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THE DAIRY INDUSTRY ON THE FAR NORTH COAST OF NEW SOUTH WALES

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SUMMARY

Part I.—The New South Wales Department of Agriculture and the University of New England are co-operating in a research programme on the economic problems of the dairy industry in the Far North Coast area of New South Wales. This region is one of the most important butter producing areas in Australia. Further, while farm incomes apparently compare favourably with those in many other Australian dairying regions, it still seems that there is a substantial “low-income” problem. This is indicated by reports on a number of farm surveys and is reflected in a decline in the number of dairy farmers in the area.

In the 1953 cost-of-production survey by the Bureau of Agricultural Economics and the State Departments of Agriculture the region was made the subject of a more detailed analysis of the factors related to financial success in dairy farming. Also, since 1949 there has been a number of special purpose surveys. These include:

- (a) a study of the factors underlying a decline in productivity;
- (b) a study of the tenure pattern and its agricultural and sociological implications;
- (c) an evaluation of methods which could be used to improve the incomes of a sample of small farms; and
- (d) a study of the social and economic factors affecting farmers' acceptance of extension advice.

The main conclusions of these studies are briefly summarized in Section 2.

There has been a decline in both the number of dairy cows and commercial dairies in the area. For the Richmond-Tweed Region, which is effectively equivalent to the Far North Coast area and more convenient for statistical analysis, in 1960 the number of dairy cows (in milk and dry) stood at 237,800 only 84 per cent of the 1939 level, while the number of commercial dairies, at 4,230 was 81 per cent of the 1939 number.

Low incomes and a contracting industry appear to be the result of a complex of technical and socio-economic factors. The technical factors include:

- (a) rainfall which is unreliable in the critical spring period;
- (b) a decline in soil fertility since settlement; and
- (c) pastures which are predominantly grass dominant and of low quality.

Two socio-economic factors which are briefly discussed are those of an ageing farm population and the sharefarming system of farm operation.

The general features of the region's environment are reviewed in Section 4. Also special attention is given to the results of technical research at Wollongbar Agricultural Research Station. One of the most interesting of these is the testing of a range of legume species and the associated problems of plant nutrition, establishment, etc. It appears that substantial improvements in pasture quality and production should be possible in the relatively near future.

Part I concludes with brief sections describing the organization and objectives of the economics research programme. The objectives may be summarized as:

- (a) undertaking economic analysis aimed at providing information for an extension programme designed to improve the management of existing farms ;
- (b) studying the long-term adjustment of the industry to changed economic, technical and social conditions with the aim of providing recommendations to facilitate this process and reduce the hardships involved.

Part II.—A sample of sixty Far North Coast dairy farmers was interviewed as a preliminary step in the research programme. The final sample, which was selected by quasi-random processes, without controls for tenure characteristics, appeared to contain a disproportionate number of share farmers, and average per farm production seemed slightly higher than that of the population from which it was drawn. Also, seasonal and price conditions were more favourable than it seems realistic to expect for the next few years. However, the results for the 1958-59 year are considered to be reasonably close to those for an "average" season.

In the presentation of the financial data the sample is separated into three tenancy groups—owner-operators, sharefarmers and sharefarm owners. It is emphasized that the method of analysis must be studied in detail for satisfactory interpretation.

If the estimates of opportunity costs for the labour and capital used on the sample farms are realistic it appeared that net incomes were substantially less than satisfactory. Thus the data on income provides a recent and confirmative test of the hypothesis that the contraction in the number of dairy farmers in the area is largely, or partly, due to low farm incomes.

The sharefarming system of farm operation was referred to by the recent Dairy Industry Committee of Enquiry as a cause of many of the low income problems in the industry. This structural feature of the industry is discussed at some length. It is shown that the share agreements used are closely similar to the perfect agreement suggested from economic theory. Further, the sharefarms and owner-operated farms were of approximately equivalent average size and production. However, expenditure on such items as "repairs and maintenance" and "feed, seed and fertilizer" on the sharefarms was very substantially below that on the owner-operated farms. A number of reasons are suggested for disinvestment and lowered intensity of operation on sharefarms. In particular it is shown that there is a group of owners, those who are retired or widowed, with farms providing low incomes to the sharefarmers. Thus these owners are a problem group in the industry whose existence should be borne in mind. However, no attempt is made to suggest how such a problem sector can be effectively, yet necessarily sympathetically, treated other than to formulate some obvious principles which merely represent a starting point for constructive thought on improving the sharefarming system in general. It is also emphasized that any criticism of sharefarming must be made with the reservation that it frequently is a good system in which an energetic man can progress at a fairly satisfactory rate towards the goal of farm ownership.

A further section of the article is devoted to a statistical analysis of the relationship between production and net income per farm and an evaluation of the effect of the Committee of Enquiry's recommendation that the subsidy to the dairy industry be removed over a period of ten years. A decline in returns of such magnitude would apparently cause substantial hardship among those Far North Coast dairy farmers who would then be producing at the Committee's minimum target level of a farm income equivalent to that from 8,000 lb. butterfat plus sales of pigs, calves, and culls. It is estimated that some 20 per cent of the owner-operators producing at this level, at present, without the subsidy, would receive less than £870 per annum to meet their needs for living expenses, for loan repayments and interest, and for any additional developmental expenditure.

The final section of the article provides a description of some characteristics of the sample farms, chiefly by frequency distributions and averages. In 1958-59, average herd size was fifty-six for the owner-operator group and fifty-four for the sharefarmer group, while average production per cow was respectively 174 and 171 lb. commercial butter. Some attention is given to:—

- (a) the number of farms on which production fell below the 8,000 lb. butterfat standard which was mentioned above. It was estimated that ten out of twenty-seven owner-operator farms and sixteen out of thirty-one sharefarms required further development to raise production to this standard;
- (b) F. H. Gruen's claim that for this area number of cows is more important than production per cow in determining financial success. No clear answer emerges and it is suggested that the appropriate answer must be given with knowledge of the particular farm and farmer rather than as a rule of thumb;
- (c) aspects of farm practices such as spray irrigation, vetch production, grazing control and alternatives in the disposal of skim milk. No attempt is made at an economic evaluation of these practices.

Part I: INTRODUCTION TO AN ECONOMICS RESEARCH PROGRAMME

1. INTRODUCTION

At the beginning of the 1959-60 financial year the Australian Dairy Produce Board, under the terms of the Dairy Produce Research and Sales Promotion Act, made grants to the Division of Marketing and Agricultural Economics, New South Wales Department of Agriculture, and the Faculty of Agricultural Economics, University of New England, so that they could engage in a joint programme of research into the economic problems of the dairying industry on the Far North Coast of New South Wales.

Before proceeding to specify the objectives of the research programme it seems desirable to elaborate the reasons for the selection of the Far North Coast region as the area for this research.¹ This discussion will also serve as a general introduction to a series of articles on the results of the programme.

¹ It is expected that the author will be stationed at Lismore for several years and that, while giving some time to the problems of other North Coast areas, he will concentrate on detailed investigations in the Far North Coast Area.

First, the region is one of the most intensive and important butter-producing areas of the Commonwealth. While it is only 1.2 per cent of the area of New South Wales, at March 31, 1960, it supported 26 per cent of the State's dairy cows (in milk and dry). It is comprised of the Upper Clarence Valley and the valleys of the Richmond, Tweed and Brunswick Rivers.² The watersheds of the Richmond and Brunswick Rivers include the "Big Scrub" area; an area of 250 square miles of intensively dairied red soil, on a basalt plateau between Lismore and the coast.

A second reason lies in the economic problems of the dairying industry of the Region. Evidence of returns to labour and/or capital which are low by comparison with other industries in the same economy may be obtained from two general sources; direct attempts at comparing incomes and evidence of migration from the industry concerned. The economic surveys which are discussed in Section 2 (*Previous Surveys*) provide evidence of the first type. Migration data are provided in Section 3 (*A Declining Industry*). Both types of evidence must be accepted with some reservation. On the one hand, income studies are frequently open to criticism on the grounds of neglect of non-cash forms of income, such as the rent of houses used by sharefarmers and the goods consumed which are home grown, and of the problems involved in estimating net income. On the other hand, evidence of migration which relates only to loss from one industry, without reference to where it has been absorbed, must be accepted with some reserve because the explanation may lie in an industry which competes for two or more of the fairly immobile factors of production, that are easier to transfer together than separately, and is in a particularly prosperous condition. For example, it could be argued that in this case the beef cattle industry partly fulfils these conditions; the partly-tied factors are, of course, land and labour.

However, despite these reservations, the evidence quoted below and in Part II of this article, together with observations on living standards, is taken as a definite indication of a low income problem in the area.

An approximate idea of the relationship between net incomes of dairy farmers on the Far North Coast and those of dairy farmers in other areas of Australia may be obtained from the report on the 1953 cost-of-production survey of the industry.³ In a ranking of thirty-five dairying regions on the basis of "average return on capital", a ranking which would be similar to one based on the "net income" concept used in this study, the Big Scrub area of the Richmond-Tweed Region was listed as third highest in the Commonwealth, while the region comprised of the remaining portions of the Richmond-Tweed was listed as eleventh highest. This ranking must be accepted as only a very general indication of the relationship. The sampling procedure eliminated farms which did not reach a specified level of production and herd size, and exceeded certain limits with respect to

² See Map 2 and Section 4 for a more precise definition. The reader should note that the terms "Richmond-Tweed Region" and "Far North Coast" refer to practically the same area.

³ 1953 *Dairy Survey: Costs and Incomes of a Sample of Butterfat Producers in Australia*, Bureau of Agricultural Economics, Canberra, July, 1955. The net income levels of Australian dairy farmers are thoroughly reviewed in *The Australian Dairy Industry, An Economic Study*, edited by N. T. Drane and H. R. Edwards (Melbourne: F. W. Cheshire, 1961), Chapter 6.

income derived from sidelines ; these restrictions, which were necessary to fulfil the "cost of efficient production" concept and to prevent serious errors through difficulties in measuring sideline costs, considerably reduce the validity of the regional comparisons. Another factor is that, in the period which has elapsed since the cost-of-production survey, it may be that some of the southern dairying areas have had greater productivity increases.

A third reason, which is intimately related to the second, lies in the technical problems of the area. Some of the more important of these may be listed as:

- (a) rainfall which is unreliable in the critical spring period—the period when many of the cows in the region commence lactation ;
- (b) a decline in fertility since settlement which has not been overcome with fertilizers, and has therefore accentuated the problems arising from inadequate farm size ; and
- (c) pastures which are predominantly grass dominant and of low quality, except in the early part of the summer period of rapid growth. This problem is closely related to (a) and (b), and shows itself particularly in the low average production per cow.

In general, it seems that environmental conditions, not well suited to the persistent growth of the plants that are so valuable in the more southern dairying areas, have so far considerably restricted per acre productivity increases. A fuller discussion of these problems is given in section 4 (*The Region and the Environment*).

Finally, there are important problems which are best described as socio-economic. There is apparently a fairly high incidence of aged farmers. On the one hand, this adds to low income problems in an industry which requires much physical effort and progressive adjustment to change. On the other, it seems that elderly people with no family to support can achieve their desired standard of living with a lower income. Evidence of the age structure of the dairy farmer population of the region has not yet been collated and is therefore not included in this article.

A second problem of a similar nature is the extent of the sharefarming system of farm operation. This problem is briefly referred to in Part I of this article and in greater detail in Part II, Section 11 (*The Sharefarm Problem*). Sharefarming may be a satisfactory or good system if the owner is progressive. However, it frequently happens that it serves to retain the management of a farm effectively in the control of an aged and conservative ex-farmer. This particularly applies when the sharefarmer is a relative and the owner continues to live on the property. Thus a son, who will eventually inherit the property, may spend his potentially most productive years while prevented from effecting needed changes in farm organization by the conservative attitude of his father.

Thus, there are a complex of technical and social factors which have so far prevented per acre productivity increases sufficient to give, and maintain, satisfactory income levels under present price conditions. Why has this not been adequately compensated for by increases in the size of farms, and the elimination of marginal farms?

The social and institutional factors leading to relatively slow adjustments in these directions include: that older farmers have difficulty in obtaining off-farm employment, the desire of farmers to remain self-employed, the

need to buy additional land near or adjacent to the existing farm, and the problems low income farmers experience in obtaining credit.⁴ Some of the factors which were mentioned as restricting per acre productivity are also obviously important.

2. PREVIOUS SURVEYS

The first survey of the dairy industry in the Region, by the Division of Marketing and Agricultural Economics of the New South Wales Department of Agriculture, was made in 1949.⁵ It was an economic survey with special reference to trends in the productivity of farms on the red basaltic soils of the Far North Coast. At that time the problems of this area had been brought into prominence with the recognition of a decline in butter production. A two-pronged approach was made towards rectifying the deficiencies in the basic knowledge of the area. On the one hand, the CSIRO and the New South Wales Department of Agriculture undertook an investigation of the soils and pastures of the area; on the other, the economic survey was made with special consideration for obtaining information which would help in planning, and in the interpretation of, the basic scientific research. The sample consisted of forty-three "red-soil" farms that supplied a butter factory located on the "Big Scrub" area near Lismore and had complete records of production over a seventeen-year period.

