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THE MARKETING OF MILK IN NEW SOUTH WALES

by

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1. DEVELOPMENTS IN SYDNEY'S MILK MARKETING.
2. THE MILK PRICE SPREAD.
3. THE SUPPLY PROBLEM.
4. INCENTIVES FOR WINTER PRODUCTION.
5. THE PRODUCER'S RESPONSE TO PRICE.
6. PRODUCTION METHODS IN THE MILK ZONE AND AVENUES OF INCREASED PRODUCTION.
7. COSTS OF PRODUCTION.
8. FREIGHT COSTS.
9. FACTORS CONDUCIVE TO CONTROL OF MILK PRICES.
10. MULTIPLE PRICE SYSTEMS FOR MILK.
    (*a*) Quota Schemes.
    (*b*) Pooling Schemes.
    (*c*) Seasonal Differentials.
11. ALTERNATIVE METHODS OF OVERCOMING THE SUPPLY PROBLEM.
12. RETAIL DISTRIBUTION.
13. STANDARDISATION OF MILK AND BUTTER-FAT DIFFERENTIALS.

Liquid milk is becoming an increasingly important source of income to the Australian dairy farmer. No survey of marketing in relation to the Australian dairying industry would be complete without an examination of the liquid milk market[1].

In most Australian capital cities, boards have been established to administer the distribution of milk supplies. The particular focus in this study is upon controlled milk marketing in the State of New South Wales. At the same time, the questions discussed within this framework have much wider reference. The problems of milk marketing, especially that of the seasonality of supplies, have much in common the world over.

The discussion of the contemporary economic problems encountered in the Sydney Milk Zone is supplemented by reference to alternative administrative techniques used in other countries. An effort has been made to point out any adaptations of these techniques which would be required if they were adopted locally.

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[1] This article is essentially an extension of the study of the marketing of butter and cheese already published. See Alan G. Lloyd, "The Marketing of Dairy Produce in Australia," *Review of Marketing and Agricultural Economics*, Vol. 18, No. 1 (March, 1950), pp. 6-93.

1. DEVELOPMENTS IN SYDNEY'S MILK MARKETING.

Pre-Control Days.

Prior to the Milk Acts of 1929 and 1931, there were three legislative measures governing the production and distribution of milk and other dairy produce for human consumption. These were:

(1) The Dairies Supervision Act of 1901—a consolidating measure which replaced a statute passed in 1886.

(2) The Pure Food Act of 1908.

(3) The Dairy Industry Act of 1915.

The 1901 Act provided for the registration af all dairymen, milk vendors and dairy premises. Duties of registration and inspection were vested in the local authorities. The administration of the Act was supervised by a staff of inspectors attached to the Board of Health. Under the Act, dairy premises were subject to inspection at all reasonable times.

The 1908 Act, *inter alia,* prescribed standards for the purity and quality of foods, and, in the case of milk, prescribed certain standards concerning the amount of solids-not-fat and milk-fat contained in the milk.

The 1915 Act is concerned with manufactured dairy produce, requiring the registration of factories, testing and grading of cream, etc.

The Dairies Supervision Act of 1901 left much to be desired in the marketing of liquid milk. Only inadequate measures were available to prevent the distribution of tuberculosis and low quality milk. Poor grading, ineffective pasteurisation and old supplies were other inadequacies in the marketing system.

Special legislation for the Sydney supply had been advocated for many years before the first control measure was passed in 1929. In 1913 a Royal Commission exposed the inadequacy of inspection as then organised[2]. In 1923 the New South Wales Board of Trade, after an investigation, recommended a re-organisation of the milk industry, with control of the Metropolitan milk supply vested in a central authority[3].

The fact that some fifty-nine local councils in the Metropolitan area were responsible for registration and inspection inevitably meant differing standards for dairy buildings and equipment, milk delivery vehicles and methods of transport. There was little effective control over the numbers and types of persons registered as dairymen and milk vendors.

The Health Department reported in 1926 that only one out of thirteen "flash" pasteurising plants had a recording thermometer[4]. The same report stated that, in the case of milk produced in the country, quite a long period elapsed between the time the milk left the udder and its delivery to the consumer. In some cases the time elapsing was found

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[2] Royal Commission of Inquiry as to Food Supplies and Prices, Report on the Supply and Distribution of Milk, Sydney, 1914.

[3] N.S.W. Board of Trade, *Interim Report upon the Conditions of Production and Distribution of Certain Foodstuffs,* Sydney, 1923.

[4] Report of the Producers' and Consumers' Conference held at Bathurst, September, 1926, p. 98.

to be as much as five days. It was also found that the bottled milk supply, as then organised, could not be regarded as possessing much, if any advantage over the general supply from the viewpoint of quality.

Milk from the country was handled for the most part by distributing companies, who took delivery from producers at country railway stations. According to the New South Wales Year Book the average time between milking and arrival in Sydney was between sixteen and twenty-four hours[5]. Milk from the Metropolitan dairies was distributed directly to consumers within a few hours of milking. Immediately prior to the enactment in 1929 of the Metropolitan Milk Act, approximately one-third of the Sydney milk supply was derived from Metropolitan dairies. However, the proportion of supply from this source has decreased considerably as the pressure of population has increased, until in 1949-50, only about eight per cent. of Sydney's milk supply was derived from dairymen-vendors.

Prices in pre-control days were fixed by agreement between producers' associations and the distributing companies, but as deductions were sometimes made on various counts, and gallonage sometimes computed over-generously (in terms of lbs. of milk to the gallon), these price agreements were nominal only[6].

The 1926 Bathurst Conference.

In September, 1926, the First Producers' and Consumers' Conference was held at Bathurst under the presidency of the Minister for Lands, the Hon. P. F. Loughlin, M.L.A. This conference was hailed, in the presidential address, as "the direct approach to marketing problems bringing producers and consumers together rather than a commission or board of inquiry."

In relation to milk, it was indicated by the president that the main concern was with the high costs of distribution. Out of the £2,200,000 paid by consumers for milk in 1925-26, it was reported that the wholesaler took £416,666, the retailer £883,353 and the farmer £800,000. Pasteurisation, freight, etc., absorbed approximately £100,000[7].

In the same address the introduction of retail zoning was foreshadowed. The president decried "the spectacle of a dozen milkmen distributing milk within perhaps a radius of 50 yards, one man going over another's tracks."[8]

The Producers' Milk Committee at the Conference recommended that the Government be asked to create a Board to control the collection of milk in the country and its distribution in the metropolitan area. The Board was to consist of producers' and consumers' representatives, with a majority of the former. The Committee advocated that the Board should have the power to license producers and distributors, fix prices and marketing margins and allocate "blocks" (exclusive areas) for collection and retail distribution.

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[5] Bureau of Statistics and Economics, *The Official Year Book of N.S.W.*, 1928-29, p. 746.

[6] Lengyel and Beecroft, *The Cost of Distribution* (Melbourne: Melbourne University Press, 1949), Part II, p. 14.

[7] Report of the Producers' and Consumers' Conference, 1926, *op. cit.*, p. 9.

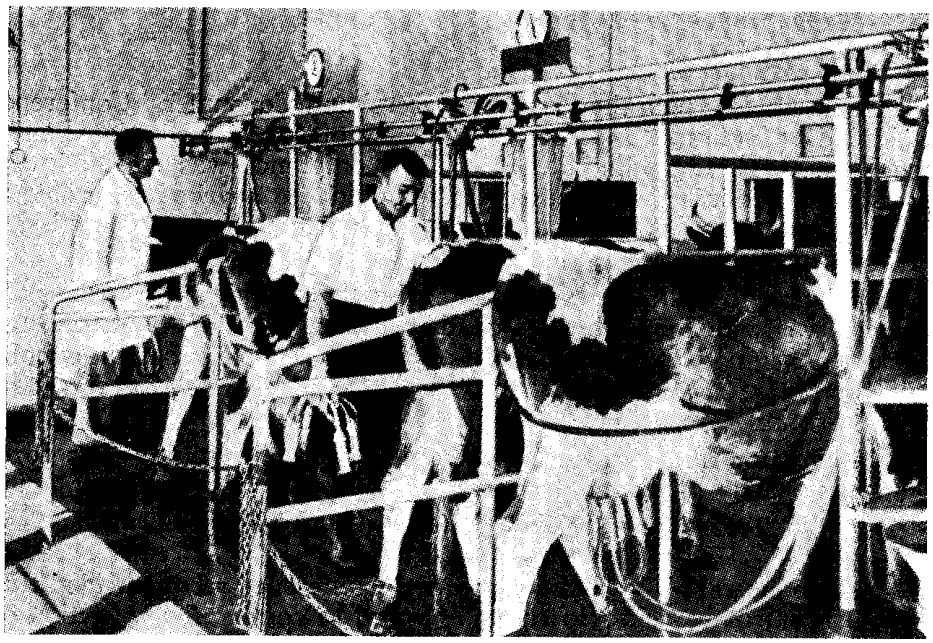
[8] *Ibid.*, p. 11.

The Consumers' Committee also supported the idea of a central authority to control milk marketing and the suggestion of block distribution.

After the Bathurst Conference, a bill for the regulation and control of the metropolitan supply was submitted to the State Parliament in 1927, but did not become law, as the session ended before it had been fully considered by the Legislative Council.

The First Milk Board, 1929.

The Board consisted of nine members, four elected members representing the producers, and five appointed members made up of a chairman, two consumers' representatives and two advisory non-voting representatives of distributors. The functions of the Board were to register and supervise all dairy farmers and traders associated with the metropolitan supply; to establish grades of milk; to fix minimum prices to farmers and maximum wholesale and retail prices; and to supervise premises, equipment and methods used in connection with the production and distribution of milk. One of its powers, not possessed



The Milking Bails in a Modern Dairy.
Milk Board regulations prescribe standards for the construction and maintenance of dairy facilities.

by previous licensing authorities, was the power to cancel a registration in the event of two or more convictions under any of the three controlling Acts.

The Metropolitan Milk Act commenced on 31st January, 1930, and the full Board was constituted on 12th May, 1930.

The "Milk War."

At this time the depression of the 'thirties was beginning to make itself felt in a steep decline in milk consumption. Competition in the retail market became very intense and there was a sharp downward trend in the prices paid to farmers.

The Milk Board attempted to halt this downward trend simply by fixing prices, but the price fixation of August, 1930, was quite ineffective. The metropolitan distributing companies adopted the expedient of not purchasing milk, but receiving it from dairymen as agents only, the milk to be disposed of "to best advantage." Prosecutions against distributing companies for paying dairymen less than the minimum price failed, and it was obvious that the price-fixing provisions of the 1929 Act were useless.

In the following period, known now as the "Milk War," prices to producers declined rapidly, as is shown in Table I.

TABLE I.

Prices Paid to Producers, 1930 *to* 1932.

Month.	Price. Pence per gallon.
November, 1930	10
December, 1930	10½
January, 1931	10
February, 1931	9
March, 1931	9
April, 1931	6½
May, 1931	5
June, 1931	8
July, 1931	8
August, 1931	7½
September, 1931	9
October, 1931	9
November, 1931	9
December, 1931	6½
January, 1932	6½
February, 1932	6½

Source:—Report under the Milk (Investigation) Act, 1936, Sydney, 1937.

