1947.

To the extent that part-time, family labour has been replaced by full-time family labour included in the census collection, the census figures can be misleading. This point is discussed within the article.