The conclusions reached were to the effect that, over the period studied, it appeared that the decline in production was more due to:

- (a) a smaller and more expensive labour supply;
- (b) a more satisfactory price for butter; and
- (c) lower rainfall, particularly in the spring;

rather than to a decline in soil fertility.⁶

⁴ This list of factors is, of course, quite inadequate for a thorough explanation. However, there are many discussions of them which are readily available. See, for instance, two recent publications: Drane and Edwards, *op. cit.*, p. 22, and T. W. Schultz, "A Policy to Redistribute Losses from Economic Progress", *Journal of Farm Economics*, Vol. XLII, No. 3 (August, 1961), p. 558. See also: G. M. Neutze, "Depressed Agricultural Areas and Location Economics". Paper presented at the Annual Conference of the Australian Agricultural Economics Society, February, 1962, to be published in *The Australian Journal of Agricultural Economics*, Vol. 6, No. 1 (September, 1962).

Were the writer trying to provide a full discussion of the reasons for relatively slow adjustments, he would include reference to the theories of K. O. Campbell *et. al.* on the processes of capital formation in Australian agriculture. (See K. O. Campbell, "Some Reflections on Agricultural Investment", *The Australian Journal of Agricultural Economics*, Vol. 2, No. 2 (December, 1958).) The reader is also reminded that recent suggestions by economists for the introduction of domestic allotment quotas for dairy production are aimed at speeding the rate of adjustment of farm size and number of farms. See, for example: F. H. Gruen, "Crying Over Spilt Milk", *The Economic Record*, Vol. 37, No. 79 (September, 1961), Appendix, p. 369.

⁵ Alison M. Kingsland, "An Economic Survey of the Productivity of Dairy Farms on the Red Basaltic Soils of the Far North Coast of New South Wales", this *Review*, Vol. 18, No. 1 (March, 1950).

⁶ It appears that technical research workers, now, do not agree with this conclusion.

A further study of farms in the "Big Scrub" area was undertaken by the Division in 1953.⁷ A random sample of seventy-three "red soil" farmers was interviewed with the objectives of providing a comprehensive description of the sample, evaluating development plans, and of finding the causes of the existing tenure pattern and studying its agricultural and sociological implications. The conclusions of the study on farm tenure are of particular interest.

Thirty-one farms (or 40 per cent of the sample) were operated under tenancy arrangements and of these twenty were sharefarms and eleven leased.

It was considered that the expansion of tenancy was largely due to the hard physical work associated with dairy farming, allied to the natural forces of age and variations in the family composition of owners and the individual desires of their children. Rate of tenancy formation was shown to have decreased with depressed butter prices and increased with moderately good butter prices. However, it also decreased in times of exceptional prosperity, when it appeared that more sharefarmers and tenants were able to buy the farms they were operating. While it seemed that tenancy was not leading to exploitation of the farms, sharefarmers and tenants were found to be less efficient in terms of production per man and per cow than were owner-operators. On the sociological side it was suggested that non-owner operators, unrelated to their landlord, had a lower standard of living than other operators.

The next economic survey was the Australia-wide cost-of-production survey by the Bureau of Agricultural Economics and the State Departments of Agriculture in 1953 and 1954. This Division selected the Richmond-Tweed Region for a special study of the relation of some factors to differences in net farm incomes.⁸ The sample in this instance was of 113 farms selected at random from the group complying to the criteria for efficient production established for the survey, and not ruled out for reasons such as non-co-operation and incomplete records. The main conclusions of this survey may be summarized as:

- (a) The number of cows milked per man was the most important single factor in determining farm incomes. It appeared that yield per cow was much less important and was frequently overrated as a measure of successful dairying.
- (b) Of the few, but important, management practices studied, controlled rotational grazing seemed to be the one giving substantial increases in net returns.
- (c) From budget studies of net farm returns, and their relation to cow numbers, it appeared that net income was generally unsatisfactory if less than twenty-five cows were milked per man. This was equivalent to thirty-four cows for a family man with a labour force of the farmer and his wife.

⁷ "Dairy Farming on the Red Basaltic Soils of the Richmond-Tweed Region", this *Review*, Vol. 22, No. 1, (March, 1954), and Louis Dillon, "Dairy Farm Tenure in the Big Scrub Area of the Richmond-Tweed Region", this *Review*, Vol. 22, No. 4 (December, 1954).

⁸ F. H. Gruen, "Incomes of Dairy Farmers in the Richmond-Tweed Region", this *Review*, Vol. 23, No. 3 (September, 1955).

The next survey, in 1956, arose directly out of these previous surveys as well as from general knowledge of the region. It was clear that a substantial number of problem farms, farms with living standards below those considered satisfactory in our community, existed in the region as well as in other dairying regions of the North Coast. It is, of course, obvious that reasons for low net farm income can range from a small farm size, even with costs at an almost irreducible minimum, to high costs per unit of production even where farm size is more than sufficient to tax the abilities of a young and industrious man. The previous surveys had shown, perhaps not surprisingly, that low incomes were largely the result of low output. It was therefore decided to have a close look at a random sample of small dairy farms in the Richmond, Clarence and Tweed Valleys.⁹ The group sampled was specified by an upper limit of 5,500 lb. commercial butter (c.b.) in an average season. Seventy-four farmers were interviewed and later sixty-eight of these received visits from an extension officer, to examine weaknesses in farm organization and the methods which could be used to increase incomes.

On the basis of the survey it was estimated that between 900 and 1,150 dairy farmers in the three valleys (15 to 20 per cent of the total number, then 5,650) produced less than 5,500 lb. c.b. in an average season. Thirty per cent of the farmers in the survey were aged or infirm, or were female operators without adult male assistance. However, most frequently the reasons for low output were found to be in the nature of the farm and were not the result of the disabilities of the operators. Thirty-two of the seventy-four farms were considered too small to be developed by known economic techniques to produce what was considered, from the cost-of-production survey, to be a satisfactory output of 7,500 lb. commercial butter. On a further twenty-five the land was regarded as markedly unsuitable for dairying; on the remaining seventeen, bad management, lack of finance, aged operators, tenure conditions, and institutional problems of ownership were quoted as reasons for low returns.

Finally, reference must be made to the survey by Fallding,¹⁰ which was made with the general aim of studying social and economic factors affecting farmers' acceptance of extension advice. This survey involved farms from the Kyogle Shire as well as from Bellingen Shire, which lies well to the south of the Far North Coast. Among his many important conclusions was that the natural features of the farms determined financial success to a considerable degree quite apart from the way the farms were managed. An interesting observation from the point of view of this research programme was:—

“His (the extension officer's) work should be concentrated on promoting better farm programmes within the farming community and advising on individual farms. He should give high priority to assisting farmers to use budgeting and other techniques to plan farm improvements in the light of their individual resource endowments.”¹¹

⁹ F. H. Gruen and E. J. Waring, “A Survey of Small North Coast Dairy Farms”, this *Review*, Vol. 26, No. 1 (March, 1958).

¹⁰ Harold Fallding, *Precept and Practice on North Coast Dairy Farms*, University of Sydney, Department of Agricultural Economics, Research Bulletin No 2, Sydney 1958.

¹¹ *Ibid.*, p. 8.

3. A DECLINING INDUSTRY

In their analysis of trends in dairy cattle numbers in Australia for the period 1946 to 1956 Bollman and Ward¹² showed the distinct change that was occurring in the location of the industry. Of the important butter producing areas only those of Victoria and Tasmania showed substantial increases in numbers. In the other States increases were mainly confined to the areas where production of milk for the metropolitan markets is important and areas where total dairy cattle population is small. They referred to the North Coast in the following terms:—

“In the traditional and large dairy supply areas of the North Coast, in the Richmond, Tweed and Clarence Valleys, stagnation or decline in dairy cow numbers has persisted throughout the period.”

Data on trends in the dairying industry of New South Wales have recently been provided by Holmes¹³ who studied the changes between 1939 and 1960. In 1960 the Sydney milk zone areas had shown a return to the pre-war numbers of cows (in milk and dry) while numbers in the milk product areas stood at 78 per cent of the 1939 level. The comparable figures for numbers of commercial dairies are Milk Zone, 77 per cent of 1939, and milk product areas, 75 per cent of 1939. Of the North Coast he states:—

“The North Coast, in general has experienced a sharp decline since 1956. In terms of the unsolved problems of spring drought and unreliable feed in early lactation, the semi-tropical climate and related pasture problems, it can be claimed that this decline has been surprisingly belated, and has only occurred when the increasing discrepancy between beef and butterfat prices has finally brought into play the economic forces necessary to compel the closure of many smaller dairies and their amalgamation into beef grazing holdings.”

However, he points out earlier, with reference to the decline in commercial dairies and dairy cow numbers, that in the milk product areas the number of cows milked per farm has been almost constant, suggesting that both large and small units are being lost from the industry.

This loss in number of suppliers to dairy factories on the North Coast has been particularly rapid in the last two years. In the twelve months ended March 31, 1960, the number of registered dairies in the coastal strip between Kempsey and the Queensland border dropped from 7,012 to 6,677 or 4.8 per cent.¹⁴ In the Far North Coast the number of suppliers to the butter factories fell by 4 per cent between December, 1958, and December, 1959, and a further 4 per cent by December, 1960.

Table 1 shows, for the shires of the Richmond-Tweed Region, numbers of dairy cows and an estimate of the number of commercial dairies in the years 1939, 1950 and 1960. In each case the number in 1960 has been expressed as a percentage of the number in 1939. It will be seen that the decline has been most severe in the Tweed and Woodburn Shires. In Kyogle Shire there was no decline in the number of cows, and only a small decline in the number of dairies.

¹² F. H. Bollman and A. B. Ward, “The Changing Distribution of Australian Dairy Cattle”, *Quarterly Review of Agricultural Economics*, Vol. XI, No. 2 (April, 1958).

¹³ J. H. Holmes, “The Changing Distribution of Dairying in Coastal New South Wales.” *Proceedings of the 2nd Annual Meeting of the Institute of Australian Geographers*. (Unpublished), May, 1961. An amended version of this paper is to be published in *The Australian Geographer* in 1962.

¹⁴ Commonwealth Bureau of Census and Statistics.

TABLE 1

Number of Dairy Cows and Commercial Dairies : Richmond-Tweed Region, at March 31, 1939, and 1960*

Shire	Dairy Cows (in milk and dry)				Commercial Dairies			
	1939	1950	1960	1960 as per cent of 1939	1939	1950	1960	1960 as per cent of 1939
				per cent				per cent
Byron	33,761	29,595	28,001	83	681	613	544	80
Gundurimba	32,698	30,124	28,832	92	634	592	528	83
Kyogle	50,661	50,451	50,513	100	847	840	789	93
Terania	47,978	43,476	40,026	83	847	807	720	85
Tintenbar	25,792	23,449	21,868	85	528	493	428	81
Tomki	29,441	27,624	25,255	86	540	500	418	77
Tweed	52,092	42,384	34,575	66	912	787	625	69
Woodburn	12,239	9,882	8,779	72	247	202	180	73
Regional Total	284,662	256,985	237,849	84	5,236	4,834	4,232	81

* Number of registered dairies which submitted "Pastoral and Agricultural Returns". These figures may contain a few dairies which have ceased commercial production but are still registered.

Source: Deputy Commonwealth Statistician, Commonwealth Bureau of Census and Statistics, Sydney.

The author gratefully acknowledges the help of Mr. J. H. Holmes who had extracted this data from the records of the Deputy Commonwealth Statistician.

Only Gundurimba, Tomki and Kyogle Shires show noticeable increases in the number of cows milked per dairy. Table 2 illustrates the way in which this figure has changed for four of the Shires and the Region. Terania Shire, which is not included, also shows a slight fall in the number of cows per dairy.

TABLE 2

Number of Cows per Commercial Dairy: Richmond-Tweed Region, March 31, 1939 and 1960

Shire	1939	1960	Increase or Decrease
Gundurimba	51.5	54.6	per cent +6
Kyogle	59.8	64.0	+7
Tweed	57.1	55.3	-3
Woodburn	49.6	48.8	-2
Region	54.4	56.2	+3

Source: Derived from Table 1.

4. THE REGION AND THE ENVIRONMENT¹⁵

Boundaries

The boundaries of the Far North Coast, and its relation to the north-eastern portion of New South Wales, are shown in Map I.

For the purposes of the research programme, at the farm level, it is desirable to take the complete section of the industry which is served by the Norco Co-operative Ltd. group of factories, with the exception of those farms which are in Queensland, and the Casino Co-operative Dairy Society Ltd. This section of the industry lies wholly within the area known as the Far North Coast of New South Wales. However, for statistical purposes it will be necessary to refer only to the area known as the Richmond-Tweed region, the boundaries of which were defined to coincide with shire boundaries. This region excludes a few of the dairy farms which lie within the Far North Coast in the vicinity of Woodenbong. To avoid confusion over the differences between these areas it is desirable, at this stage, to clearly define their boundaries.