Retail prices varied widely between suburbs during this period. Some regular vendors charged the "fixed" price of 8½d. per quart at some periods, whilst in districts where many so-called "hawkers" operated, the retail prices fell at times to as low as 4d. per quart. The vendors' margin fell so low in many cases as to make it impossible to provide for proper conditions of distribution. The operations of many unregistered traders also made the policing of hygiene regulations difficult, and the quality of the milk supply is reported to have deteriorated.

Until this time, the local authorities had made no attempt to limit the number of vendors registered under the Dairies Supervision Act. Many of those displaced from their normal employment in the early 'thirties entered the retail milk trade. According to the first Milk Board, "the effect of the entry of these persons into a branch of the industry already over-manned and over-capitalised in relation to a reduced turnover, was to displace men employed under normal industrial conditions, and to intensify the indiscriminate competition which was a prime cause of the collapse in farmers' prices."[9]

[9] The Metropolitan Milk Board. *Annual Report*, 30th June, 1931.

The extent to which farmers' prices could have been kept at artificially high levels in a period of depression without a very drastic reduction in demand is debatable, though demand for milk seems to be relatively inelastic. Nevertheless, the price-cutting which occurred in the retail milk industry following upon the influx of vendors had many undesirable and inequitable features.

To a large extent, much of the price-cutting was only apparent in that it was associated with reduction of the quality of milk. To become an unregistered vendor, untrammelled by the regulations accompanying registration, required very little capital, and even the smallest return was acceptable to many who would otherwise have been unemployed. Vendors who had built up businesses at the cost of much capital were forced to cut prices in competition with the new arrivals. As in many other depressed industries, excess capacity of plant, labour, etc., was very evident in milk retailing, especially amongst the established pre-depression vendors.

> Vendors whose businesses had been developed over a number of years and who, as employers, were bound by the provisions of industrial awards, found themselves at a serious disadvantage with competitors who were not employers of labour and who were able to trade without regard to industrial award conditions. These latter were 'hawking' milk around the city and suburbs at all hours in an endeavour to attract trade from established vendors who were bound to observe the hours of work prescribed by the awards for their employees. Much of the milk sold by these hawkers was purchased from farmers close to the city at very low rates and was being sold at prices so low that the established vendors found it difficult to hold their businesses.[10]

It was at this period that the second conference of producers and consumers was held at Bathurst (1931). The consumers' committee agreed with the producers' committee on the need for effective price fixation, but differed on how this was to be obtained. The producers favoured statutory methods, with a reconstitution of the then-existing Board to enable it to fulfil its functions as already laid down. The consumers recommended the formation of a single co-operative company working with a distributing agency organized in Sydney. They recommended that the Milk Board be reconstituted to negotiate prices with the producers' co-operative and to control metropolitan distribution. Both committees sought the distribution of milk in sealed containers, whilst the consumers' committee also advocated a block system of retail deliveries and the provision of free milk for school children.

In August, 1931, a Bill was introduced into the Legislative Assembly, which followed in broad terms the recommendation of the producers' committee, *i.e.*, repeal of the 1929 Act and the reconstitution of the Milk Board under a new Act giving it effective powers.

The 1931 Milk Board.

The new Milk Board consisted of three full-time members appointed by the Governor for a term of seven years, but eligible for re-appointment. One member is appointed as chairman, one as producers' representative and one as consumers' representative. Since 1942, the producers' representative has been the nominee of dairymen registered under the Milk Act, 1931, and there is provision for the nomination to be made by means of an election.

[10] William E. Murphy, *The Milk Board of New South Wales*, Sydney, 1949, p. 29.

On 28th January, 1932, the new Milk Board opened a public price enquiry. Evidence was given by witnesses representing producing interests, country factories, wholesale and retail interests and consumer organisations.

Prices were fixed on the basis of this evidence (although no investigation was made to test the evidence), and applied as from 5th March, 1932. Reference to Figure 1 will show that prices to producers were fixed at a level below the ineffective determination made in August 1931, but above the competitive level of early 1932.

Another important step taken in the first year of effective Board control was the regulation of hours of retail delivery. These regulations, gazetted on 4th March, 1932, brought deliveries by non-employers of labour into line with conditions which had to be observed by employers under industrial awards. "The regulations also had a beneficial effect on quality by preventing the practice of vendors in 'hawking' milk around the suburbs throughout the day, often in temperatures and under conditions positively detrimental to quality."[11]

The Vesting Provisions.

Except for milk produced and retailed directly by dairymen-vendors, all milk supplies for consumption or use in the Metropolitan Milk Distributing District from 10th January, 1933, became absolutely vested in, and the property of, the Board.

> By this method of direct control, the Board can give each producing district its proper share of the markets by fixing the quantity to be forwarded week by week. Also it can safeguard quality by refusing to accept milk which does not meet its requirements or pass regular factory tests.[12]

In the operation of the vesting provision of the Act, the Board appointed five distributing companies as its agents in respect of the Metropolitan milk supply, and two distributing companies in respect of the Newcastle supply. (The Newcastle Milk Distributing District was established by proclamation under the Act in September, 1931.) At the present time, two of the original companies appointed in 1932 in respect of the Metropolitan Milk Distributing District, and one of the companies appointed in 1933 in respect of the Newcastle Milk Distributing District, remain as agents, the others having been absorbed. The Sydney agents are the Dairy Farmers Co-operative Milk Co. Ltd., and the N.S.W. Fresh Food & Ice Co. Ltd.

Each agent acts in respect of certain country depots. The agent informs the Board, week by week, of its anticipated milk needs, the Board distributes this amount amongst the various factories and the agent draws from each factory such quantities as the Board directs. Returns showing the weight of milk taken day by day from individual dairyment for the liquid market are forwarded to the Board weekly by each factory, and at intervals of four weeks the Board makes direct payment to the dairymen concerned (3,583 in 1949/50).

Milk received by the agent at the Board's direction becomes the property of the agent on its arrival in Sydney or Newcastle, and after deducting the costs of transport and treatment, the agent makes payments to the Board for such milk. Prices to be paid by the agent to the Board are fixed, under a twelve-month agreement between the two parties.

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[11] *Ibid.*, p. 30.

[12] N.S.W. Milk Board, *The Sydney and Newcastle Milk Supply*, Sydney, 1941.

Dairymen-vendors are exempted under section 26 of the Act from the vesting provisions, to avoid complications. "To require these dairymen to supply to the Board and re-purchase supplies for their own trade would have involved unnecessary dislocation and expense and would have served no useful purpose."[13] The vesting provisions, applied to country factories, allow the Board to take only a certain amount for the liquid trade. Since all dairymen-vendors' milk goes into the liquid trade, the use of vesting powers to enforce quotas is unnecessary.

There have been two important legal challenges to the system under which all country milk for the liquid trade within the Milk Distribution Zone should be vested in and sold through the Board.

In 1933, the Board prosecuted a dairyman who supplied milk to a Sydney vendor contrary to the requirements of the Milk Act. The High Court upheld the Board's prosecution.

A second case in 1939 involved the famous section 92 of the Constitution, the proscription against interference with interstate trade. Cream not vested in the Board was being sold by a Sydney company which was importing from Victoria. Again, the High Court's decision favoured the Board, and the vesting provisions remained unbreached[14].

The Milk (Investigation) Act, 1936.

This Act was passed in 1936 for the purpose of enabling an investigator to be appointed to enquire into the administration of the Milk Act, 1931. The investigator, Mr. E. H. Swift, in his report to the Government, criticised the Board for its failure to investigate carefully the finances of its agent companies; for its failure to hold more than one prices enquiry since its appointment in 1932; and for its inability to determine whether or not the wholesale and retail margins allowed were reasonable[15]. In particular, Mr. Swift alleged that the agent companies were making excessive profits from the sweet cream section of their businesses.

The first price fixations in 1932 and 1933 for Sydney and Newcastle were made without any exhaustive enquiry into costs, as this would have meant several months' delay when an emergency measure was urgently needed. Mr. Swift's report hastened the adoption of a more careful analysis into costs and margins through the medium of a public enquiry.

A new Board was appointed in 1937 (the five-year term of the old Board having expired), and a further price review was arranged. Three sources of evidence were used. Evidence was taken from 89 witnesses on oath at a public enquiry held in August, 1937; the Board's officers undertook independent investigations of the cost of factory treatment and distribution; and a firm of public accountants made an exhaustive examination of the trading methods and accounts of the two main Sydney distributing companies. The new prices took effect from 1938.

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[13] Murphy, *op. cit.*, p. 64.

[14] For further details on this case see Lloyd, *op. cit.*, p. 66 *et seq.*

[15] Murphy, *op. cit.*, p. 36.

Sweet cream was paid for at 1½d. per gallon less than the price of liquid milk, and for the first time wholesale and retail prices were fixed for cream and bottled milk [16].

Speaking of the general improvement in the quality of milk which had followed on Board control, the investigator, Mr. Swift, said, "the whole of the processes with regard to production and treatment at the country factories are [*sic*] now under effective supervision, whereas, in days gone by, milk was sent to Sydney which would have no possible prospect of getting into circulation under Milk Board control. The regular practice of testing milk at the country factories, supplemented by inspection of farms, has unquestionably led to vast improvements in quality. Summing up the whole situation, I am definitely of the opinion that there is overwhelming evidence of a general improvement in the quality of the milk supplied to Sydney and Newcastle."

An important step toward the improvement of quality occurred on 1st July, 1938, when the Board brought into operation by-laws which ensured that all milk sold in the proclaimed distributing districts would be pasteurised, or if produced and retailed directly by a dairyman on his own behalf, would be obtained exclusively from dairy herds certified to be free from tuberculosis by the Department of Agriculture. The 1941 Act fixed five grades of milk, viz., Special Raw Milk, Raw Milk (Grade A), Raw Milk (Grade B), Special Pasteurised Milk, and Pasteurised Milk. Practically all milk distributed in the two cities is either Pasteurised Milk or Raw Milk (Grade A). A small quantity of Special Pasteurised Milk is sold in Sydney.

Extensions of the Milk Zone.

Additional Milk Distributing Districts established by proclamation under the Act since 1932 have been as follows:—Erina, gazetted 17th August, 1945; Wollongong, gazetted 17th August, 1945; Blue Mountains-Lithgow, gazetted 7th November, 1947. There were also minor

[16] Further price adjustments occurred on the following dates:—

1st July, 1939: The price paid to the producer and the retail price remained unchanged, although marketing margins within the price-spread were altered.

26th January, 1942: The retail price was increased from 2s. 4d. to 2s. 8d. per gallon. The price to the producer was increased from 1s. 0d. to 1s. 4d. per gallon.

1st May, 1942: The retail price was reduced to 2s. 6d. per gallon. The price paid to the producer remained unchanged.

14th April, 1945, *to 31st October*, 1947: Prices were determined by regulations under the National Security Act. During this period the prices paid to dairymen remained at 1s. 4d. and the retail price as 2s. 6d. per gallon. Cost increases were covered by Commonwealth Government subsidies.