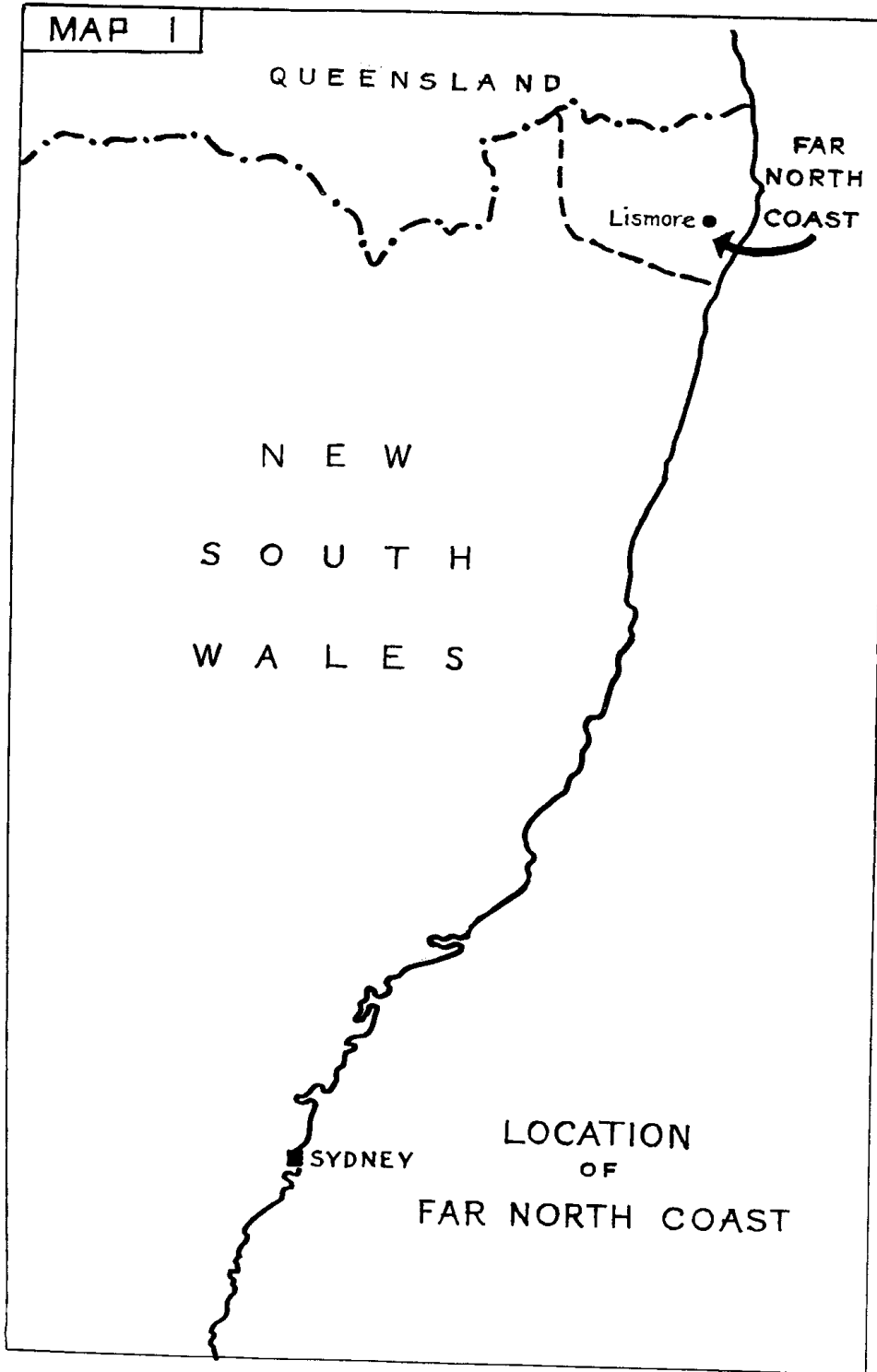
In the division of the State into regional areas for planning purposes by the Premier's Department¹⁶ the boundaries of the Richmond-Tweed Region, an area of approximately 3,770 sq. miles, were defined to take advantage of the natural degree of homogeneity in the Far North Coast region and also, due to the convenience for statistical purposes, coincide with shire boundaries. The shires included are Byron, Gundurimba, Kyogle, Terania, Tintenbar, Tweed, Tomki and Woodburn. The northern and southern boundaries are practically identical for both regions. The northern boundary is clearly defined naturally, as is the interstate line, by the crest of the McPherson Range. The southern boundary follows approximately the thinly settled and hilly to steep south-eastern extremity of the Richmond Range, which separates the Upper Clarence and the Richmond basins from the Lower Clarence basin.

The western boundaries, however, differ. The western boundary of the Richmond-Tweed Region follows the course of the Upper Clarence River while the natural western boundary to the Far North Coast area is the eastern escarpment of the Great Dividing Range. Both boundaries are shown in Map 2. However, the difference is quite unimportant, either in the interpretation of statistical data on the dairying industry, or of results obtained from farm surveys.

The dominant physiographical feature of the region is the McPherson Range from which stem the other mountain ranges and the major river systems. The three main river systems are, of course, the Richmond, Tweed and Upper Clarence. Also there are two minor systems, the Brunswick River and Crabbes Creek, which are associated with the eastern scarp, and drain the divide between the Richmond and Tweed Rivers.

¹⁵ This section is based largely on information contained in:—*The Richmond-Tweed Region, a Preliminary Survey of Resources*, Division of Reconstruction and Development, Premier's Department, 1945; Faculty of Agriculture, University of Sydney, *The Agricultural Industries of the Far North Coast of New South Wales* (Roneoed pamphlet); and L. W. McLennan, *Economic Survey of North-Eastern New South Wales, Far North Coast Zone* (Roneoed pamphlet).

¹⁶ Division of Reconstruction and Development, Premier's Department, *op. cit.*



Climate

The climate is sub-tropical with rainfall of predominantly late summer-early autumn incidence and ranging from 70 inches per annum in the north-eastern coastal strip to 40 inches on the western boundary of the region. Rainfall isohyets are shown on Map 2. There are considerable fluctuations in butter production from year to year which appear to be mainly due to variations in rainfall and its incidence throughout the year. This production uncertainty, through its effect on the incomes and development plans of the farmers and on the costs of the butter factories is an important problem of the area. At present the Department of Geography and the Faculty of Rural Science, University of New England, are co-operating in a study of the relationship of rainfall variability to production uncertainty. An idea of the degree of this uncertainty can be obtained from Waring's¹⁷ estimates that in the Byron Bay area, assuming a long-term average annual yield of 150 lb. commercial butter (c.b.) per cow, average production per cow for the area varies between extremes of 190 and 110 lb. c.b. per annum. Similarly for the Kyogle area he estimates the range at from 175 to 125 lb. c.b.

Land Types and Their Problems¹⁸

For the purposes of research into the dairying industry it cannot be assumed that there is a great degree of homogeneity in the region. The Upper Clarence basin should be regarded as a sub-region while there are marked variations of climate and soils in the rest of the region. Map No. 4 of the survey of regional resources¹⁹ was an attempt to subdivide the region into land types with a fair degree of uniformity. This map, which was prepared from a survey by L. W. McLennan²⁰ shows, among others, the land types that are important for dairying. F. H. Gruen²¹ used this classification when studying the relationship between soil type and farm income. A slight simplification of this classification is used to show the major land types used for dairying in Map 2. In brief the main features of these land types are:—

(i) *The Red-brown Volcanic "Big Scrub" Area.* An area of 250 square miles of red-brown volcanic soils on an undulating plateau which varies from 300 to 600 feet above sea level. It is mainly used for dairying but is also used for a variety of crops, including bananas, pineapples and peanuts. The whole area is cleared and carrying capacity is fairly high. From a previous survey by the Division it seems that approximately 30 per cent of the dairy farms in the region are located on this soil type.

¹⁷E. J. Waring, "Supplementary Irrigation of Pastures in Humid Areas" this *Review*, Vol. 27, No. 4 (December, 1959).

¹⁸Detailed soil studies, which were, however, not concerned mainly with fertility, are described in J. W. McGarity, *The Soils and the Richmond-Tweed Region: A Study of Their Distribution and Genesis*, M.Sc.Agr. Thesis, University of Sydney, 1956 (unpublished); and K. D. Nicholls and B. M. Tucker, *Pedology and Chemistry of the Basaltic Soils of the Lismore District, N.S.W.* C.S.I.R.O. Soil Publication No. 7, 1956.

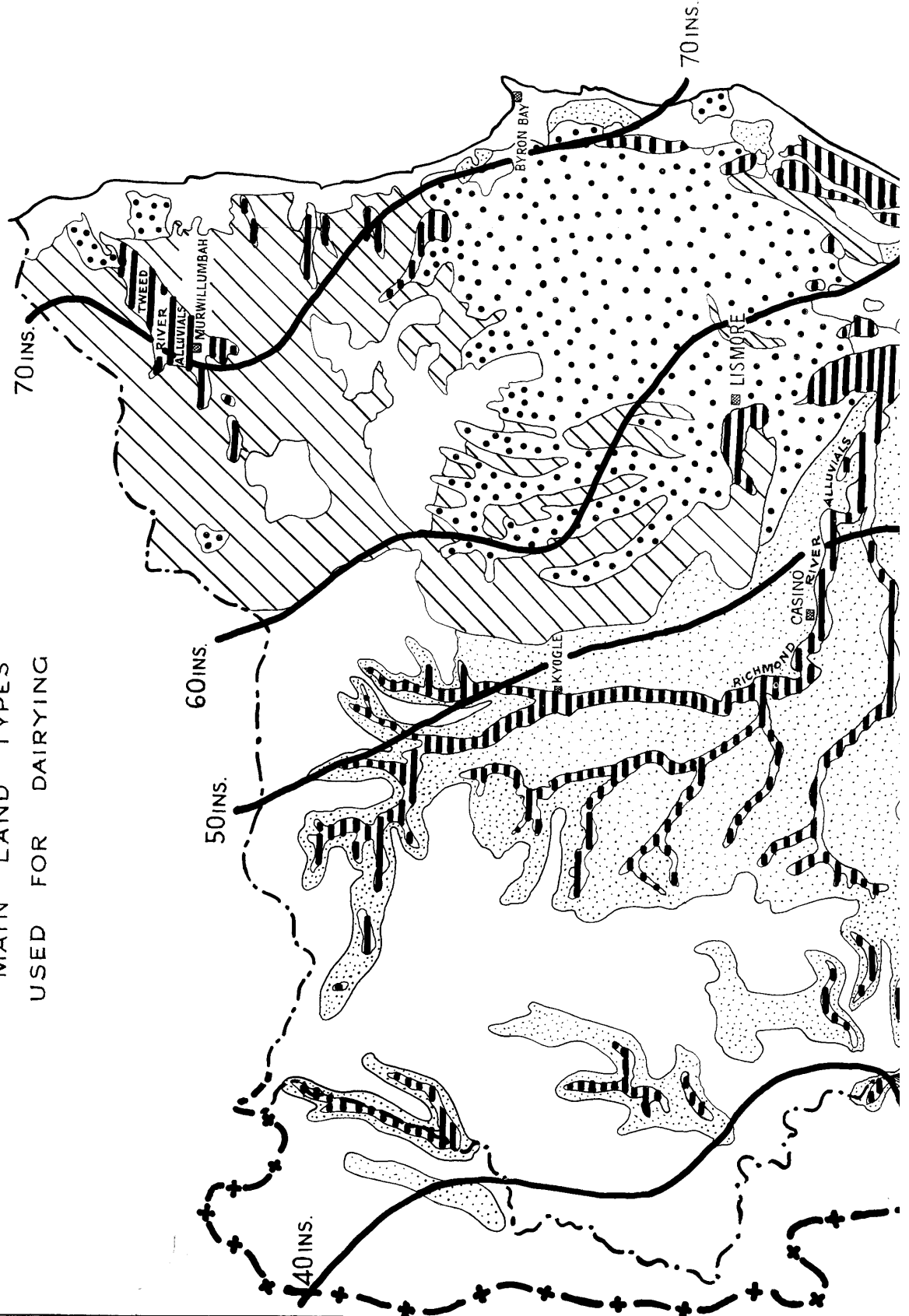
¹⁹Premier's Department, *op. cit.*

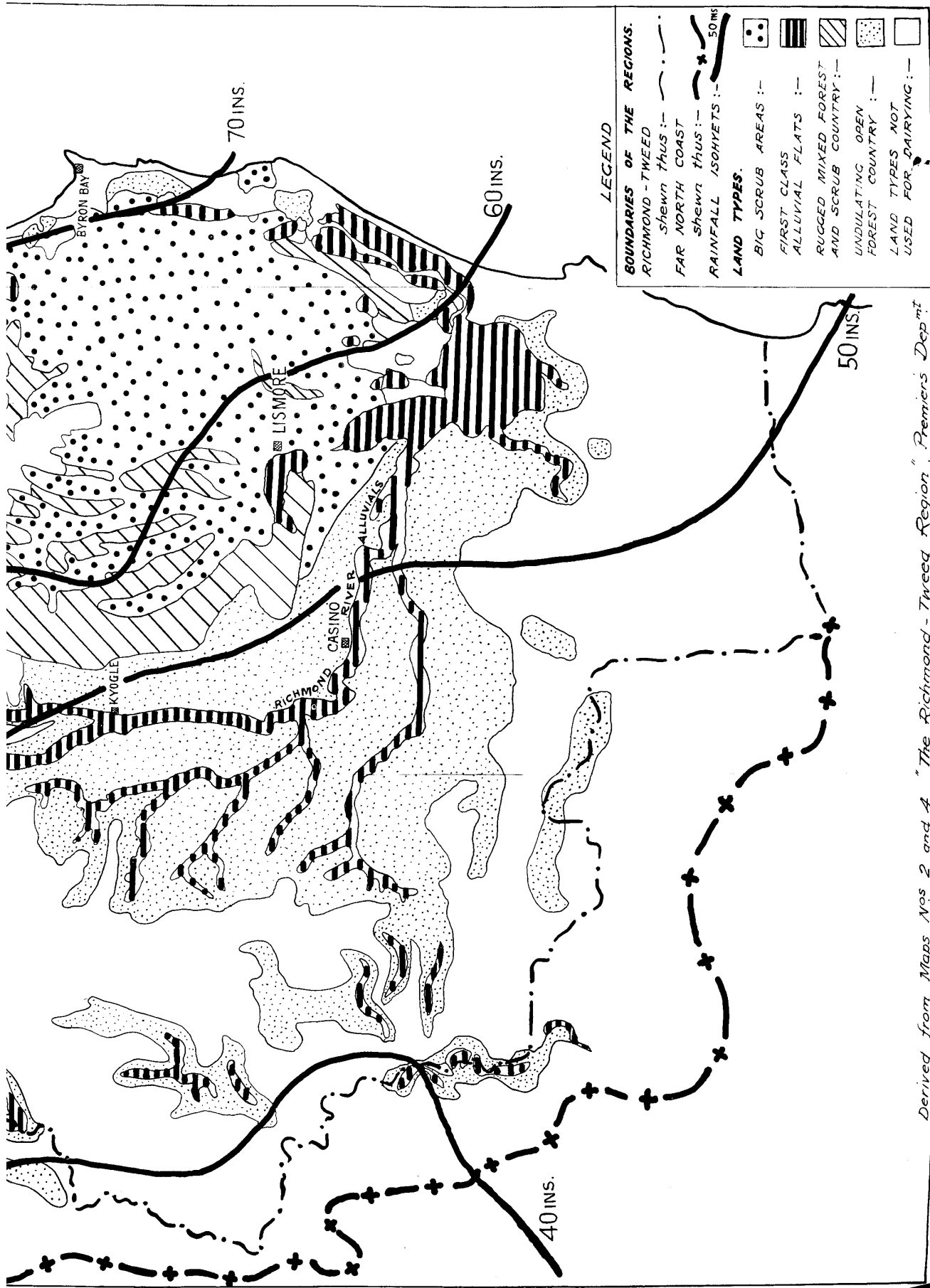
²⁰McLennan, *op. cit.*

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

FAIR NORTH COAST REGION

SHOWING
MAIN LAND TYPES
USED FOR DAIRYING





Derived from Maps Nos 2 and 4 "The Richmond-Tweed Region," Premier's Dept.

The dominant grass species is "paspalum" (*Paspalum dilatatum*) but kikuyu (*Pennisetum clandestinum*), a valuable species, and compressum (*Axonopus affinis*, also known as carpet grass), an inferior pasture plant, are both believed to be increasing in the area. The only important legume component is the naturalized white clover (*Trifolium repens*), but, except during a good spring, its contribution to pasture quality is not very substantial.

While these soils respond readily to combined dressings of nitrogen and phosphorus the poor clover growth and the fairly rapid fixation of applied phosphate in unavailable forms has generally meant that farmers have not considered the application of superphosphate to be warranted in the absence of improved legume species.

(ii) *First Class Alluvial Flats*.—This land type includes the area classified by McLennan²² as "first class alluvial flats" and also the area that was classified by him as "flats rendered highly productive by moderate drainage", but which was classified by Gruen²³ as "low lying flats subject to frequent and severe flooding".²⁴ It is thus comprised of highly fertile strips up to a mile and more wide on the Richmond, Tweed and Brunswick Rivers and their tributaries as well as the broad and low-lying flood plains near the mouth of the Richmond and Tweed Rivers.

While the most fertile parts of these flood plains are generally used for sugar cane and other more intensive forms of land use, there are large areas devoted to dairying. The higher level alluvials are very highly regarded for dairying and they are, of course, particularly well suited to supplementary irrigation, a practice which has increased rapidly in the last few years. A feature of irrigated pastures on these flats is the excellent performance of ladino white clover. However, unfortunately, due partly to the attacks of the *Amnemos* weevil,²⁵ and partly to other factors, white clover rarely persists in this area, as a vigorous species, for more than four years and frequently for only two years after planting. This poor persistence of sown pastures may be regarded as the main problem on this soil type. In both irrigated and non-irrigated pastures (only a fairly small percentage is irrigated), paspalum is the dominant grass. In favourable years clover growth is good without irrigation.

(iii) *Rugged Mixed Forest and Scrub Country*.—This land type, which predominates in the Tweed Shire and is also important in Terania and Byron Shires, is comprised of large areas of mixed hardwood forest and scrub country, broken by numerous streams running into the Richmond and Tweed Rivers. The broken chains of small alluvial flats along the creeks provide cultivation and good pasture land and largely make dairy farming in these areas possible.

²² McLennan, *op. cit.*

²³ Gruen, *op. cit.*

²⁴ The period covered by Gruen's survey was one with a remarkably atypical frequency of flooding. The modification from McLennan's classification is for simplicity. However, it is realized that there are distinct problems associated with the low-lying flats.

²⁵ Discussed later under the heading of *Pasture Problems* (p. 28).

Pastures on this land type are mainly of paspalum or carpet grass (compressum). The more fertile slopes and flats carry paspalum and white clover. The main problems of the area for dairying may be listed as:—

- (a) low pasture productivity and quality, with compressum an ever increasing pest; and
- (b) the steep terrain, which is a major restriction in the effective working of the farms and which in many areas leads to a severe weed problem.

These problems are particularly evident in the Tweed Shire, and the northern part of Byron Shire, on this land type.

(iv) *Undulating Open Forest Country*.—The northern two-thirds of the Tomki Shire is composed almost entirely of undulating to flat, open forest country. This type also extends into Woodburn Shire, while there are large areas in Kyogle Shire, but here the topography is more rugged. In the Tomki and Woodburn Shires the soils are mostly heavy clay loams and clays with a strong tendency to Melon-hole formation, a condition which develops where the insufficiently drained clay flats expand on absorption of excess moisture. Paspalum is the dominant pasture species with some blady grass (*Imperata Cylindrica* var. *Major*), and other coarse tussock forming grasses, on the poorer hills, and white clover in areas of the richer low country. In the Kyogle Shire the soils are dark brown to black and of heavy texture. On these hill soils paspalum is less vigorous and there are greater amounts of the coarser and less useful grasses. White clover occurs only on the lower slopes of some of the hills, but native legumes occur sparsely on much of the steeper country.

In the Tomki and Woodburn Shires the problems of this land type are mainly those associated with low feed quality, due to pastures becoming "sod-bound" with paspalum, and the low incidence of legumes. The soils are difficult to cultivate and improved pastures, if established, rarely persist long. In Kyogle Shire pastures on the hills are coarser and dairying would generally not be possible except for the existence of numerous alluvial flats.

Pasture Problems

The basic problem of all North Coast pastures is that of grass dominance and general protein deficiency. Under normal dryland conditions adequate feed of high quality is available only during the summer flush of pasture growth. "Native" white clover, when it still persists as a significant component of pastures, is essentially a spring grower and consequently makes a substantial contribution only in favourable years. It will be recalled that spring is the period of lowest and most unreliable rainfall.²⁶

In contrast to the more favoured dairying areas of, for instance, Victoria, the economic advantages of pastures sown with improved strains of white, subterranean, strawberry and red clovers and the rye grasses, or other grasses of European origin, have not been sufficiently clear for their adoption on large areas. Basically this is because of the fairly frequent failures at establishment and the poor persistence of these pastures. This poor persistence largely stems from a rather unfavourable environment and the

²⁶ Faculty of Agriculture, University of Sydney, *op. cit.*

Amnemos weevil. The predominantly summer incidence of the rainfall encourages the rapid growth of paspalum, and the other summer growing grasses, allowing them to rapidly attain dominance in these pastures unless they are carefully managed. The weevil pest *Amnemos quadrituberculatus*, which attacks the roots of the clover plants, has acted as a deterrent to further sowings of subterranean clover following a serious outbreak in 1956. It is also considered to be responsible for the decline of white clover in the Big Scrub areas and to be one of the reasons for the low productivity of many clover pastures in coastal areas. (However, see the further reference to this pest below.)

Research into Pasture and Soil Problems

The attack on the technical problems of the Region is largely the responsibility of a combined Department of Agriculture-University of Sydney research team working at Wollongbar Agricultural Research Station. "Over the last decade the prime aim in research has been to overcome the problem of feed shortage during the year by the testing and introduction of legume species and attention to associated problems (establishment, management, nutrition, utilization, nodulation and protection from insect pests and diseases)".²⁷

A feature of the programme is co-operation with district farmers in the maintenance of experimental plots on a wide variety of soil types throughout the Region. At present species trials are being conducted on sixteen farms and several additional sites have been arranged.

Results have been most impressive.²⁸ They are briefly and incompletely reviewed here. One outstanding development was that of the "sod-seeder" which was designed in the early 1950's. Subterranean clover (Clare and Yarloop strains) has been found to be a useful pasture plant for autumn to early spring fodder, if carefully managed. Also, vetch (or golden tare, *Vicia sativa*) has been shown to be a valuable annual crop, for the provision of winter and spring grazing, and is now widely accepted by farmers in the Region. An important development, favouring the future use of subterranean, white and red clovers, is the recent announcement, that it is possible to achieve satisfactory and economical control of the *Amnemos* weevil by a combination of insecticidal treatment and careful management.

The most interesting development in the last few years is the very promising results obtained with some sub-tropical legumes. These can be classified on the basis of potential into two groups:—

VERY PROMISING

Dolichos axillaris.
Leucaena glauca.

OUTSTANDING

Glycine javanica.
Desmodium uncinatum.
Desmodium intortum.
Dolichos lab lab.

²⁷ Research Report, Wollongbar Agricultural Research Station, January 1, 1960, to May 31, 1961, N.S.W. Department of Agriculture, 1961 (roneoed).

²⁸ For a summary of the research work over the period 1950 to 1956, and a review of previous work, see *Seven Years Pasture Research on the Far North Coast of New South Wales*, University of Sydney, School of Agriculture, Report No. 2, Parts I and II, December, 1957.

A more recent introduction to the Region, the CSIRO bred "Siratro A", which is derived from two Mexican strains of *phaseolus atropurpureus*, also appears to hold great promise. It is hoped that these legumes will lead to some substantial increases in productivity within the next few years.

The studies of the nutritional requirements of pastures and crops have shown that potassium and nitrogenous fertilizers, as well as phosphatic, and molybdenum fortified phosphatic fertilizers, can have an important role in pasture establishment and maintenance.

One interesting experiment is the "Feed Year" grazing trial. The aim of this trial is to compare two farming systems, a "typical farm" where pasture supply is the naturally occurring *paspalum* and *kikuyu*, and an "improved farm" on which legumes and crops are established. The work in this trial is thus the culmination of all the other research work which applies to the soil type on which it is situated. The improved farm is gradually being altered to try to obtain an ideal "feed year". That is, so there is a satisfactory supply of high quality fodder for the herd throughout the year. An area of 48 acres is divided into two matched "farms" of 24 acres and matched herds are used. Careful account is taken of the costs involved in improving the farm as well as of the extra production obtained.

With reference to the organization of research a recent important development is the provision of substantial financial assistance from the Australian Dairy Produce Board. These industry funds are being used for the expansion of research staff and facilities and to ensure adequate co-ordination and direction of dairy industry research throughout the North Coast. For this purpose Mr. W. J. Hudson has been appointed Supervisor of Dairy Industry Research (North Coast).

Finally, reference must be made to the work of the Department's Extension Service in the further testing of pasture species and fertilizers. While this is not fundamental research it is an essential prerequisite to the widespread adoption of the Research Team's recommendations.

Problems of Animal Health and Nutrition

Problems of animal health and nutrition are mentioned only briefly. Research into pasture problems is, of course, aimed at better cattle nutrition. Other problems relating to the health and nutrition of cattle (infertility, mastitis, milk fever, etc.) or pigs (carcase quality, pneumonia, etc.) are presumed to be general problems for the dairying industry rather than specifically important in the Region. In the absence of reliable information on the extent of such problems it is difficult to ascertain their full impact on the economy of the industry. However, their influence on productivity and income levels cannot be ignored. For instance, from superficial observation it would appear that there is considerable scope for profitable improvement in technical efficiency in the pig enterprise on many farms.