31st October, 1947: The minimum price paid to dairymen for milk increased to 1s. 5½d.; the maximum retail price was 8d. per quart.

14th May, 1948: The minimum price paid to dairymen was fixed at 1s. 9½d. per gallon, plus subsidy. The retail price was fixed at 9d. per quart.

10th September, 1948: The minimum price paid to dairymen for milk and sweet cream was fixed at 1s. 8d.; the maximum retail price remained at 9d. per quart.

18th March, 1949: The minimum price paid to dairymen was fixed at 2s. 2d. per gallon; the retail price was fixed at 11d. per quart.

7th October, 1949: The minimum price paid to dairymen was fixed at 1s. 10d. per gallon; the retail price was fixed at 10d. per quart.

The retail prices quoted are for bulk milk. The term "price to producers" refers to producers within the Metropolitan Milk Distributing District.

extensions to the Metropolitan Milk Distributing Districts in 1941, 1942, 1947 and 1948. Small additions were made to the milk producing zone in 1944, 1946 and 1947, involving 688 new registrations of country dairymen. In 1948, the milk producing zone was extended to include the Gloucester-Manning River district, which involved the registration of 718 additional dairies.

2. THE MILK PRICE SPREAD.

Figure 1 shows the price spread between producer and consumer for milk distributed by the Board from 1926 to 1950. During the "Milk War" of 1930-32 retail prices ranged widely between suburbs. Some regular vendors charged the "fixed" price of 8½d. per quart at some periods, whilst in districts where many unregistered vendors operated, the retail price fell in some cases to as low as 4d. per quart. It is therefore quite impossible to establish a representative retail price for that period.

It can be seen from Figure 2 that the producers' share of the retail price has increased steadily during the period of Board control. However, it would be erroneous to ascribe this increase solely to the activities of the Board. In a period of rising prices, it is usual for the producer's share of the retail price to increase because distribution margins tend to be inflexible. The producer's share of the retail price of most commodities is higher now than it was in the early 'thirties. However, Figure 1 shows that there has been an absolute reduction in the margin between the producer's price and the retail price since the Board was constituted.

Part of this reduction in marketing costs has been due to the economies resulting from zoning and the abolition of afternoon deliveries. Against these economies must be set the restriction of consumer's choice and the reduction in the vendor's incentive to improve service when operating in a monopolistic situation. Other factors which may have influenced the reduction in marketing costs are a reduction in profit margins and economies gained by the large-scale treatment and handling of milk.

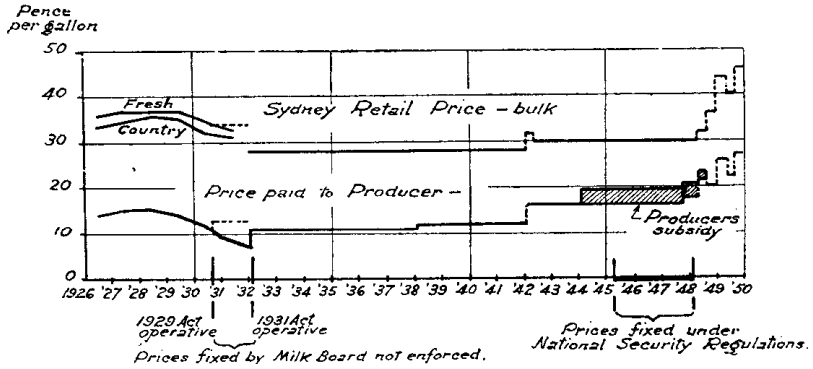

Fig. 1.—Prices Paid to Producers and Retail Prices, 1926 to 1950.

The prices fixed by the 1929 Milk Act, are shown even though they were not enforced.

The prices paid to producers prior to the fixation of prices in 1932 are nominal only, as they were subject to various deductions, and because at times gallonage was over-generously computed.

The producers' subsidy is expressed as an average of the various subsidy rates paid, weighted according to the length of the period to which the subsidy rate applied, but not weighted according to the amounts of milk attached to each subsidy rate. The rates were varied twenty-three times between the 14th April, 1944, and the 2nd September, 1948.

The prices paid to producers prior to 1932 are wholesale prices paid by metropolitan distributing companies to farmers for milk delivered on trucks at country railway stations or factories. After 1932, the prices paid to producers are shown as at factory door.

Prior to 1932, the retail price of "fresh" milk produced by dairymen-vendors was higher in Sydney than the price of country milk.

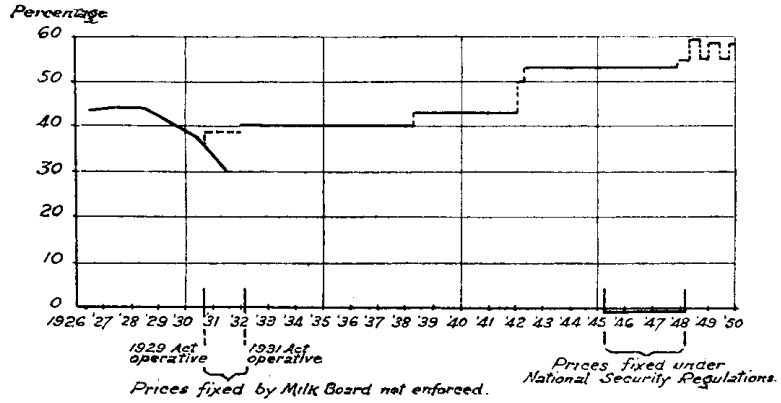

Fig. 2.—The Producers' Share of the Retail Price, 1926 to 1950.

In computing percentages, the retail price for country milk was taken as the representative retail price prior to 1932. The producer's price used excluded any subsidies paid.

Table II gives details of the distribution margins allowed at the time of the price review of 7th October, 1949.

TABLE II.

The Milk Price Determination, 7th October, 1949.

	per gallon. s.	d.
ALLOWANCES FOR DISTRIBUTION SERVICES—		
Minimum price to dairymen (including sweet cream) ...	1	10
Treatment allowance to country factories	0	1.25
Allowance for transport costs	0	1.00
Margin for Board's administrative costs	0	0.25
Selling price to agent company	2	0.5
PRICE PAYABLE BY VEHICLE VENDORS—		
Bulk milk	2	4.5
Bottled milk—pints	2	9
half pints	3	1
Special pasteurised bottled milk	2	11
PRICE PAYABLE BY OTHER VENDORS—		
Not exceeding 10 gallons—		
Bulk milk	2	9.75
Bottled milk—pints	3	2.75
half pints	3	6.75
Special pasteurised bottled milk	3	4.75
Exceeding 10 gallons—		
Bulk milk	2	8.25
Bottled milk—pints	3	1.25
half pints	3	5.25

RETAIL PRICES—	Bulk. d.	Bottled. d.	Special Pasteurised. d.
Half pints	2½	3	...
One pint	5	5½	6
One and a half pints	7½	8½	...
Two pints	10	11	11½

Source.—Milk Board Journal, January, 1950.

3. THE SUPPLY PROBLEM.

During the early years of the Milk Board's existence there was a continual surplus of production over liquid milk requirements, and only 35 to 40 per cent. of country milk produced within the milk zone was absorbed by the market in liquid form. The balance went into less profitable uses such as butter, cheese, ice cream and powdered milk. Since 1940, however, the milk zone has suffered from seasonal shortages of milk, although the spring and summer months continue to yield a high proportion of surplus milk. The narrowing gap between production and consumption of fresh milk and cream over the last decade is shown in Figure 3.

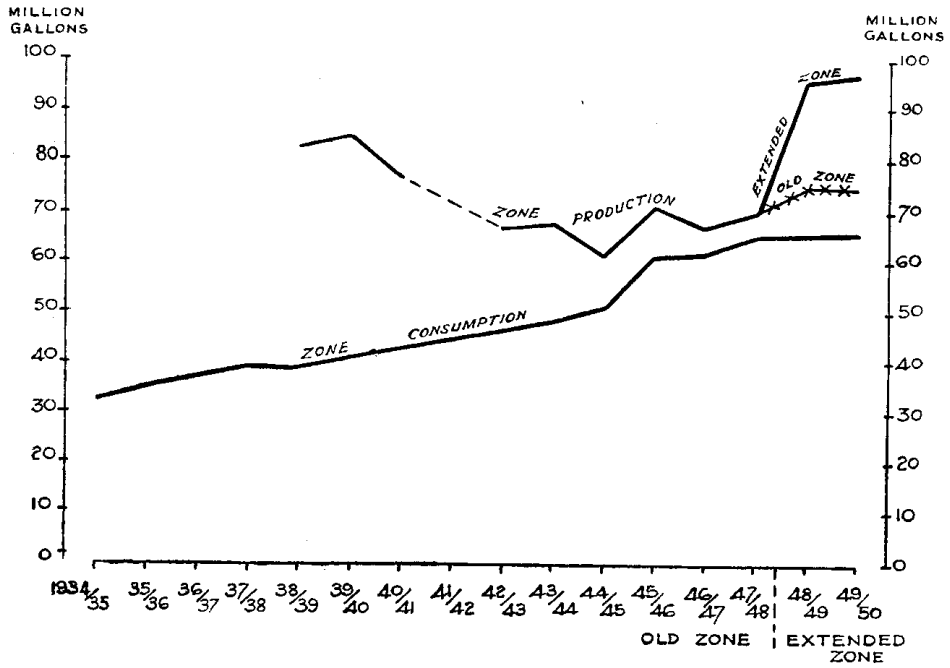

Fig. 3.—Zone Production and Consumption.

The figures for zone production from June, 1940 to June, 1942, are not available. The figures given for zone consumption represent an estimate of consumption in the absence of cream rationing. It is equal to the sum of (*a*) milk received by the Board, including supplementary supplies from outside the milk zone, (*b*) an estimate of production by dairymen-vendors and (*c*) unsatisfied cream demands due to cream rationing. No allowance has been made in zone consumption for unsatisfied milk demands in periods of milk rationing.

It should be remembered in interpreting this graph that a small but significant proportion of zone production is not available for liquid milk consumption. This amount is made up of milk produced by unregistered dairymen and milk rejected on the grounds of quality. In 1948-49, milk produced by unregistered dairymen in the old zone amounted to approximately 3.5 per cent. of total production in the same area. Milk production per farm has decreased since 1940. At the same time, the population of the distributing zones has increased considerably and consumption per head has shown a steep upward trend. In spite of the fact that cream rationing considerably reduced the demand for liquid milk after 1943, rationing of liquid milk has occurred during the winter months for the last ten years.

During these periodic shortages the Board has drawn upon areas outside the milk zone for supplementary supplies. The actual quantities drawn from outside areas in the last decade are shown in Table III.

TABLE III.

Supplementary Supplies Received from External Suppliers, 1940 to 1950.

Year ended 30th June.	Quantity. Gallons.
1940	485,024
1941	1,131,258
1942	1,435,527
1943	1,068,760
1944	476,174
1945	1,053,693
1946	2,668,277
1947	5,215,206
1948*	4,892,392
1949*	nil.
1950*	137,958

* The Milk Zone was extended in May, 1948.