One problem of cattle health which must be mentioned is that of the cattle tick. The spread of this pest in New South Wales is confined to the Far North Coast (except for occasional outbreaks further south). Thus it is a problem of the dairying industry only in this region and in Queensland. In New South Wales all dipping for tick eradication or control is undertaken at Government expense and the actual production loss suffered

by producers is believed to be small.²⁹ The New South Wales Department of Agriculture has established a cattle tick research centre in the Wollongbar district. The aim of the research work at this centre will be to find why attempts at the eradication of the cattle tick from the Far North Coast have not been completely successful.

5. THE OBJECTIVES

While the basic objective is the obvious one of undertaking economic analyses which will help to alleviate the problem of low farm incomes in the area, the projects can conveniently be subdivided into two types with rather distinct objectives:—

- (a) Projects with the objective of providing data for an extension programme designed to improve the management of existing farms. These will, therefore, consist of the economic analysis of farm practices and the results of scientific research, with reference to their application on a farm scale.
- (b) Projects which will be concerned with the long term adjustment of the industry to changed economic, technical and social conditions, and which have the objective of providing recommendations to facilitate this process of adjustment and reduce the social hardships involved. These projects will therefore relate to matters such as tenure arrangements, problems of farm amalgamation, alternative uses of the land, etc.

It is, of course, to be expected that the results of each group of projects will have implications for the other group. For instance, farm tenure arrangements have very definite implications for farm management recommendations.

6. ORGANIZATION OF THE PROGRAMME

The programme is being directed by a committee consisting of:

The Dean, Faculty of Agricultural Economics, University of New England;

The Principal Economics Research Officer, Division of Marketing and Agricultural Economics, New South Wales Department of Agriculture;

The Senior Project Officer, Land Use Section, Bureau of Agricultural Economics; and

The Supervisor of Dairy Industry Research (North Coast).

The grant makes provision for two professional appointments but, at present, only one of these positions has been filled.

With the appointment of the author the committee met and suggested that he commence the research programme with a survey of a sample of farms from the Far North Coast. This survey is described in Part II of this article.

²⁹ *The Economic Importance of Cattle Tick in Australia*, Bureau of Agricultural Economics, Canberra, August, 1959.

Part II. A PRELIMINARY SURVEY**7. INTRODUCTION**

With reference to the objectives stated for the research programme, the survey reported here may be regarded as a preliminary study intended to familiarize the research worker with the area, its problems, and the most urgently needed economic research. Its more specific objectives were to obtain details of costs, incomes, tenure arrangements, and farm management with particular reference to practices adopted in the provision of extra feed for the winter and spring periods of feed shortage.

Because the survey was to be a preliminary study, and in order to speed completion of field investigation and analysis, the organizing committee suggested that the sample should be small and that the inquiries should relate to only one year, if this would not lead to serious distortions due to abnormal seasonal conditions. The sample was restricted to sixty farms, but it was decided that the 1959-60 season was particularly favourable so the survey was taken over the two-year period July 1, 1958, to June 30, 1960.

As the position of the dairy industry, with respect to its protection and subsidization, is under review, it is anticipated that the data from this survey which relates to the general problems of the industry will be of particular interest. For this reason special attention has been given to the details of the net income estimates. Also, an attempt has been made to provide additional information on two of the structural aspects of the industry, farm tenure and farm size, which at present are a partial cause of the problems of the industry and will be even more important if the subsidy is reduced or, if, for any other reason, farmers' returns for butter continue to fall.

In the interpretation of the results of this study, particularly the income data, it should be borne in mind that the two-year period covered was more favourable than it appears reasonable to expect for the next few years, for several reasons, which will be explained in detail, but may be listed as:

- (a) Favourable seasonal conditions, particularly in 1959-60, which is considered to be the best season for a number of years.
- (b) Good prices for beef, including culled cows, and prices for butter and pigmeats, which were a little above those prevailing before the beginning of the period and at present.

Also, in 1958-59, the sample had an average per farm production approximately 7 per cent above an estimated average for commercial dairy farms in the region. For this reason alone, the results shown must be regarded as substantially above average expectations.

In the analysis of the results it was convenient and desirable to consider the tenure groups separately, with the exception that the three cash-tenant operated farms and the farms run by owning partnerships were treated as owner-operated farms. The terms which refer to the tenure classification include *owner-operator* and *sharefarm owner*, which are self explanatory, and *cash-tenant* and *sharefarmer*. A sharefarmer is a non-owner who receives a specified proportion of the proceeds in return, mainly, for the provision of labour to operate the farm. In contrast, a cash-tenant pays a fixed rent to the landlord. The numbers in the sample falling into the different tenure groups are shown in Table 3.

TABLE 3
Classification of Farm Management

Type of Management	Number
Owner-operator	23
Partnership*	4
Cash-Tenant†	3
Sharefarmer‡ (family member) ..	9
Sharefarmer‡ (not a family member) ..	22

* Includes three farms with a family sharefarm system but with the owner actively engaged in farm work. These farms have been treated as partnerships throughout the analysis.

† One cash-tenant is also the owner of a sharefarm included in the cost and income part of the analysis.

‡ The sample probably includes a disproportionate number of sharefarmers.

TABLE 4
*Estimated Dairy Production: Far North Coast Region
1950-51 to 1959-60*

Season	Production Commercial Butter
	'000 lb.
1950-51	40,623
1951-52	28,789
1952-53	40,797
1953-54	30,848
1954-55	40,467
1955-56	37,408
1956-57	31,154
1957-58	33,630
1958-59	36,779
1959-60	39,386

Source: Factory and Department of Agriculture records.

8. SEASONAL CONDITIONS AND PRICES

It seems clear that 1959-60 was a good season and that 1958-59 was at least an "average" season. An inspection of rainfall records for the principal towns in the Region shows that good falls were recorded in the spring of both years. Also, it was the general opinion of the interviewed farmers that the 1959-60 spring was particularly favourable, with clover growth at its best for many years. The favourable seasonal conditions are reflected in the estimated dairy production for the region which is shown in Table 4.

Estimated returns to producers at the factory door for butter, over the period 1953-54 to 1959-60, are shown in Table 5. Butter returns per lb. during the survey period were above those for the preceding three years. Also, because of the recent adverse trend in butter prices, and additional uncertainty about future prices due to the United Kingdom's proposed entry into the European Common Market, it seems that returns for butter during the survey period should be regarded as above the average expectations for the next few years.

TABLE 5
Returns to Farmers for Butter at Factory Door: 1953-54 to 1959-60*

Season	Return per lb.
	pence
1953-54	48.2
1954-55	46.7
1955-56	45.3
1956-57	44.5
1957-58	43.9
1958-59	46.4
1959-60	46.6

* This is estimated as "overall return to manufacturers" less assessed cost of manufacture of butter.

Source: Derived from—Annual Reports, Commonwealth Dairy Produce Equalisation Committee Ltd.

TABLE 6
Average Prices for Beef and Pigs at Homebush, Sydney,
January, 1954 to June, 1961

Period	Beef*	Pigmeat†
	Shillings/100 lb.	pence/lb.
1954 January to June	140	29½
July to December	162	19¼
1955 January to June	149	21½
July to December	141	27¼
1956 January to June	140	28½
July to December	139	31
1957 January to June	134	27¾
July to December	163	26¼
1958 January to June	171	24¾
July to December	166	25½
1959 January to June	178	26¼
July to December	207	33¼
1960 January to June	219	28½
July to December	230	30
1961 January to June	216	26½

* Beef prices—ox and/or heifer 650-700 lb. 1st and 2nd export quality.

† Pig prices—140-150 lb. (Bacon weight) 1st and 2nd export quality.

Source: *Twenty Sixth Annual Report*, The Australian Meat Board.

Trends in returns for beef and pigmeat sales are summarized in Table 6. As these relate to the Homebush market, Sydney, not the Far North Coast, they should be regarded as an index of relative price movements rather than as estimated average values. Pigmeat prices were apparently high in 1959-60 and at moderate levels in 1958-59, while beef prices were extremely satisfactory during the survey period. Prices of poorer quality beef were also particularly high at this time, so that it was a period when sideline beef and veal production, and sales of culled dairy stock, were also, more profitable than it seems reasonable to expect over the next few years. Finally, the overall cost-price situation for the Australian dairying industry since 1954 is summarized in Table 7.

TABLE 7

*Indices of Prices Received for Dairy Products and of Prices Paid for Farm Requisites: 1953-54 to March, 1961**

Period	Prices Received for Dairy Products	Prices Paid for Farm Requisites	Ratio-Prices Received/Prices Paid
1953-54	203	191	106
1954-55	198	192	103
1955-56	195	199	98
1956-57	191	209	91
1957-58	196	215	91
1958-59	201	214	94
1959-60	199	219	91
Quarter ending—			
September, 1960 ..	199	226	88
December, 1960 ..	198	226	88
March, 1961	199†	228†	87†

* Prices received for dairy products include returns for butter, cheese, whole-milk, etc., weighted in accordance with the volume of milk devoted to each. Prices paid are weighted so the index is a composite for all primary industries. A further point is that the series takes no account of some important sources of dairy industry income—pigs, calves, culls, etc.

† Preliminary.

Source: Bureau of Agricultural Economics. See R. F. O'Donohue and A. E. Cox, "The Measurement and Interpretation of Trends in the Cost Price Situation of the Farm Sector." *Quarterly Review of Agricultural Economics*, Vol. XIV, No. 2 (April, 1961).

9. THE SAMPLE

It was decided that a sample of approximately 60 farms would be appropriate for a preliminary general survey. As there is a total of more than 4,000 suppliers to butter factories, in the region, this is a small sampling fraction but it was considered sufficient to give a good cross section of the types of farmers and farms which are to be found in the region.

An alphabetical list of suppliers to each butter, cheese and processed milk factory was obtained. In the preparation of the list for the Murwillumbah factory those suppliers known to be in Queensland were omitted. The exact number of these was not noted but they represented no more than a few per cent of the total number. These lists were then used to prepare a random sample of suppliers by the systematic selection of every 40th name, with the exception, that where the 40th was found to have been a supplier for only part of 1959-60 the first supplier after the 40th, with records for the full year, was taken. As there is no apparent reason for any periodicity in such a list the selection of every 40th entry should have given a random sample. When the 40th name was replaced by a subsequent one there was, of course, a fairly high probability that the replacement farmer was related to the farmer being replaced; however,

this should not have upset the random nature of the sample for the region. Where payment was made by the factory separately to a farmer and his share-farmer, care was taken to see that the farm was only counted once.

A further exclusion was made, on the advice of Departmental officers, of those farms known to have a production of less than 3,000 lb. c.b. Farms of less than this size were thought to be either:—

- (a) run on a part-time basis ; or
- (b) run by invalid or aged farmers ; or
- (c) operated with dairying as a sideline enterprise (e.g., to sugar production) ;

and data on farms with such atypical features were expected to be difficult to interpret. This production level is, of course, very low ; it is less than half the average production per farm for the region.

The remaining list, of 113 farms, was in turn sampled by use of a random number technique to give a basic list of 60 producers and a further list of replacements. Throughout, care was taken to give each factory representation in the final sample in proportion to the number of suppliers to that factory. Map 3 shows the distribution of the sample farms.

It was possible to check two characteristics of part of the sample against those of the population from which it was drawn.³¹ A comparison of the frequency with which the farms fell in certain production groups is set out in Table 8, for 1958-59.

A second check was made with the average production of the "Norco sample" and Norco suppliers.³² The average in 1958-59 for the sample was 8,840 lb. c.b. For the Norco suppliers quoted it was 7,780 lb. including the under 3,000 lb. group and 8,250 lb. excluding this group. From both these checks we may conclude that the final sample was substantially biased towards the higher production groups. This bias is probably largely due to the fact that farmers who refused to co-operate, or had insufficient records, were more frequently low producers. Of a total of 24 rejections for various reasons 15 were excluded primarily for these two reasons. However, it was not possible to check the actual production of these farms.

A second source of bias, of a different nature, also appeared to arise through rejections for these two reasons. The percentage of sharefarmers in the final sample was increased by the greater willingness of this tenancy group to co-operate. In general sharefarmers have more free time between milkings than owner-operators, and no doubt this was reflected in their willingness to participate. The treatment of results throughout the report is based on the separation of the farms into tenancy groups, partly to avoid the effect of this source of bias.

³¹ Norco Co-operative Limited, *Evidence Submitted to Chairman and Members of the Committee of Enquiry Appointed by the Commonwealth Government to Enquire into the Affairs of the Dairy Industry*, Byron Bay, N.S.W., November 26, 1959.

³² *Ibid.*

TABLE 8
*Analysis of Production Groups: 1958-59: "Norco Sample"
 Compared to Norco Suppliers**

Production Group†	Sample		Norco Suppliers	
	No.	% of Total	No.	% of Total
lb. Commercial Butter				
3,001— 5,000	3	6.4	561	16.7
5,001— 7,000	6	12.8	828	24.7
7,001—10,000	19	40.4	987	29.4
10,001—12,000	8	17.0	408	12.2
12,001—15,000	7	14.9	321	9.6
15,001—20,000	3	6.4	191	5.7
Over 20,000	1	2.1	56	1.7

* The number of Norco suppliers shown omits 342 farms for which incomplete data was available, as well as those with production less than 3,000 lb. c.b.

† N.B. The range over which the production groups are taken varies. It appears that if the ranges were taken over 2,000 lb. intervals, from 3,000 lb. up, that the modal group would be 5,000 to 7,000 lb. c.b.

10. THE FINANCIAL DATA

Method of Analysis

CONVERSION FACTORS

If actual production of commercial butter was not available, all production was converted to commercial butter, at the rate of 1 lb. butterfat = 1.2175 lb. commercial butter and 1 gallon of milk = 0.5 lb. commercial butter.

CASH COSTS AND INCOME (excluding livestock)

The farmers made available their income tax records and these, and occasionally cash books or other records, were used as the source of information on cash costs and income. Wide variations exist in the details of expenditure kept by farmers, and in the methods by which cost items are classified by different tax agents, particularly in respect of repairs, and of operating expenses for plant and machinery, which are often merged with car expenses and with capital expenditure on overhauls of machinery. Similarly, there are some items of capital expenditure (new fences, buildings) which may be included as deductions for taxation purposes, but which are not a reasonable charge to annual operating costs. Efforts to identify, and to treat appropriately, such items were made in the field work and during office tabulation.

The aggregated costs (excluding livestock purchases) referred to in the text are described below:—

Rates and taxes: This item includes shire rates and the stock levy of the Pastures Protection Board.

Repairs and maintenance: All costs involved in repairing or maintaining farm buildings, fences, plant, trucks, and, where applicable, sharefarmers houses.

Fuel, oil and electricity: These costs were amalgamated to roughly estimate the outlay on running expenses for mechanical aid. Fuel for the farmer's car is not included.

Seed and fertilizer: These expenses, which are amalgamated with fodder expenses in the tax return, were estimated as a measure of expenditure on cropping and pasture improvement.

Feed: Separate estimates of feed bought for the dairy herd and pigs.

Business expenses: Includes insurance, tax agent's fees, bank charges, and estimated telephone expenses and travel expenses for the business including an allowance for the farmer's car. (See below in "Other Comments").

Veterinary and herd improvements: Expenditure on veterinary fees, stock medicines and herd testing, when appropriate.

Miscellaneous services: Including charges for hire, contract, cartage and agistment as well as payment to sharefarmers for rearing calves.

Miscellaneous sundries: Outlay for dairy requisites, firewood for dairy, weed and vermin poisons, etc.

The total of these items is referred to as "*Cash Costs*".

The receipts, excluding livestock sales, referred to are:—

Butterfat: All payments for butter supplied during the year.

Calves: "Bobby" calves are considered separately from the livestock trading account. These are calves sold within a few weeks of birth.

Other: Income from bananas, small crops, sales of bags, dividend payments on shares in the co-operative factories, etc.

The total of this group is referred to as "*Total Receipts (excluding livestock)*."

LIVESTOCK ACCOUNT

Trading: Sales and purchases of cattle and pigs shown separately.

Inventory: Difference between opening and closing values (see "Interest" for valuation rates). Pigs and cattle are included together and valuations were made at conservative rates to ensure that this item was not overstated.

DEPRECIATION

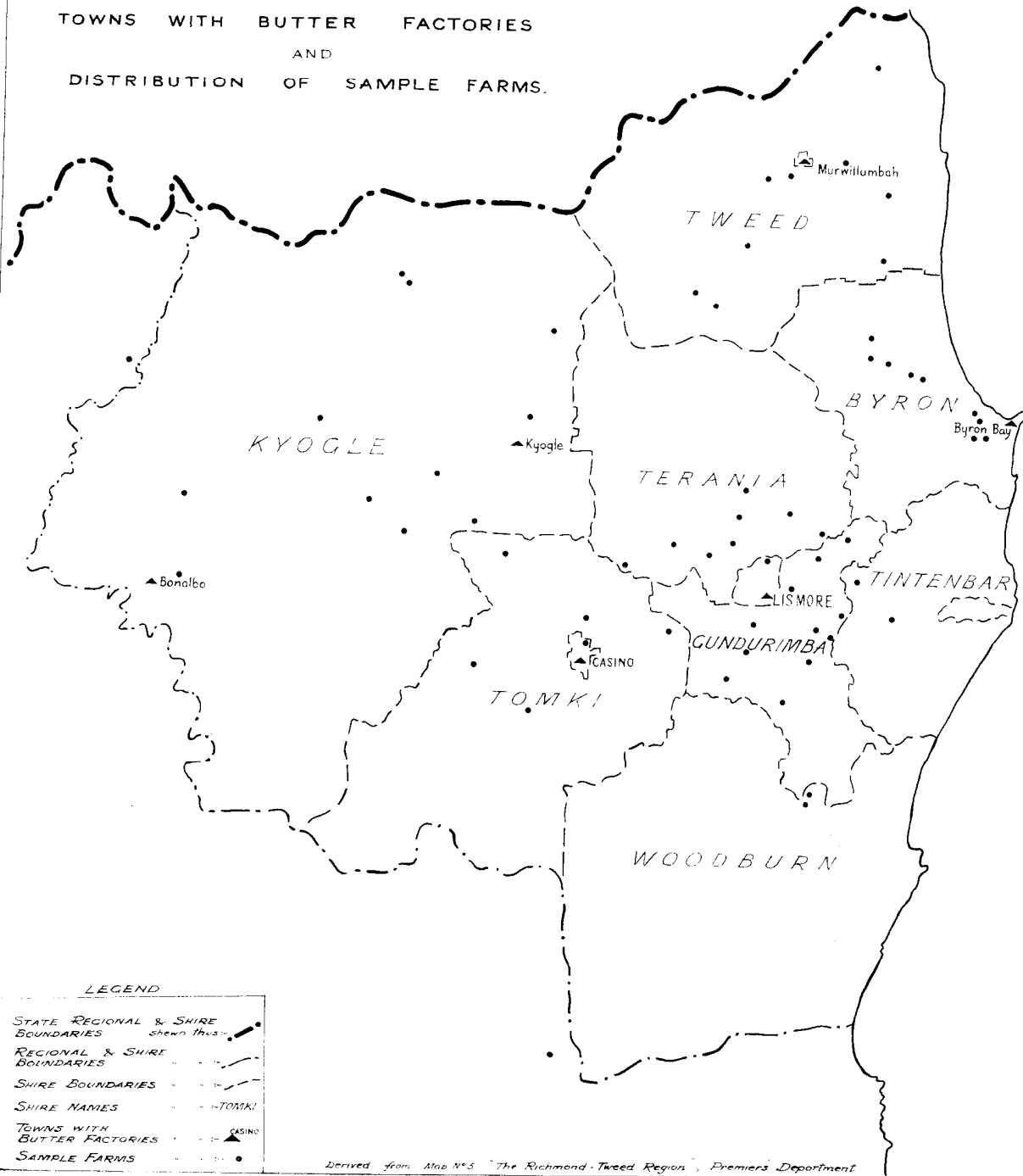
A record was made of the depreciation schedules submitted with each tax return and of major items which, for taxation purposes, were not then being depreciated. This list was then used to estimate depreciation allowances with rates related to the life of the assets concerned, rather than the special accelerated rates currently allowable for taxation purposes. The method used was to allow 10 per cent residual value and depreciate the balance in equal amounts over a time period depending on the nature of the item. Examples of the period allowed are:—

Item	Period of Years
Tractor	10
Milking plant	10
Dairy	20
Sharefarmer's house	40

As the aim of a calculation of depreciation in a survey of this nature is to estimate how much should be set aside each year for asset replacement to maintain the property in its present state, but not to overestimate

RICHMOND - TWEED REGION

SHOWING
SHIRE BOUNDARIES, LOCATION OF
TOWNS WITH BUTTER FACTORIES
AND
DISTRIBUTION OF SAMPLE FARMS.



LEGEND

- STATE REGIONAL & SHIRE BOUNDARIES *shown thus:*
- REGIONAL & SHIRE BOUNDARIES
- SHIRE BOUNDARIES
- SHIRE NAMES
- TOWNS WITH BUTTER FACTORIES
- SAMPLE FARMS

Derived from Map N° 5 "The Richmond-Tweed Region", Premier's Department

this amount, replacement values were used. If the historical cost seemed a fair guide to replacement cost it was used. Otherwise the approach was to use conservative present day costs except when a specific value could be given (for example, with some items of machinery). It was considered that the cost of greater accuracy was not warranted. However, care was taken to see that the amount estimated was conservative. For instance, the replacement value of the sharefarmer's house was taken at £2,000. Most of the newish sharefarmer's houses seen were small cottages with few amenities so this figure may not be as conservative as it first appears. In general the amount shown for depreciation may be regarded as falling short of the amount of reinvestment required to maintain the farmer's present financial position relative to the rest of the economy, especially given the reasonable assumption that productivity increases are required to maintain this position. This is the assumption behind the depreciation of dairies over a twenty-year period. It is considered that most dairies in the sample became obsolescent with the advent of the "herringbone" shed.

CAPITAL FOR INTEREST

Land and buildings: The farmers interviewed made available the valuations of the Valuer-General's Department, which cover all properties in the region for rating and taxation purposes. The method of assessing improved value is by direct relation to the current market value of similar properties together with allowances for access, location, topography, soil types, pastures, etc. Consideration of recent trends in land values and the time lag between valuations suggests that all values should be within 10 per cent of current market values. Throughout values were adjusted to exclude the estimated value of the owner's house.

Plant: Valuation of plant was on the basis of conservative replacement value for those items that were actually used.

Livestock: In the absence of satisfactory records of the number of livestock in different age groups over the period it was not possible to give an accurate estimate of their value. It was therefore decided in general to use the extremely rough method of valuing all cattle at £25, all sows and boars at £20, and all other pigs at £5. However, when substantial numbers of young vealers were sold the value per head of the change in inventory was reduced to give a figure more in keeping with the true change in value.

IMPUTED COSTS

For a meaningful discussion of imputed costs it is essential to clearly establish a frame of reference for the assumptions on which they are based. It was shown in Part I of this report that there is substantial migration from the dairying industry of the Far North Coast. The purpose of estimation of charges for labour and capital and the calculation of "profit" may be considered to be to provide a further and recent test of the hypothesis that this migration can largely be explained by low net returns. It is also to provide a logical basis for the analysis of production and net income which is explained in Section 13.

The charges imputed should therefore be on an opportunity cost basis. That is, the amount required should equal the amount that would be forthcoming if the farmer used his capital and labour in their most

profitable alternative use. However, it will be noted that this is impossible to assess with any degree of confidence. The estimates must therefore be considered to be very subjective. Those who disagree with the figures used can use their own estimates to recalculate the "profit" figure. Reference must also be made to the fact that the figure called "profit" (= net income less imputed costs), as well as being very dependent on the assumptions concerning charges for labour and interest, includes all the errors inherent in the other figures. These may be quite substantial, particularly in the estimation of changes in the value of the livestock inventory.

LABOUR

This item was estimated by use of a schedule based on the rates of pay under the Dairying Employees (State) Award. An owner-operator was allowed £880 p.a. or £16 16s. per week. A sharefarmer or other adult male, not an owner-operator, £850, and junior full-time males the appropriate award rate. On most sample farms it was claimed that the wife assisted with the milking, generally for periods varying between 2½ hours and 4½ hours a day. This work was accounted for by allowing husband and wife £1,100 per annum on owner-operator farms, and £1,000 p.a. on sharefarms. Junior females were treated at the appropriate rates taking into consideration the estimated time worked. Labour by school children was not considered. Also, if the farm operator was over 65 years of age the allowance was reduced to a half.

It is frequently claimed that, because its alternative uses are limited, family labour is employed in less productive work than hired labour, and indeed that much family labour would not be used, at all, if it had to be hired. Thus, the allowance for the wife's labour may seem rather generous. For comparison the Commonwealth Bureau of Census and Statistics³³ quotes the average weekly earnings per employed male unit in New South Wales for 1958-59 as £21 per week. It may be thought that this figure should be adjusted for comparison with the incomes of the survey farmers as it is probable that a money income in a rural area of equal amount to one in the city has greater real, or purchasing, value.³⁴ In their survey, Gruen and Waring made adjustments for milk and eggs produced and consumed on the farms, for differences in the basic wage (between Sydney and the best estimate for the Far North Coast), and for rent. In this survey an adjustment for rent is not appropriate, except for sharefarmers, as the value of the owner-operators' homes was not allowed as capital investment for the calculation of interest. Also, in 1958-59 about £70 of the net income for owner-operators and £60 for sharefarmers could be attributed to the fact that average production of the sample farms was 7 per cent above the estimated average for commercial dairy farms in the region.³⁵ Further, it seems reasonable to assume that the average effective working week of the husband is not less than 50 hours (of broken time, including Sundays) and frequently that the wife's contribution is 20 and up to 30 hours. Thus the allowance may be more suitable for

³³ *Yearbook of the Commonwealth of Australia*, 1960, Commonwealth Bureau of Census and Statistics, Canberra.