Source:—New South Wales Milk Board Statistics.

Between 1943 and 1949 the dairy cow population of New South Wales decreased by 95,000. This must be attributed largely to a movement from dairying to more profitable lines of agriculture and inability to secure farm labour. At present, over one million gallons is sent every year from the milk zone to several southern and western towns which were formerly able to secure local supplies of liquid milk.

In 1949-50 the Milk Board drew fifty-seven million gallons on behalf of consumers. Dairymen-vendors produced and retailed approximately four million gallons, making a total of sixty-one million gallons. It is anticipated that within the next twelve months an additional eight million gallons of milk per annum will be required for cream, and one million gallons to cover ordinary population increase. Total requirements will then be seventy million gallons.

In 1949-50 the production of milk in the milk zone was approximately ninety-one million gallons. However, about fifty-nine per cent. of this milk output was produced in the six summer months. Figure 4 shows the extent of seasonal fluctuation in production in the milk zone. Since the zone was extended in May, 1948, an average could only be taken over the two years 1948-49 and 1949-50. It should be remembered that during each of these years serious floods occurred in winter in the milk zone.

It will be noticed, in Figure 4, that there is a considerable gap between production and supply. This gap represents (1) surplus milk above requirements for the liquid market; (2) milk rejected on grounds of quality; and (3) the milk equivalent of cream sent to zone factories by unregistered dairymen for manufacture into dairy produce. In periods of shortage, the gap between production and supply is made up of milk in the latter two categories.

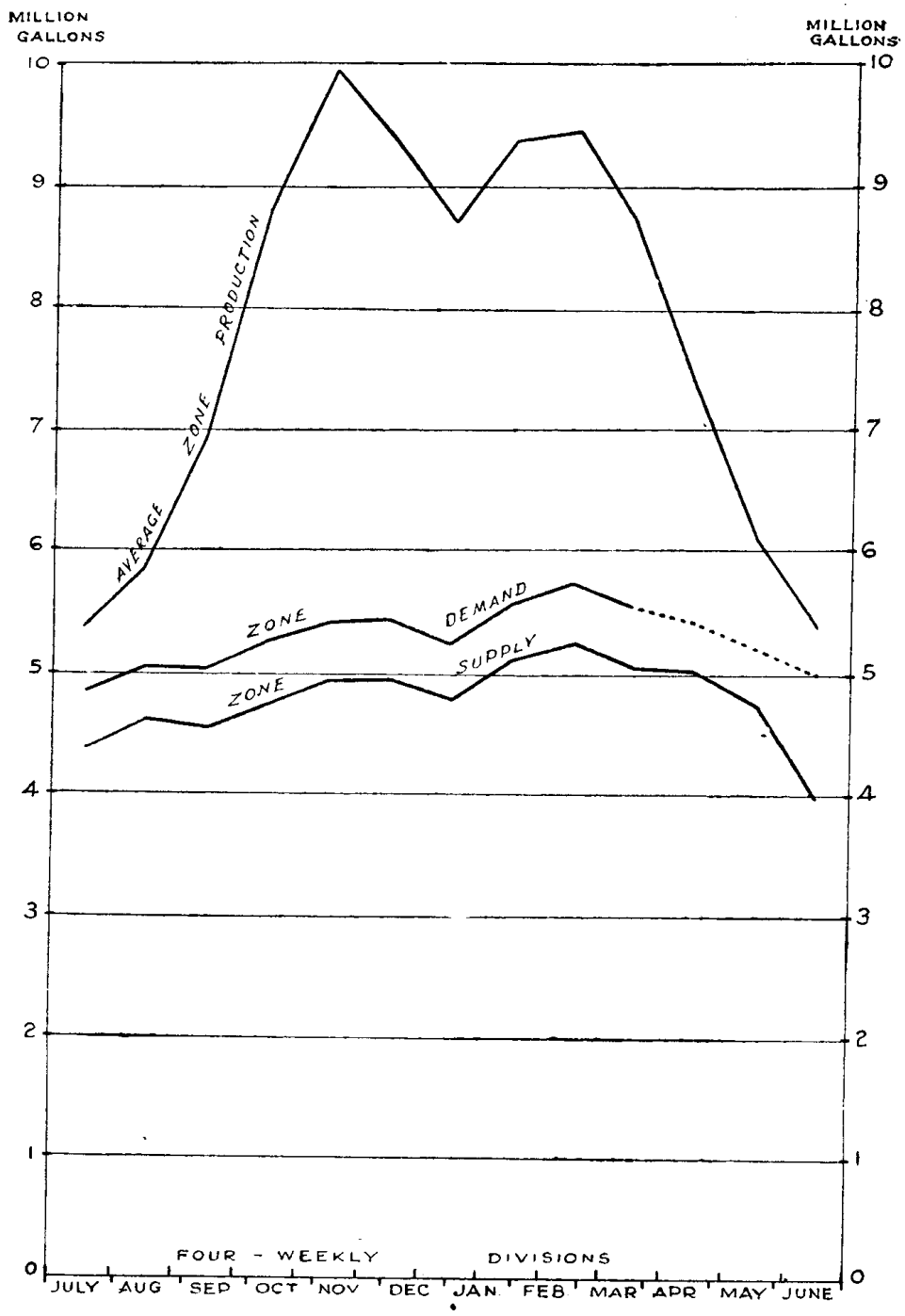

Fig. 4.—Production, Board Intake and Estimated Demand in the Milk Zone by Four-Weekly Periods.

Average zone production represents an average of the years 1948–49 and 1949–50.

Zone supply represents the intake of milk by the Milk Board in 1949–50, excluding supplementary supplies obtained from outside the zone. Such supplementary supplies amounted to 137,453 gallons, drawn during the last ten weeks of the year.

Zone demand represents the estimated demand in 1949–50 in the absence of milk and cream rationing. An amount of 480,000 gallons per four weeks, the estimate of unsatisfied cream requirements, has been added to actual consumption in periods of unrationed milk supply. Zone demand in periods of milk rationing (shown as a dotted line) has been estimated on the basis of demand immediately prior to and following the rationing period.

Table IV gives details of recent changes in four of the factors relevant to milk production and consumption.

TABLE IV.

Population, Milk Consumption Per Capita, Milk Producers and Milk Production Per Farm in the Milk Zone, 1938-39 *to* 1949-50.

Year ended 30th June.	Zone Population.*a*	Milk Consumption per Capita per Day.*c*	Number of Board Suppliers.		Annual Milk Production per Supplier.*d*	
			Old Zone.	Extended Zone.	Old Zone.	Extended Zone.
	Thousands.	Pints.			Gallons.	Gallons.
1939	1,550*b*	0.57	3,495	.....	20,530	.....
1945	1,724*b*	0.62	3,303	.....	15,894	.....
1946	1,855	0.71	3,358	.....	18,590	.....
1947	1,878	0.74	3,540	.....	17,049	.....
1948	1,951	0.71	3,594	4,307	17,740	.....
1949	1,962	0.70	3,541	4,276	19,492	21,159
1950	.....	.....	3,567	4,400	19,359	20,737

a As at 31st December.

b Population of Metropolitan and Newcastle Distributing Districts only. The population of the Erina and Wollongong Distributing Districts was added after 1945. That of the Blue Mountains-Lithgow Distributing District was added after 1947.

c This figure includes the milk equivalent of cream consumption. In every year listed with the exception of 1938–39, cream was rationed.

d This figure can only be obtained by dividing total zone production by the number of Board suppliers. Insofar as some producers within the zone are not Board suppliers, the quotient has a theoretical significance only. Variations in the quotient from year to year would be partially a result of unregistered producers within the zone becoming Board suppliers and *vice versa.* In 1948–49 only 3.5 per cent. of production in the old zone was from unregistered dairymen. However, the area added to the old zone in May, 1948, contained a large number of unregistered dairymen.

Source :—N.S.W. Milk Board Statistics.

The Quota System.

Any consideration of the milk shortage in New South Wales must take into account the way in which the farmers' share of the liquid milk market is determined. This has an important effect on the farmer's income and thus his incentive to produce. The degree to which the producer's quota of liquid milk affects his income can be seen from Table V, which compares the prices paid to the producer for liquid milk and surplus milk used for butter, from 1931-32 to 1949-50.

Until the end of 1938 the practice had been for the agent companies to requisition milk weekly from each factory under their control. These requisitions were accepted by the Board with whatever alterations were necessary, from time to time, to safeguard the interests of various centres in the zone. In November, 1938, new arrangements were made whereby the agent companies would requisition weekly the total quantities required by them and the Board would decide the quantities to be drawn from each country depot. This arrangement is termed the "district quota system."

Each factory is allotted a minimum weekly quantity of liquid milk (a quota), based upon its normal share of the liquid milk trade during the preceding three years. In addition, each factory is entitled to share in any increase in sales above the total of quotas for all factories, according to the proportion which its individual quota bears to the total. When quotas were first allotted, the Board made a careful survey of the supply condition of each factory during the preceding three years, in order to ensure that the rights of suppliers were preserved. The increase in Board milk requirements and the changed conditions of supply since 1938 have made constant revisions of the quotas necessary. Usually the Board reviews the quotas each year, at the end of winter.

The last announcement by the Board, regarding the principles which were to be observed in determining a quota, was made in the following resolution, passed in May, 1945:—

(*a*) In view of section (27) of the Milk Act, it is expedient that, so far as may be practicable, the factory authorised to receive on the Board's behalf shall be allotted a quota from time to time which shall have regard to the quantity of milk allotted to it in its previous quota, and,

(*b*) Increased trade shall be spread *pro rata, i.e.,* proportionally to quotas over all the supplying factories, subject to the continued ability of the factory to supply and meet all the Board's requirements and subject to any special circumstances which the Board may consider should be taken into account.

Variations in sales, in conditions of production, in weather conditions, and in the holding capacity of available rail transport vats make it impossible to adhere strictly to any pre-determined allocation. Discrepancies which occur between quota allocations and the quantities actually drawn from particular depots are adjusted periodically.

One of the factors which affects a factory or depot's quota is the volume of milk supplied in winter. A factory which consistently over-supplies its winter quota is more likely to get an increase in its quota than one which under-supplies its quota in the winter months. However, the quota is not determined on the basis of winter supplies alone. Rather winter performance is one of a number of factors considered in setting the quota.

Naturally the farmer supplying the factory or depot benefits if an increase in the district's winter production leads to an increase in the factory quota. However, the factories or depots do not allot their quotas amongst the farmers in proportion to their winter production, so that there is no direct incentive from this direction for the farmer to increase his winter production.

In the early years of Board control individual quotas were allotted to dairymen supplying milk to the Board from the Seven Hills, Toongabbie, Liverpool and Narellan districts. It was the Board's practice to decide from time to time the quantity of milk to be accepted weekly from these individual dairymen. The principal determining factor in the allotment was the average weekly quantity of milk delivered to the Board by each dairyman during the preceding two years. However, with the increase in milk consumption, and the occurrence of a drought in 1940, it became the Board's practice to take all available milk from these districts, and the individual quota system was discontinued in 1941.

A similar system was applied to Penrith dairymen in 1939. In this case the Board allotted a district quota to the Penrith receiving depot. The depot then allocated its quota amongst the dairymen as individual quotas. The main factor in the latter allocation was the average weekly volume supplied by each dairyman during the preceding winter months.

Another factor affecting the size of a district's quota is its distance from the retail market. For example, all milk produced in the Liverpool and Toongabbie districts is taken by the Board. The Campbelltown, Penrith and Windsor districts have high quotas relative to total production. As with winter production, this factor is only one of several influencing the Board in fixing quotas, and cannot be expressed through a strict mathematical relation between quota size and distance from

the market. The Board's power to alter quotas is limited by a provision in the Act which obliges it to take into account previously existing conditions of supply in the liquid milk market.

The factories distribute their quota of Board milk amongst their suppliers in such a way as to ensure that the proportion of the supplier's milk which receives the liquid price is the same for each supplier to the particular factory. A rotational system is used. The names of suppliers are arranged in a list and if the factory quota equals the production of the first thirty suppliers in the list, then those suppliers are paid liquid price for the whole of their milk for that day. On the following day, the liquid price would be paid for the milk of the next twenty-five names on the list, if their total production exhausted the factory's quota.

The amount of any individual farmer's milk which is paid for at the Board price is wholly dependent upon (1) the factory quota, and (2) the proportion which his total annual production bears to the total annual production of all suppliers to the factory. This system yields no advantage at all to the "even" producer over the "uneven" producer.

If the factory allocated to its suppliers their share of the liquid market through a pool, the pool price would automatically be higher in periods of shortage than in periods of flush production, since a higher proportion of the factory's milk would be diverted to the Board in the former periods. This would be the case even if the price to producers for liquid milk was not higher in winter than in summer. The payment of a higher price for milk in winter, as is the Board's current practice, would reinforce the seasonal variation in the pool price.

Under the rotational system, the producer's average return varies between seasons in the same way as would a pool price. However, the payment of a pool price (usually referred to as a "blended price") would make the seasonal variation in average returns all the more obvious to the producer, who would in any case probably prefer a system under which he was paid one price for all of his milk.

4. INCENTIVES FOR WINTER PRODUCTION.

Two incentives are offered to producers to increase their winter production. Firstly, there is the indirect incentive in that the Board, when revising a factory's quota, takes into account the extent to which the factory over-supplies or under-supplies it quota in winter months. Any increase in the factory's quota means that the individual farmer will be paid on a fresh milk basis more frequently.

However, the financial incentive offered to the individual farmer to increase winter production is very small. Even if the Board applied a strict formula making the factory quota wholly dependent on the volume of its winter supplies, this would still be the case. If, out of a hundred suppliers, one increased his winter production, he would receive only one-hundredth of any quota increase. Such increase would be shared amongst all suppliers in the proportion of their total production. Any increased costs involved in increasing his production would, however, be wholly borne by the individual producer himself.

If the quota system is to be effective in increasing winter production, one of two methods must be applied: (1) A system of "individual quotas," as applied by the Board for some areas in the pre-war years,

or (2) a scheme whereby factory quotas would be allocated among suppliers in proportion to their winter production. The latter method has already been tried by the Penrith receiving depot in 1939, but it was eventually abandoned, allegedly because of inadequacy of staff.

The second incentive at present offered by the Board is the payment of a higher price for milk produced in winter than milk produced in summer. The principle of paying different prices for summer and winter milk was adopted in May, 1948, as an extension of the scheme of granting subsidies on winter production which was practised by the Commonwealth Government. The policy is based on a recognition of the simple fact that if demand for a commodity, subject to price control, exceeds supply at the fixed price (as happens seasonally in the case of milk), then the fixed price needs to be raised.

At present, the annual cost figure and the seasonal price differentials are established at price reviews every six months. To the 1949-50 winter price was added a "production incentive" of one penny per gallon in addition to the seasonal differential. This is an indication of the inadequacy of the policy of fixing prices solely on the basis of costs.

5. THE PRODUCERS' RESPONSE TO PRICE.

The question arises as to what extent dairymen will react to price incentives by increasing production. In agriculture it is not always true that the voluntary responses of the producers to price are of a kind likely to result in an equilibrium price.

A decline in the price of his principal product may cause the farmer, instead of reducing output, to work harder and produce more in order to maintain his total income by selling a larger amount at the lower price. Conversely, an increase in price could conceivably lead to a diminution of supply, at least in the short run. The shape of the supply curve for any agricultural industry depends to a considerable extent on whether or not the industry is organised on the basis of family labour.

If marginal returns were considerably higher than in other industries for some time, an influx of new entrants into the industry might occur. In this case, the increased supply would be caused by a larger number of suppliers rather than by the expansion of production of existing suppliers. The rapidity of the response would be determined partly by the obstacles to the entry of new factors of production into the industry.

It may be that once a certain income level is attained, some producers put a high price on any sacrifice of leisure, and part of so-called "farmer's inertia" may mean just this. If this is so, the higher the level of producers' returns the greater the marginal returns necessary to expand production by a given amount. The fact that dairying is an occupation necessitating long hours of work, except during the winter period, would provide some explanation for such an attitude.

The depression of the 'thirties provided some evidence that conditions of negative elasticity of supply existed in the dairy industry, since low prices stimulated butter production. Producers were apparently forced to increase output in order to maintain the same level of gross returns [17].

The producers' response to price changes is limited by other important factors such as movements in production costs and the speed with which new factors of production can be added. If the producer's response takes the form of an enlargement of his herd through natural increase, a considerable time lag may occur before increased production is obtained. In the short run, the cost of hand-feeding could be a factor of vital importance. Furthermore, there are many factors outside the scope of the producer's plans such as varying climatic conditions, which are not influenced by price. A study of producers' response to price in the New South Wales dairying industry would involve intensive research and is beyond the scope of this article.

6. PRODUCTION METHODS IN THE MILK ZONE AND AVENUES OF INCREASED PRODUCTION.

Recently a survey of factors affecting production on dairy farms within the milk zone was initiated by the Milk Board. The survey, which covered 3,300 farms, disclosed the following facts:—

(*a*) No form of fodder conservation was practised on 34 per cent of the farms surveyed.

(*b*) No pasture improvement was undertaken on 88 per cent. of the farms surveyed.

(*c*) Only 20 per cent. of the farmers controlled breeding with a view to autumn-winter production.

(*d*) Adequate labour was lacking on 29 per cent of the farms.

(*e*) Milking machines were used on 75 per cent of the farms.

(*f*) The proportion of area under cultivation to area suitable for cultivation was 40 per cent [18].

Insofar as these factors could be affected, by offering increased price, either in winter or for the whole year, the potential production response would appear to be very large. According to Milk Board officials, adjustment and control of the breeding programme and an adequate supply of farm-grown fodder in winter would considerably reduce seasonality of supply. It remains for pricing methods to provide an adequate financial incentive for farmers to adopt these and other practices.

In general, a zone dairy farmer can plan to increase his winter production in any of three ways: (1) a re-arrangement of calving dates, so that fewer of his cows are dry during winter months, (2) an increase is herd size, either by breeding or by purchase, (3) improved feeding

[17] Interpretation of this phenomenon is beset by many difficulties. The expansion of dairying could have been due to the fact that dairy prices fell less than other prices. Another point which would have to be considered is that dairying is a relatively easy adjunct to other enterprises. The industry's supply curve could vary in elasticity at different points along the curve, so that behaviour in the 'thirties might not be typical of the producer's attitude to expansion to-day.

[18] N.S.W. Milk Board, *The Milk Board Journal*, June, 1950, pp. 288-289.

by laying down permanent pasture, fodder conservation and hand-feeding. The cost and availability of feed and labour (especially summer labour) and the degree to which improved pasture can be easily laid down are three vital factors in determining which methods of increasing production will be chosen.

7. COSTS OF PRODUCTION.

The financial incentive necessary to call forth adequate winter production must be sufficient not only to cover any additional costs associated with such production, but also to compensate the farmer for his increased effort. It is difficult to estimate the extent to which increased winter production would involve increased money costs. The recent survey of farming methods in the milk zone suggests that an expansion of production, given improved farming methods, would not involve a large rise in costs. However, the extent to which this statement applies to winter conditions cannot be determined on present evidence.

TABLE V.

Returns per Gallon Received by Producers for Liquid Milk and Milk Processed for Butter.

Year.	Average Payment for Liquid Milk by Milk Board.	Average Payment including Subsidy.*a*	Average Payment for Cream for Butter. (Milk Equivalent per Gallon.)*b*	Column 4 as a Percentage of Column 3.
	pence.	pence.	pence.	per cent.
1931–32 ...	11.093	11.093	5.40	48.7
1932–33 ...	11.100	11.100	4.53	40.8
1933–34 ...	11.015	11.015	4.05	36.8
1934–35 ...	10.892	10.892	4.53	41.6
1935–36 ...	10.793	10.793	5.49	50.9
1936–37 ...	11.095	11.095	5.88	53.0
1937–38 ...	11.212	11.212	6.27	55.9
1938–39 ...	11.835	11.835	6.27	52.9
1939–40 ...	11.838	11.838	6.55	55.3
1940–41 ...	11.839	11.839	6.55	55.3
1941–42 ...	13.492	13.492	6.55	48.5
1942–43 ...	15.811	15.811	7.71	48.8
1943–44 ...	16.001	17.001	8.96	56.0
1944–45 ...	16.011	19.861	9.30	58.1
1945–46 ...	16.046	19.546	9.78	60.9
1946–47 ...	16.110	19.610	9.78	60.7
1947–48 ...	17.640	20.500	11.52	65.3
1948–49 ...	21.968	22.298	12.48	56.8
1949–50*c*	23.500	23.500	13.69	58.3

a The subsidy figures included represent averages of payments made throughout the year, weighted according to the duration of the various levels of subsidy, but not weighted according to the quantities of milk involved at each rate.

b Based on the conversion factor 2.075 gallons of milk (4.1 per cent. butterfat) = 1 lb. of commercial butter, which is believed to be an approximate average for N.S.W. It should be noted, however, that milk for liquid consumption need be only 3.4 per cent. butterfat to meet the Board's requirements.

c Estimated.

Sources:—New South Wales Milk Board, *Annual Report*, 1948–49, p. 24. *Official Year Book of New South Wales*, 1947–48, p. 469. Murphy, *op. cit.*, p. 47.

The Board's policy is to fix the price of milk at average cost of production as determined at price inquiries, public or private. The Board cannot vary prices without an inquiry and any variation in prices must be approved by the Minister for Health. At an inquiry, evidence is invited from interested parties, including associations of dairymen (*i.e.,* the Milk Zone Dairymen's Council and the Primary Producers' Union), factories, wholesalers and retail vendors' associations. The practice since 1948 has been to conduct inquiries every six months.

In computing average costs of production interest is allowed on capital at 5 per cent. and an allowance is made for the operator's labour at award rates. An allowance is also made for family labour at award rates.