³⁴ Two approaches to comparison of real incomes, with reference to the dairy industry, are those of F. H. Gruen and E. J. Waring, *op. cit.*, p. 12, and N. T. Drane and H. R. Edwards, *op. cit.*, p. 150.

³⁵ These figures were calculated using the equations developed for Section 12.

comparison with that of the "average male employee" than it first appears. For the reasons given elsewhere it should be noted that the comparison should be made for the 1958-59 year. The 1959-60 season should be considered as very substantially above average.

INTEREST

The Bureau of Agricultural Economics has generally regarded the opportunity cost of capital in farming as the average trading bank overdraft rate, or the long-term bond rate³⁶. However, the person buying a farm may act as if a different rate is appropriate for several reasons. If he thinks he may obtain a farm as an investment on purely economic criteria he will, of course, decide between this and other alternatives with an analysis of the likely returns, and the risks involved. These risks may cause the individual to choose a different interest rate to the bank rate. Also, if the buyer thinks he will be an owner-operator his assessment is coloured by his opinion that it is desirable to work as a dairy farmer. Alternatively, investment in land may be seen as a device for obtaining capital gains in a period of inflation, and a dairy farm may appear the most suited to his financial position, abilities and interests. In deference to the possibility that the combined effect of these factors makes an interest rate below the overdraft rate appropriate (as is frequently contended), rates of 5 per cent and 3 per cent were chosen to give two measures of the requirement for interest. It is emphasized that these guesses may both be unrealistic.

MEASURES OF INCOME

The interpretation of these measures of income will be made clear by reference to Table 10.

Net Cash Income: A measure of the money available for disposal by the farm family during the year. This item therefore is "Total Receipts" (excluding livestock), *plus* gain on livestock trading *less* "Cash Costs", interest paid, rent and payments to sharefarmers, if appropriate.

Total Income: Total receipts (excluding livestock), *plus* livestock sales, and gain in livestock inventory.

Estimated Net Income: Total income less "Total costs—interest paid and rent", Total costs include "Cash Costs", depreciation, livestock purchases, losses on livestock inventory and, if appropriate, payments to sharefarmers. Interest paid is excluded because the imputed interest is allowed on the full value of the farm, excluding the owner's house. Rent is excluded as the few cash-tenants have been treated as owner-operators, also owners renting paddocks have had interest imputed as if they owned them.

OTHER COMMENTS

Throughout this discussion the results are presented separately for each year. The number included in each group varies between the years because those farms with records for only the 1959-60 season were not excluded from the survey.

The allowance for the farmer's car, which is included in business expenses, varied. The amount allowed was intended to be a conservative estimate of the appropriate costs. Thus some farmers were allowed a half, or a

³⁶ See, for example: "The Cost Structure and Management Problems of the Dairy Industry in New South Wales," this *Review*, Vol. 23, No. 3 (September, 1955).

third, of the car running expenses and depreciation. For others it seemed more appropriate to allow only £30, for running expenses, to an owner-operator, and £20 to a sharefarmer, as well as a third of the depreciation. Cars were not included in the assessment of capital for interest.

Costs and Incomes

CASH COSTS

Average cash costs are set out in Table 9. It should be noted that items "Seed and fertilizer", "Feed cows", and "Feed pigs" are estimates based on the aggregate figure shown in the tax return and information obtained during the interview. Also, several of the sharefarm owners have two farms which are included in the survey. Another owns a number of sharefarms but only one of them was included.

TOTAL COSTS, INCOME AND NET INCOME

Table 10 shows total costs, income and net income of the sample farmers. It may be noted that "receipts 'other'" are not very substantial. It is the opinion of the author that this is not due to any significant understatement of sideline income.

TABLE 9
Average Cash Costs of Sample Farmers

Items	Owner-operators		Sharefarmers		Sharefarm Owners	
	1958-59	1959-60	1958-59	1959-60	1958-59	1959-60
	£	£	£	£	£	£
Rates and Taxes	93.7	93.1	3.1	3.1	95.3	94.3
Repairs and Maintenance	147.1	156.4	4.8	8.6	84.0	81.8
Fuel, Oil and Electricity	100.8	95.9	32.6	32.6	45.7	46.1
Seed and Fertilizer	78.7	64.0	19.5	24.7	26.0	34.9
Feed—Cows	30.6	67.0	6.5	15.8	7.8	17.1
Pigs	100.1	107.0	27.5	30.1	34.0	39.2
Business Expenses	79.7	86.3	37.0	39.2	46.6	47.0
Veterinary and Herd Improvement	13.3	24.9	2.4	3.0	7.0	13.0
Miscellaneous Services	22.9	30.6	3.8	5.5	8.4	21.5
Miscellaneous Sundries	39.1	29.7	12.8	15.2	22.8	17.7
Total	706.0	754.9	150.0	178.6	377.6	412.6
Number of Farmers	27	29	31	32	26	27

Two of the owner-operators also had a sharefarmer on a separate property. Thus there are "payments to sharefarmers" for the owner-operator group. Also it will be noticed that trading by sharefarmers in cattle is insignificant. Few sharefarmers own cattle or derive any direct benefits from sales of the owner's cattle. Sharefarming agreements are described in the next section.

NET INCOME, IMPUTED COSTS AND "PROFIT"

Table 11 shows the derivation of "profit" from net income by the subtraction of imputed costs. In the normal business sense "profit" refers to the surplus available, as a return to capital. The term is not used in this sense here. Rather, it is used in an artificial way to avoid the awkward question of whether the residual should be imputed to labour or capital. Thus it corresponds to the "return to management" which is used in some studies but is not considered an appropriate description here. It is emphasized that the imputed costs are based on arbitrary valuations and that the "profit" figure is also subjective.

Some sharefarmers should be allowed imputed interest. This item would not be very substantial on the average and has not been calculated. The entry in "imputed allowance for labour" for sharefarm owners arises from the several sharefarms where the owner does a substantial amount of work.

RANGE OF NET AND CASH INCOMES

Table 12 shows for 1958-59 numbers of farms in various income groups for the two measures of income, "Net cash income" and "net income" which were described under the heading "Measures of Income" on page 41. Sharefarm owners are not included because many have other major sources of income. *The income of sharefarmers does not include any allowance for rent of houses.*

It is emphasized that these figures are net returns irrespective of the size of the labour force. For this reason Table 13, in which the "net income" is expressed per adult male worker for 1958-59, has been included. In some other surveys of the dairying industry net income has been expressed per "adult male equivalent". The method of analysis used here does not require the conversion of female and junior labour into these units. It merely requires the calculation of the net income per adult male actually working on the farm. However, allowance has been made where the male worker is elderly or invalid. One farm is excluded from the owner-operator group because there was no male worker. It should also be noted that in some of the cases with two adult male units one is not married and a close member of the family.

TABLE 10
Average Total Costs, Income and Net Income of Sample Farms

Item	Owner-Operators		Sharefarmers		Sharefarm Owners	
	1958-59	1959-60	1958-59	1959-60	1958-59	1959-60
Costs—	£	£	£	£	£	£
Cash Costs	705	755	150	179	377	413
Interest Paid	83	87	1	1	19	24
Rent Paid	87	83	..	..	2	7
Depreciation	209	217	42	49	194	193
Payments to Sharefarmers	113	122	..	..	1,011	1,244
Total	1,197	1,264	193	228	1,603	1,881
Receipts (excluding Livestock)—						
Butterfat	1,789	2,211	816	988	1,845	2,246
Calves	129	131	41	61	129	165
Other	48	47	18	33	43	87
Total	1,966	2,389	875	1,082	2,017	2,498
Livestock Trading Account—						
Cattle Purchased	156	277	6	27	141	134
Pigs Purchased	167	285	21	26	26	32
Cattle Sold	397	466	17	12	362	320
Pigs Sold	504	739	187	257	239	357
Net Gain	578	643	177	216	434	511
Livestock Inventory—						
Net gain	—58	99	12	14	—59	63
Net Cash Income	1,557	1,986	902	1,119	1,042	1,321
Total Income	2,865	3,693	1,091	1,365	2,618	3,239
Total Costs less Interest paid and Rent	1,408	1,656	219	281	1,808	2,016
Net Income	1,461	2,037	872	1,084	810	1,223
Number of Farmers	27	29	31	32	26	27

TABLE 11
Average Net Income, Imputed Costs and "Profit" of Sample Farmers

Item	Owner-Operators		Sharefarmers		Sharefarm Owners	
	1958-59	1959-60	1958-59	1959-60	1958-59	1959-60
Net Income	£ 1,461	£ 2,037	£ 872	£ 1,084	£ 810	£ 1,223
Imputed Allowance for Labour ..	1,160	1,180	1,142	1,161	60	60
Imputed Allowance for interest at 5 per cent.	607	602	150	150	610	620
Rent of House .. .. .	..	..	..	150	..	..
"Profit"	-306	255	-120	73	140	543
Imputed Allowance for Interest at 3 per cent.	364	361	..	..	366	370
"Profit"	-63	496	-120	73	384	793
Number of Farmers	27	29	31	32	26	27

TABLE 12
Frequency Distribution of Net Income and Cash Income, Owner-operators and Sharefarmers, 1958-59

Income Group	Owner-Operators		Sharefarmers	
	Net Income	Net Cash Income	Net Income	Net Cash Income
£	No.	No.	No.	No.
Less than 600 .. .. .	..	..	6	4
601— 800	4	2	9	10
801—1,000	2	4	8	9
1,001—1,200	4	2	4	3
1,201—1,400	5	6	2	3
1,401—1,600	4	4	..	..
1,601—2,000	3	4	2	2
More than 2,000	5	5	..	..
Number of Farmers	27	27	31	31

TABLE 13
Frequency Distribution of Net Income per Adult Male Worker, Owner-operators and Sharefarmers, 1958-59

Income Group	Owner-Operators	Share-Farmers
£		
Less than 600 .. .. .	..	10
601— 800	6	9
801—1,000	4	8
1,001—1,200	4	3
1,201—1,400	11	3
1,401—1,600	3	..
1,601—2,000	2	1
More than 2,000	2	..
Number of Adult Male Workers	32	34

DISCUSSION

In Part I it was claimed that a problem of low farm income existed in the dairying industry of the Far North Coast region. The data presented in this Section provides further tests of this claim. For the reasons explained previously the results in 1959-60 may be regarded as substantially above average, and those of 1958-59 as approximately average for the sample, and as clearly above average for the region, because of higher production than a true random sample.

The first test used is the comparison of average incomes with imputed income standards. For 1958-59 the net incomes of both sharefarmers and owner-operators were insufficient to cover the imputed labour charge and an interest charge at 3 per cent of the estimated capital value. The sharefarm owners obtained a satisfactory return on their capital in 1958-59 and a very satisfactory one in 1959-60.

The second test lies in the data on numbers of farmers in certain income groups. This also supports the contention. For instance, 19 of the 34 adult males working on sharefarms had net incomes (excluding free house rent) of less than £800 in 1958-59.

11. THE SHAREFARM PROBLEM

COMMENTS OF THE COMMITTEE OF ENQUIRY

The recent Dairy Industry Committee of Enquiry commented on sharefarming in the following terms:—

“The experience of the Committee leaves it without any doubt that sharefarming is the root cause of many of the low income problems in the dairy industry. As a general rule, to which there are notable exceptions, sharefarming as practised in the dairy industry does not establish conditions under which the best results can be obtained from farms”.³⁷

They also point out that there is a fundamental problem, unrelated to the internal arrangement of sharefarms which—

“... is the problem of trying to make a living area that is satisfactory for one living unit, provide an income to be shared by two or more living units.”

This sharefarming problem was regarded by the Committee as “a domestic one within the industry” and not one which it was expected to solve.³⁸

This section is an attempt to provide more information on sharefarming in the hope that the store of information will eventually be sufficient for recommendations to be made. Note that the more definitive study of Dillon was summarized briefly in Part I and that the approach used here does not employ the econometric methods suited to analysis of resource use inefficiency.³⁹

³⁷ Commonwealth of Australia, *Report of the Dairy Industry Committee of Enquiry*, Commonwealth Government Printer, Canberra, August, 1960, p. 11.

³⁸ The terms of reference of the Committee were:—“To enquire into and report upon the Australian dairying industry; its conditions, structure and problems; and to make recommendations regarding steps considered necessary and practicable, having regard to the overall interests of the nation, to place the industry on an efficient, economic and stable basis for the future.”

³⁹ Louis Dillon, *op. cit.*

Also, the reader who is interested in the methodology of the analysis of the effect of tenure arrangements on resource use efficiency will find a much more sophisticated approach in: Walter G. Miller, “Comparative Efficiency of Farm Tenure Classes in the Combination of Resources”, *Agricultural Economics Research*, Vol. XI, No. 1 (January, 1959).