Reference to Table V shows a considerable discrepancy between the price paid for liquid milk and the milk equivalent of the price paid for butter. Both prices are currently based on cost determinations. Apart from the fact that the liquid milk price included one penny per gallon as a "production incentive" in the 1950 winter, the following considerations provide some explanation of the discrepancy between the two prices.

1. Milk Board regulations prescribe a higher standard of buildings and equipment, probably necessitating higher costs.

2. The delivery of milk rather than cream to factories involves a considerably higher cost for cartage. Milk is delivered more frequently than cream and occupies ten times the volume of its cream equivalent.

3. The existence of the milk zone gives a monopoly of the milk market to producers within its boundaries, which is reflected in much higher property values.

4. The prices shown in Table V for milk used for butter and liquid milk are not truly comparative, insofar as the former is the price paid for the butter-fat content of a gallon of milk. The butter producer obtains a by-product, skim milk, which he can sell to the factory or use as pig-feed.

8. FREIGHT COSTS.

The first price paid to producers by the Board was on the basis of 1s. 1d. per gallon on rail, Sydney. This was the factory selling price to agent companies. From this, freight and the costs of factory treatment were deducted, so that the producer's price lay between 11d. and 11½d. per gallon, depending mainly upon his distance from Sydney. This method of fixing the farmer's price was continued when the Newcastle price was fixed in 1933.

Since 1938, farmers' prices have been fixed on rail country sidings. The costs of transporting country milk to Sydney have been met from the Board's funds, provision being made for such costs when fixing the retail price. Thus all dairymen within the milk zone receive the same price per gallon for milk delivered to the Board.

A basic consideration in any milk distribution programme should be to get the milk to market at the lowest possible cost. The milk and cream required should be produced in areas where the cost of producing the milk plus transport costs gives the lowest overall costs. Since freight must be considered as part of cost, the payment of a uniform price for milk at receiving depots neglects certain economic factors.

In an uncontrolled market where the producer pays the freight to the market, the producer's net price for milk decreases with distance from the market. At a certain distance from the market, it becomes more payable to convert the milk into butter, which can be transported more cheaply than milk. The theoretical boundary shifts with changes in freight rates and in the prices of the products. An increase in the price of milk, other things being equal, would extend the milk area until freight costs again became prohibitive.

In N.S.W. the producer is paid by the Milk Board as at country sidings. There is no gradual reduction in the farmer's returns for milk as the distance from the market increases. Instead, a sharp drop in returns occurs at the boundaries of the milk zone. Under the quota system, districts on the extreme edge of the zone and districts closer to the city both have a certain share of the liquid milk trade and their surpluses are manufactured into butter and other products. This system increases freight charges on milk above the level which would apply in an uncontrolled system. In summer, milk is brought from the edge of the milk zone, despite the fact that demands for liquid milk could be satisfied by drawing solely on areas nearer the market.

The average return to the producer for his total production is affected to some degree by his distance from the market, in so far as this factor is considered in allotting district quotas. There is no rigid formula linking the quota with the freight cost, but a factory near the market usually receives a higher quota than a factory on the edge of the zone.

Under any system designed to secure milk at minimum transportation costs there would be a seasonal expansion and contraction of the area supplying liquid milk. However, Milk Board supervision over the handling and treatment of milk necessitates certain facilities and structural improvements on dairy farms and in factories receiving milk for the liquid market.

If the area from which milk was drawn contracted in periods of flush production, these facilities for the handling of liquid milk would not be used during those periods [19]. The problem of seasonally idle plant would occur only over the area affected by this seasonal contraction and expansion. In the area from which milk is drawn at all periods of the year this problem would not occur, except in so far as the quantity of milk handled and treated by the plant varied seasonally.

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[19] Seasonality of production poses a similar problem regarding the full utilisation throughout the year of plant used for manufactured dairy produce.

Under a quota system, plant used in handling high quality milk would be idle throughout the whole of the area supplying milk at any time during the year, with the exception of districts very close to the market where no quota is applied.

The provision of special factory buildings and equipment for handling milk for human consumption must necessitate some idle plant, when production varies seasonally. The problem of seasonal excess capacity is enhanced to the extent that processing is highly decentralised. However, the quota system results in more idle plant and higher freight costs than a system under which supplies are always drawn from the minimum possible area around the market.

An example of the latter type of system is the payment of a pool price to all zone producers, with or without a freight differential. Under this system, used in some American milk markets, all suppliers receive the same price for their milk. This price represents the return per gallon secured from a pool into which is paid income received for milk diverted to different uses. Milk requirements can thus be drawn from areas nearest the market without unduly penalising producers further out. Apart from savings in plant costs and freight costs, this tends to minimize the time elapsing between milking and delivery to the consumer.

Under this system the industry's freight costs are minimized whether the producer or the pool pays the freight. Stitts and Gaumitz, reporting on American practice, state that:—

> One of the few differentials almost universally used in pooling sales returns is that based on location in relation to transport costs. Producers in a "zone" nearer the city usually get a higher net return. In many cases all transportation costs are deducted from the pool, but prices to farmers are adjusted through "zone differentials"[20].

In New South Wales, all sweet cream for consumption in the principal markets is railed to market as whole milk and separated on arrival. This means that freight costs are higher than would be the case if the cream was separated at country factories. Separation of cream on the farm has never been seriously considered because of the difficulty of maintaining quality standards. In 1936, Mr. E. H. Swift reported:—

> I am satisfied that separation in Sydney is, on the weight of the evidence, the only satisfactory method of dealing with sweet cream for the whole of the purposes for which it is used. By that means only can the best quality be assured[21].

Apart from the deleterious effects of rail transportation on cream quality, cream is much more difficult to handle than milk, since it tends to adhere to the sides of containers, and the distributing companies are not equipped to handle cream in bulk.

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[20] T. C. Stitts and E. W. Gaumnitz, *Relative Prices to Producers under Selected Types of Pools*, Farm Credit Administration Bulletin 25, Washington, 1938, p. 55.

[21] Quoted in Murphy, *op. cit.*, p. 76.

9. FACTORS CONDUCIVE TO CONTROL OF MILK PRICES.

Some measure of control over the marketing of milk is necessary to safeguard quality. However, this is not the only motive for the widespread practice of bringing milk distribution under public control. According to Cohen:

> The competitive determination of prices is not desirable in the case of milk for three main reasons. In the first place, competitive prices are likely to prove unstable, since the demand for milk is inelastic, and supply responds substantially, though tardily, to price changes. Any chance variation in volume, therefore, sets up a cycle of fluctuations in prices and production. In the second place, farmers rarely equal dealers in bargaining power. Milk can be wholesaled more cheaply on a large than on a small scale; so dealers are few relatively to farmers. Finally, milk prices must be determined for a substantial period in advance. It is desirable, therefore, that farmers should organize, as in fact they have done in most of the areas supplying large cities in America[22].

The practical difficulties, however, in the way of price-fixing are considerable. A flexible price accurately reflecting demand and supply conditions can be considered as one of the essential aims of good administrative pricing [23]. Theoretically, the correct price is that which is equal to the marginal cost of producing the volume of milk which is demanded by consumers at a price equal to such marginal cost plus prevailing marketing margins.

However, the task is complicated by many factors. Because of variations in annual production due to natural causes, some production must be secured in excess of estimated requirements. This, together with the natural production cycle, necessitates some system of multiple prices such as is provided under quota or pooling schemes.

10. MULTIPLE PRICE SYSTEMS FOR MILK.

Two main methods have been used in other countries to enable the payment to producers of differential prices for milk according to the use to which it is put. These methods can be broadly classified as Pooling and Quota Schemes. Some method of seasonal price differentiation is often used in association with these schemes. It is proposed to discuss these methods of organised marketing in relation to the problems of milk marketing in New South Wales.

(a) Quota Schemes.

The characteristic feature of quota schemes is that a certain quota of the farmer's total milk production is paid for at the liquid price, the remainder being marketed in the form of manufactured dairy produce, which yields a lower price.

One of the earliest schemes of this type was introduced in 1918 by the Maryland State Dairymen's Association in the United States [24]. The producer was paid the liquid price for a fixed basic quantity of his milk, equal to his average production in the period of the year when

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[22] R. L. Cohen, *A Survey of Milk Marketing Schemes and Price Policies*, University of Cambridge, Department of Agriculture, Farm Economics Branch, Report No. 20, 1933, p. 58.

[23] An interesting plan for flexible milk pricing has recently been adopted in the Boston (U.S.A.) milk market. For details see W. C. Welden, "Formula Pricing of Class I Milk under Market Orders," *Journal of Farm Economics*, Vol. XXXI, No. 1 (February, 1949), Part II, pp. 420-427.

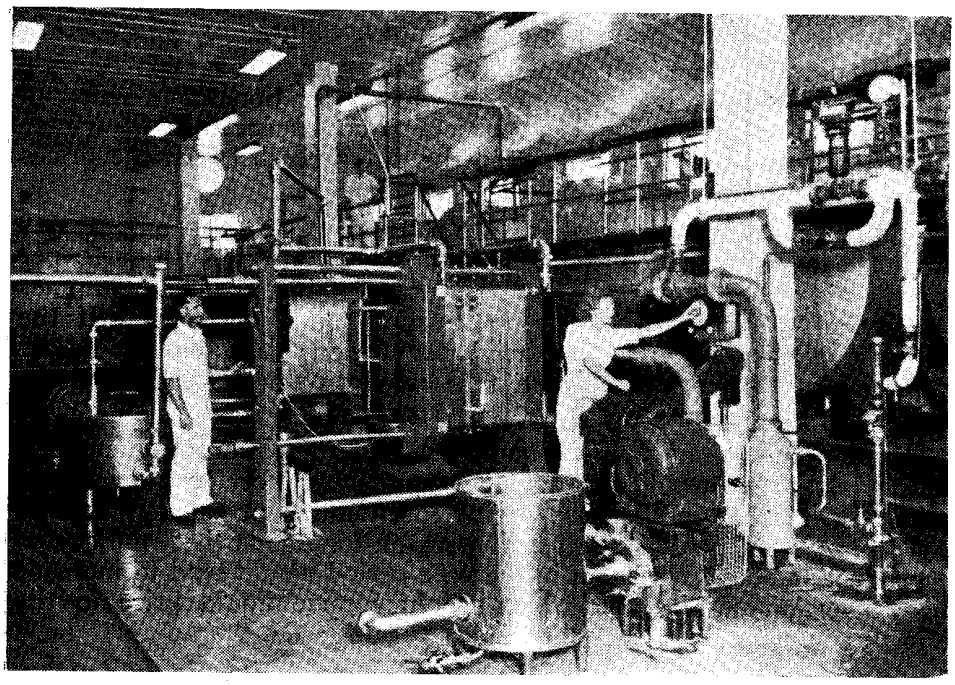
[24] Cohen, *op. cit.*, p. 30.

total supplies of milk were lowest, *i.e.,* his liquid milk quota was based on his winter production. All production over and above this fixed basic quantity was sold at the surplus price. However, this scheme can only be applied when the demand for liquid milk is approximately equal to the supply at the period of lowest production.

Small differences between basic purchases and liquid sales can be covered by an adjustment fund built up from a levy on all milk produced. Payments out of, or into, the fund can be governed by the relative movement of payments to farmers for liquid milk and receipts from liquid milk sales less marketing margins.

Where the sum of all basic quantities regularly exceeds the total demand in the period of low supply, a variant of this plan, known as the "Pittsburgh Scheme," can be applied. Under this scheme producers are paid the liquid price for an amount of their milk equal to their production in the base period (the period of lowest supply) multiplied by the ratio of total liquid sales in that period to total basic production.

However, the above two methods do not automatically take account of seasonal variations in demand for milk such as occurs in New South Wales, since the basic quantities are fixed throughout the year. To cover this difficulty a system of flexible quotas is more applicable.



A Modern Pasteurising Plant.
—Photo. by courtesy of Dairy Farmers' Co-op. Milk Co. Ltd.

Under such a system, producers are annually allotted a basic quantity assessed on winter production. The total of the basic quantities is fixed at the level of minimum expected demand. During the greater part of the year the total of the basic quantities will not be sufficient to meet the demand, so the monthly quotas are adjusted until their sum is equal to the demand. Where the monthly demand is twenty per cent. above the total of the basic quantities, each farmer has his quota increased by

twenty per cent. Thus the proportion of any farmer's production which receives the liquid price is determined by his production in the base period, *i.e.*, the winter months.

The calculation of the quotas could be done when the farmer's cheque was due. The scheme could also be supplied on a factory basis, quotas being allotted to the factories, who could then allot quotas to suppliers.

It should be noted that the total of basic quantities need not be fixed at the level of minimum demand, but could, in fact, be set at a level equal to, say, the average amount demanded. This method was used in England in 1922 by the Permanent Joint Milk Committee. "Standard quantities" were set for all producers based on winter production. The producer's quota of liquid milk for the month was equal to his standard quantity multiplied by an index which reflected the relation of demand and supply during the month, *e.g.*, in the period of short supply the producer's monthly quota might be 1.15 times his standard quantity. In a flush period his quota might drop to 0.75 times his standard quantity [25].

The method used by the New South Wales Board in allocating, among factories, the difference between demand at any period and total quotas, differs from the foregoing schemes in that the increase is allocated in proportion to quotas which are based mainly on total production and the previously existing share of the liquid trade, rather than winter production. The latter is, however, taken into account.

The scheme of a variable quota based on winter production offers a strong financial incentive to modify seasonal fluctuations in production. The benefits to be obtained by farmers from an increase in winter production would be dependent upon the difference between the prices paid for liquid and surplus milk.

Assuming that 40 per cent. of the average producer's output was produced in winter and 60 per cent. in summer, an increase of 10 per cent. in winter production, without any corresponding change in summer production, would increase total production by 4 per cent. If the farmer's quota were based on total production his quota would be increased by 4 per cent., but if it were based on winter production the increase in his quota would be 10 per cent.

Under a scheme of variable quotas related to winter production, a financial incentive would be provided for the producer to increase his production further in the base period, even if his production in that period was exceeding his quota. The reason for this is that the excess of production above his quota in the base period would tend to increase the proportion of his milk which would receive liquid price in the following summer.

(b) Pooling.

Under a system of pooled prices there would automatically be a higher blended price in summer than in winter, since in winter a higher proportion of the pool milk would be absorbed by the more remunerative liquid milk market [26]. However, it is possible to pay in addition, a

[25] *Ibid.*, pp. 46-50.

[26] It should be noted that this seasonal variation of the average return to the producer is not dependent upon pooling itself but on the variation in the proportion of total production absorbed by the liquid market.

pool differential to producers who maintain winter production, at the expense of producers whose winter production falls considerably. This can be done by setting aside, from the pool funds, a certain sum from which to pay premiums to "even" producers.

The general argument in favour of paying seasonal differentials from pool funds is that producers whose milk shipments vary in volume should be paid a pool price weighted more heavily by lower surplus prices in flush seasons. Similarly it is alleged that "even" producers should be paid a pool price nearer to the liquid milk level, since their milk shipments more nearly coincide with what the market demands. Zone differentials can also be applied to a pool, as is often done in the United States, so that producers close to the market receive a price higher than more distant producers.

Pools can be organised on a factory basis or on a zone basis. It is only in the latter case that the advantages of pooling, mentioned in the discussion of "freight rates," accrue to the industry.

(c) Seasonal Price Differentials.

The practice of paying a higher price for liquid milk in winter than in summer, as is done in New South Wales, is widespread. Wherever a marked seasonal fluctuation in production occurs, the price paid should be higher in periods of shortage if the administered price is to reflect changes in the relation of demand to supply.

A seasonal price differential can be used in conjunction with a quota scheme based on winter production. These two elements would give the milk producers a very strong financial incentive to reduce the seasonality of production.

A policy of paying a seasonal price differential to encourage winter production rests on the assumption that an even supply of milk is desirable. Where rationing is necessary in the winter months, a more even supply would reduce or eliminate the social cost of rationing. An even volume of production would also make possible a fuller utilization throughout the year of all assembly and transportation facilities and processing plants for manufactured dairy produce. Steady production would moreover enable a smaller number of producers close to the market to supply fully its needs throughout the year. This would make possible a reduction of handling facilities and a saving in freight costs. On the other hand, it could be alleged that winter costs of production are higher than summer costs, and that, *ceteris paribus,* even production involves a higher average cost than uneven production.

The price premium for winter production can either be taken from the pool, in which case the retail price need not be higher in winter, or it can be paid by means of a seasonal variation in retail price. Quota schemes based on winter production provide an incentive by offering the "even" producer a higher share of the liquid market without necessarily raising the winter retail price. However, to the extent that it affected overall costs of production, any method of increasing winter production would result in a pressure towards a higher retail price.

11. ALTERNATIVE METHODS OF OVERCOMING THE SUPPLY PROBLEM.

The alternative methods of overcoming the problem of periodic shortages of milk are:—

(1) An extension of the zone.
(2) A partial abandonment of the zoning principle.
(3) Increased winter production within the existing zone through a reduction in the seasonality of production and/or a general increase in production throughout the year.

The immediate practical difficulty associated with an extension of the zone is the availability of necessary facilities. Country depots outside the zone would have to be equipped for the proper treatment and handling of liquid milk. This problem has always worried the Milk Board whenever it has attempted to secure supplementary supplies from outside the zone.

If the zone were extended and the quota system still operated, some milk would have to be drawn from the new areas in periods of surplus milk production. Hence an extension of the milk zone would involve an increase in freight costs, and possibly deleterious effects on quality through longer haulage.

The Milk Board has recently signed five-year contracts with eight northern factories under which the factories have agreed to supply to the Board a minimum of 160,000 gallons weekly in the winter months, March to August inclusive. Whether this amount will, in fact, be forthcoming, and whether this measure will provide a temporary or permanent solution in the fact of increasing demand, is not yet certain. Under the terms of the contracts it will not be necessary for the Board to draw milk from these factories in the summer months.

The choice between an extension of the zone and increased winter production within the zone raises the question as what price incentive is necessary in order to stimulate winter production to the required extent. If the necessary increase in price is too large, it would be preferable to extend the zone.

In this respect, it is important to consider to what extent present deficiencies are due to lack of price incentive. The extent of farmers' response to price is exceedingly difficult to predict, but a relatively inelastic supply curve may be a possibility. It is extremely difficult to evaluate the advantages and disadvantages of these alternatives, but the problem seems to resolve itself into a comparison between the social cost of rationing, the social cost of an extension of the zone, and the social cost of stimulating increased production within the existing zone by the payment of an adequate price-incentive.

12. RETAIL DISTRIBUTION.

In pre-control days, there were virtually no restrictions on the issue of licenses for milk delivery. Competition for trade was intense and led inevitably to uneconomic and unhygienic distribution. In particular, the overlapping of delivery routes was very marked.

Several methods are available to increase the efficiency of milk deliveries. The main objective of all of them is to increase the density of deliveries. This can be achieved by (1) increasing the number of

customers per delivery mile, *e.g.*, by milkmen exchanging customers and pooling routes, and by the allocation of exclusive areas or zones, or (2) increasing the volume delivered to customers, *e.g.*, alternative day deliveries double deliveries per customer, or the reduction of deliveries from twice a day to once a day.

Both of these measures have the effect of reducing total delivery mileage. Without control of milk delivery, a situation can arise where the total distance travelled by milk vehicles is equal to, say, ten times the mileage of streets on which deliveries are made. The adoption of a system of exclusive areas or zoning amounts to the granting of a monopoly to a milk carter over a particular area. Because this system amounts to the granting of a monopoly, it follows that some sort of public control is necessary over quality, price and service. This system works best where quality is fairly standardized.

One argument often levelled against zoning is that consumers accustomed to purchasing a certain type of milk might object if forced to buy from a dealer who did not carry a comparable product. Another objection is the lack of direct competition, which might lead to a deterioration in quality and service.

Under a zoning system, a very efficient vendor offering improved service is unable to attract trade from less efficient competitors. An alternative to a system involving exclusive areas is one involving semi-exclusive areas. Under the latter system several dealers are permitted to deliver in any one area, thus allowing an element of competition and providing the consumer with some choice. This method was used in war-time England. It obviously does not lead to the same saving in delivery mileage as stricter zoning.

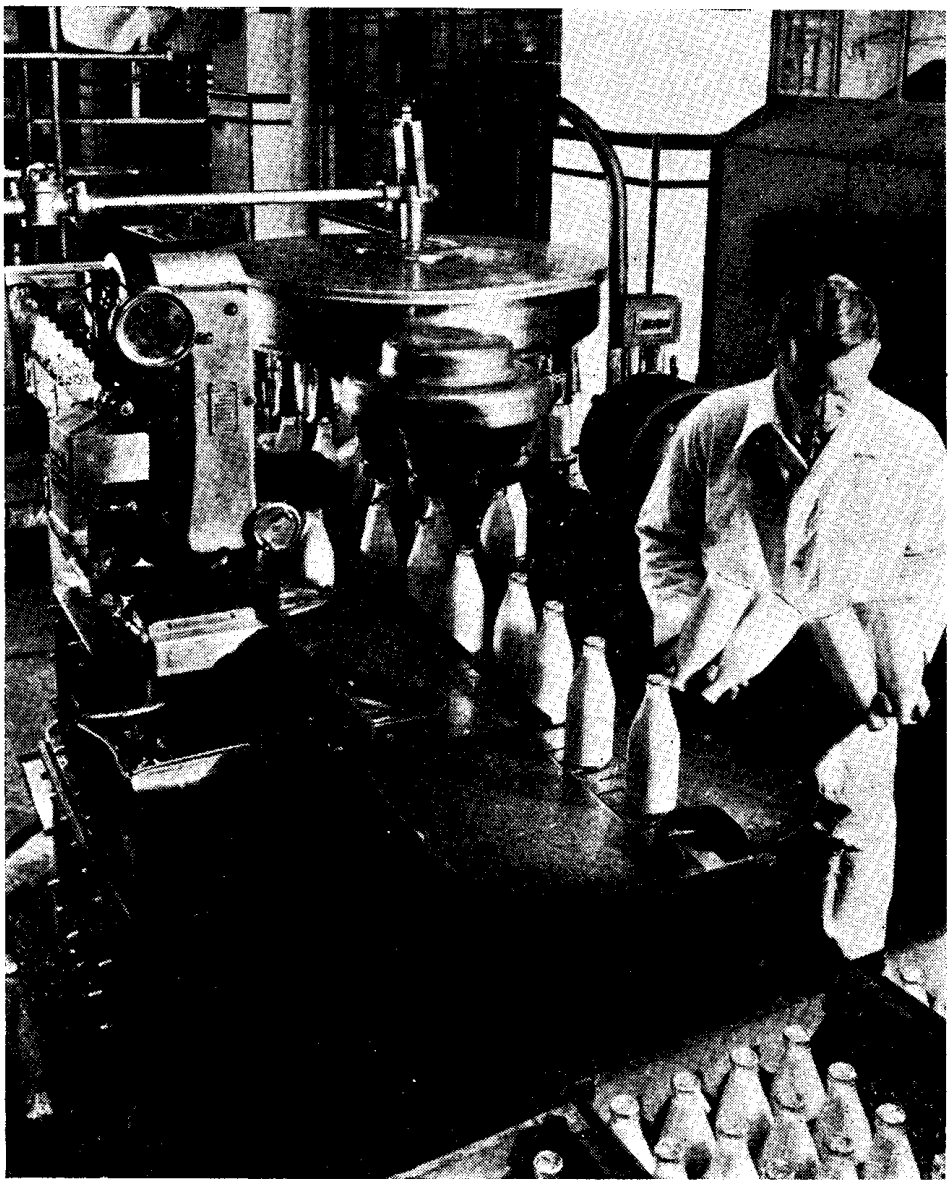
The alternate-day delivery method of reducing delivery costs is more feasible in parts of America where it is practised than in Sydney. The two important factors to be considered in this connection are climate and the availability of refrigeration to the general public.

The pooling of milk deliveries has frequently been advocated as a method of eliminating duplication of milk routes. Under this plan, the deliveries of all vendors in areas where duplication occurs would be handled by a single truck. The proposal has been criticised, however, because of the complications involved in assembling the milk and loading the truck, handling the mixed load on the route, and keeping separate books. Where a number of dealers are operating and each handles a variety of grades of milk, it seems clear that complete pooling would be unwieldy. In conjunction with semi-exclusive deliveries, however, it appears to have some advantages. Semi-exclusive deliveries with pooling would retain the major advantages of exclusive milk deliveries and yet provide some choice for consumers.

During the years the Milk Board has been in operation there has been a consistent policy against the extension of trade to other areas or the registration of new vendors, except by way of transferring existing runs. During the 1936 investigation, producers' interests urged the blocking of milk deliveries as a means of reducing costs, fearing that otherwise the current demand by consumers for lower prices might lead to a reduction in prices to the farmer. The New South Wales Milk Board, in the period between 1938 and 1941, conducted investigations

into the conditions of retail distribution with the object of assisting it in re-organising milk delivery along the lines of zoning. The Board's policy of restriction of licenses and the consolidation of milk runs was continued. The statistics in Table VI show that this was accompanied by a gradual increase in delivery efficiency with a consequent reduction in costs.

The retail prices fixed under the Milk Act are maximum prices and vendors are quite at liberty to sell below these prices. Toward the end of 1932 the Milk Vendors Association formed an organisation known as The Retail Milk Trade Consultative Committee for the purpose of stabilising retail prices at the Board's maximum rates. This organisation had as one of its main purposes the disciplining of price-cutters.



Milk Filling and Capping Machine.

—Photo. by courtesy of Dairy Farmers' Co-op. Milk Co. Ltd.

It discouraged the canvassing of trade, although it did arrange exchanges of customers between vendors. The Committee's "regulation" of vendors became no longer necessary when the introduction of the block system of deliveries ended any possibility of competition between vendors.

During the second World War, the Commonwealth Government was faced with the necessity to effect considerable savings in man-power and transport. The Department of War Organisation of Industry, in consultation with the Milk Board, decided that milk distribution should be re-organised by introduction of the block system of distribution and once-a-day delivery. It was left to the Board to establish and allocate the blocks so as to give each vendor his appropriate share of trade in the most convenient and economic area. The Department of War Organization of Industry would not agree to a zoning of deliveries with two or three vendors in each zone, but directed that distribution must be conducted on the basis of "one vendor, one block." Until the introduction of zoning, afternoon delivery of milk was common in Sydney, and in 1941 approximately 20 per cent. of Sydney's milk supply was delivered in the afternoon. This practice had become less common as the quality of milk had improved during the 'thirties.

The block system has yielded considerable savings in costs of delivery. Complaints of inadequate service were inevitable, and close supervision was, and is, necessary. The compulsory system continued until 1947, when there was a reversion to the previous method of registering vendors to trade anywhere within the boundary of specified municipalities and shires. However, vendors preferred zoning to the earlier competitive system of trading, and, since 1947, they have continued an unofficial zoning by arrangement amongst themselves.

An indication of the effect of zoning and the abolition of afternoon deliveries on delivery efficiency is given in Table VI.

TABLE VI.

Indices of Milk Delivery Efficiency in the Sydney Distributing District, 1938 to 1950.

Year ended March.	Quantity Delivered Daily per Man.	Quantity Delivered Daily per Vehicle.
	Gallons.	Gallons.
1938	34.65	54.19
1939	35.26	51.82
1940	37.01	52.51
1941	38.77	54.52
1950	85.28	88.98

Source:—N.S.W. Milk Board Statistics.

It is, of course, impossible to say that the whole of the improvement in delivery efficiency as shown by these two indices is due to the introduction of zoning and the abolition of afternoon deliveries. These are only two of the many factors which differ between the 1938 to 1941 period and 1950 [27].

[27] One important factor to consider here is that in the former period considerable quantities of cream were delivered, whereas in 1949-50 cream rationing was in force.

The gradual improvement in the 1938-41 period in delivery efficiency shown in Table VI is very probably related to the Milk Board's policy of restricting the issue of new vendors' licences, thus encouraging the growth of larger milk runs.

The extent to which milk delivery costs have been reduced by zoning and the abolition of afternoon deliveries is a matter deserving of further research. However, the results of a study along these lines in the retail milk markets of Connecticut (U.S.A.) indicate that the savings can be considerable [28]. There is no reason to assume that the degree of duplication of deliveries in Connecticut markets in 1940 would correspond with the degree of duplication in Sydney in the pre-zoning period. However, it was discovered that if the exclusive area system had been adopted in the eight major towns of Connecticut, daily delivery mileage would have dropped from 25,710 to 3,420—a reduction in mileage of 87 per cent.

13. STANDARDISATION OF MILK AND BUTTER-FAT DIFFERENTIALS.

In many overseas countries, particularly in the United States, there is a common practice of paying different prices to milk producers according to quality, in particular, according to butter-fat content [29]. In New South Wales, however, the zone producer gets the same price for his liquid milk, whether it be 3.5 per cent. or 4.5 per cent. butter-fat. Standardisation of the milk at any stage of the marketing process is illegal, so that it is not open to a farmer or a factory to reduce the butter-fat quantity of milk handled to the minimum acceptable level by adding skim milk or separating some of the cream.

Suggestions were made during World War II that Sydney's milk supply be standardised at the minimum legal level under the Pure Food Act, in order that the butter-fat so obtained could be used to alleviate Britain's butter shortage at the time. Since the butter-fat content of Sydney's milk supply in winter sometimes reaches as high a level as 5 per cent., such a measure would have yielded a considerable quantity of extra butter. In support of the proposal it was asserted that the difference in taste of 5 per cent. and 3.2 per cent. milk is not discernible, and that the difference in nutritive value is small. However, the measure was not adopted.

Most associations of milk producers in the United States have adopted schemes for payment for milk according to its butter-fat content. Each association has fixed a standard butter-fat content for which the established price is paid; for any variations from this standard premiums are paid or discounts charged. Many United States milk pools pay producers on the actual weight of butter-fat supplied.

Payment of butter-fat differentials would tend to stimulate high-quality production, which, with standardisation, would become equivalent to increased production in terms of gallons of milk. This could be passed

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[28] R. G. Bressler, Jr., D. A. Clarke, Jr., and S. K. Seaver, *The Efficiency of Milk Marketing in Connecticut, 9. Conservation Possibilities in Retail Delivery in Major Markets,* Storrs Agricultural Experiment Station Bulletin 253, 1944.

[29] It is also possible to pay quality premiums, or impose penalties, on the basis of the solids-not-fat analysis or the bacterial content of milk. Payment on these bases is technically more difficult.

on to the consumer in lower prices, or differential retail prices could be fixed according to quality. If quality differentials were paid and the milk were not standardised, the probable result would be an improvement in the quality of the milk supply instead of a price reduction.

Receiving depots are already equipped to standardise milk, but extra expense would be involved in more frequent tests of the butter-fat content of the individual producer's milk. The payment of butter-fat differentials is facilitated by a pooling system, insofar as a pool fund can be set aside for the payment of quality premiums.

Many alternatives are available in fixing the rate of quality differential. One method frequently used to pay for extra butter-fat content is the butter price equivalent, although where consumer demand for higher quality milk warrants it, the quality differentials could be increased above this level. Some formulae have been devised to base quality differentials on the increased energy value of high quality milk [30]. Another method of payment is to base the differential on the extra feed costs necessary to produce a higher butter-fat content. Carried to its logical extreme, this becomes a method of paying quality premiums on an equal profit basis.

A more flexible quality differential is obtained if the differential is expressed as a percentage of the liquid milk price, *e.g.*, 1½ per cent. of liquid price to be added for every 0.01 per cent. of butter-fat content above a base figure.

Where payment of quality differentials to producers is accompanied by standardisation, without any quality differentials at the retail level, one basis for butter-fat premiums would be to compute the market value of the extra milk yielded from standardisation of high quality milk.

Where different retail prices are fixed according to butter-fat content, the valuation set by the consumer on quality should be the basis of quality premiums for producers.

Section 23 of the Milk Act empowers the Milk Board to fix different prices (farm, wholesale and retail prices) according to differences in quality. At present, special pasteurised milk, produced on the Camden Park Estates and conforming to special conditions for butter-fat and bacterial content, commands a higher price in Sydney.

The Secretary of the Milk Board has stated his opinion that:

> Whilst payment to producers on a quality basis has, in the past, been the subject of intermittent consideration, it is unlikely to be generally adopted unless there is (as there has been in in the United Kingdom and the United States) a public demand for special grades of milk at special prices [31].

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[30] cf. E. G. Misner, *Some Methods of Computing Butter-fat Price Differentials*. Department of Agricultural Economics, College of Agriculture, Ithaca, New York (mimeographed), 1943.

[31] Murphy, *op. cit.*, p. 138.