HEADY'S MODEL⁴⁰

The application of economic theory to tenure arrangements has been most fully described by Heady. For readers not familiar with his work the following abbreviation is given using a model which is essentially the same but differs at minor points. The assumptions of the analysis are listed below:—

- (i) That it is a short run situation. The owner does not try to change his sharefarmer or the sharefarmer his farm.
- (ii) That it applies to cases “. . . where the landlord furnishes the land as a fixed cost while the tenant furnishes labor and capital and bears variable costs”.
- (iii) That total output increases in successively smaller increments if equal increments of the sharefarmers resources are progressively applied to the fixed amount of land provided by the landlord. That is, the relationship between these two factors is as shown by OY in Figure 1.
- (iv) That each party to the agreement receives a half share of the value of the output as his income. Thus, for each, the relationship between income, expressed as physical production, and output of sharefarmers resources, is as shown by OY_{1/2} in figure 1.

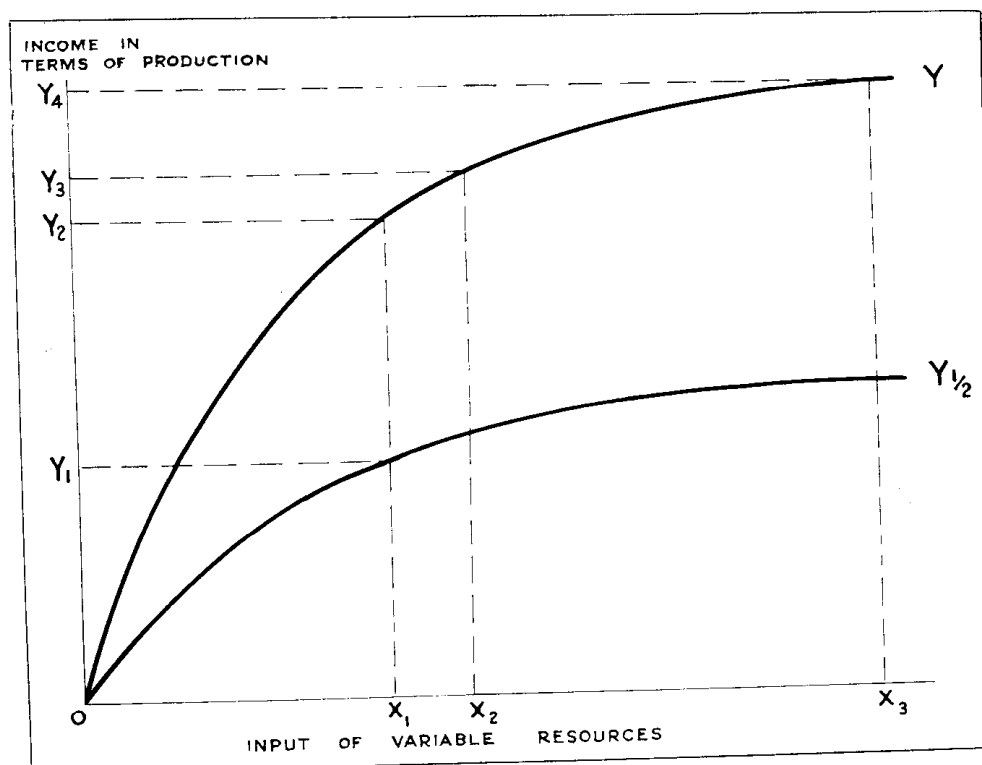


Fig. 1. Model of Relationship between Income and Input of Variable Resources for Different Tenancy Situations.

⁴⁰ E. O. Heady, *Economics of Agricultural Production and Resource Allocation* (Prentice Hall, Inc., New York, 1962), Chapter 20. The quotations given on page 47 are (respectively) from pages 595 and 600.

It is axiomatic that in such a situation the optimum input of variable resources is the level at which the additional cost of a unit increase in the amount of these resources is equal to the revenue received from the corresponding increases in output. Any smaller or greater input will give a smaller revenue.

We will assume that for the sharefarmer the optimum level of output is thus defined when input is x_1 , and his return is that from output y_1 ; total output is y_2 . Obviously under the same price conditions for an owner-operator or cash-tenant the optimum point falls at a higher level of total output which we show by y_3 ; the level of input here is x_2 . The owner of the sharefarm, under the conditions specified, incurs no extra cost for any change in the level of the sharefarmer's inputs. Thus the optimum for him is with maximum total output. Heady's interpretation is:—

“On this basis the landlord would prefer that the tenant apply resources to maximize the physical product for each acre and for the farm as a whole. The share tenant would prefer a much lower level of intensity and . . . would be willing to go an even smaller distance than the cash tenant or owner-operator.”

From this analysis he goes on to suggest:—

“Yet the imperfection” (of many share leasing systems) “is not inherent in the share characteristics of the lease. Instead, it grows out of established customs in sharing costs. A perfect share lease would provide the profit incentive for the most efficient combination of resources in the same manner as a cash lease or owner-operation. Only one condition, a complex provision, is necessary for a perfect lease in this respect. The cost of variable factors (where land is fixed) must be divided between the landlord and tenant in proportions paralleling the division of the products.”

In the “long-run” Heady's analysis suggests that sharefarmers will prefer farms of greater size, and sharefarm owners ones of lesser size, than will owner-operators or cash-tenants.

The first step of the discussion will be to answer the question: How do the agreements of the sample farms compare with the suggested perfect agreement? It will then be shown that farm size is approximately the same for the owner-operator and sharefarmer groups. This allows a comparison of intensity of production, as measured by expenditure, to be made on a per farm basis. Finally, it is suggested that part of the difference between the two tenancy groups can be explained by a simple classification of sharefarm owners on the basis of their occupational status.

THE SHAREFARMING AGREEMENTS

It will be noted that share agreements have two roles—to determine the allocation of income between capital (the owner) and labour (the sharefarmer) and to determine resource allocation as in the fashion of Heady's models.

Typically, the agreement between sharefarm owner and sharefarmer was “half shares”. Under such an agreement the sharefarmer receives half of all receipts from cream or milk, calves and pigs, and receives payment for rearing calves. Usually he is required to buy a half share in the pig enterprise, on entering the agreement, and to contribute half the outlay on fodder, fertilizer, seed, dairy requisites, fuel, electricity and similar running expenses. The owner is normally responsible for all maintenance and property expenses such as rates. He also usually owns the cattle and receives all income from cattle sales.

One variation on this basic pattern was seen on two farms, owned by the same person, on which the sharefarmer received 11/20ths of the cream receipts and provided all expenditure on fuel, power, fertilizer and seed. Another variation was found in an agreement in which the sharefarmer received 9/20ths of the returns for cream but paid only a small proportion of the running expenses. The sharefarmer in this instance received a very satisfactory income, and the arrangement was specifically designed to give the owner a greater degree of control over the working of the farm. A further variant was an agreement in which the sharefarmer was given a half share in the proceeds of a beef enterprise. The dairy enterprise on this farm was very small. Other variations of lesser importance included cases where the sharefarmer paid all the fuel and/or electricity costs (3 instances), all the running expenses of the dairy (2), all the seed and fertilizer costs (2), and none of the expenses for cattle feed (1).

TABLE 14
*Share of Income from Cream Paid to Non-family
Sharefarmers in Two Surveys**

Sharefarmers Share per £1 Cream Receipts	Number of Farmers	
	Big Scrub 1953	Richmond-Tweed 1960
Shillings	Number	Number
8	5	0
9	2	1
10	6	19
11	0	2
Total Number of Farmers in Survey ..	72	61

* The sharefarmer is not related to the farm owner.

Thus it appears that the typical North Coast dairy farm share agreement quite closely satisfies Heady's criteria for perfection assuming the sharefarmer's labour to be effectively a fixed factor. However, if it should be considered a variable factor, perhaps a more realistic viewpoint, the conditions for perfection must be violated in an agreement of this type.

While Dillon's study referred only to the Big Scrub Area of the Far North Coast and is therefore not strictly comparable with this study, the data in Table 14 are interesting. This comparison suggests that there has been a falling off in the number of sharefarmers who are willing to accept agreements specifying that they receive less than half the proceeds from sales of cream. An alternative (but, in the author's opinion, more improbable) explanation is that there has been a growing awareness of the economic rationale of having owner and sharefarmer contribute to costs, where possible, in the same proportions as those in which the income of the enterprise is divided. Although the overall 8s. in the £ agreement would be less favourable to the sharefarmer, than the typical 10s. in the £ agreement, such an agreement generally specified that a smaller proportion of the expenses were to be met by the sharefarmer.

In general the sharefarmer needs to provide only sufficient capital to purchase a half share in the pig enterprise. Interesting alternative arrangements were ones in which the sharefarmer owned a tractor and implements. In another the sharefarmer owned the milking machines; the owner maintained that, as he never had a milking machine when he worked the farm, the sharefarmer should provide one if he wanted it.

SCALE OF OPERATIONS

Table 15 shows several measures of the scale of operations in the two tenancy groups. The "estimated useful area" is a rough approximation on the basis of farmers' estimates and relates only to the dairy enterprise and any pig and beef sidelines; it includes the area used for buildings and yards. The derivation of the other averages is described in section 13. This evidence shows that there were no substantial differences in the scale of operations between the two groups except for total production per farm in 1959-60. Dillon found no significant differences in production per acre but production per cow and per "adult male equivalent" was significantly greater for the owner-operators in his survey. As far as can be assessed the work force on the sample farms of the more recent survey was approximately equivalent per farm for the two groups. It would therefore seem that an estimate of production per adult male equivalent would not show significant differences between the groups.

TABLE 15
*Average Scale of Operations on Sample Farms
For Tenancy Groups*

Average	Unit	Owner-Operators	Share-Farmers
Area per Farm	Acres ..	199	240
Estimated Useful Area per Farm	Acres ..	190	186
Cows per Farm—			
1958-59	No. ..	56	54
1959-60	No. ..	57	56
Total Production per Farm—			
1958-59	lb. c.b. ..	9,750	9,240
1959-60	lb. c.b. ..	11,067	10,137
Production per Cow—			
1958-59	lb. c.b. ..	174	171
1959-60	lb. c.b. ..	194	181
Value per Farm—			
Land and Buildings	£ ..	8,703	7,897
Total	£ ..	12,037	10,676
Number of Farmers	No. ..	29	32

EXPENDITURE

A second comparison can be made on the basis of expenditure on running costs. These are shown in Table 16. Rates and taxes which cannot be varied at the will of the operator, and business expenses, which include partly imputed expenses, in particular the allowance for a car, are left out.

TABLE 16
*Average Expenditure on Selected Items for Sample Farms
 by Tenancy Groups*

Item	1958-59		1959-60		Expenditure by Share-farmer as proportion of expenditure by owner-operator	
	Owner-Operator	Share-farmer*	Owner-Operator	Share-farmer	1958-1959	1959-1960
	£	£	£	£	per cent	per cent
Repairs and Maintenance ..	147	75	156	78	51	50
Fuel, Oil and Electricity ..	101	71	96	72	70	75
Feed, Seed and Fertilizer ..	210	110	238	147	52	62
Veterinary and Herd Improvement	13	8	25	14	62	56
Miscellaneous	62	43	61	54	69	89
Total	533	307	576	365	58	63
Number of Farms	27	31	29	32	..	..

* It may be noticed that this column is not the simple sum of the averages quoted for sharefarmers and sharefarm owners. This is because the figures for the sharefarm owners have been adjusted to a per farm basis.

Clearly there are substantial differences in the willingness of the operator (including the sharefarm owners) of these two groups of farms to make outlays for running expenses. Apart from the differences explained by the theory propounded by Heady, which would be expected to be relatively small given the nature of the share agreements, some other reasons for the differences are obvious. The item "repairs and maintenance" is largely the responsibility of the sharefarm owner. For an owner-operator some of the motivation for expenditure on this item is to avoid inconvenience and loss of time. As the sharefarm owner will be less likely to be aware of the need for such outlay it could easily be neglected if, as usual, it is his responsibility. Another reason is that the amount of plant and structures is on the average less, as would be expected, for the sharefarms. There is, therefore, less to maintain. One point on this item, that requires comment, is that the sharefarm owner is responsible within the business for repairs to the home. Theoretically, the owner-operator cannot claim these expenses for taxation deductions. This should increase expenditure on this item in the sharefarm group, but not greatly for, while some owner will see the house as a means of attracting or retaining a good sharefarmer, most probably regard expenditure in this direction as unproductive. The general appearance of sharefarmers' houses is sufficient proof of this.

The items "fuel, oil and electricity" and "fuel, seed and fertilizer" are generally shared equally, although some owners provide all the fertilizer and fodder for cattle. At first glance, from marginal analysis, it would be expected that these inputs would be used on sharefarms in similar quantities to the amounts used on owner-operated farms. However, there are several factors which complicate the decisions on these items. These include:

- (a) on the one hand, the sharefarmer is the sole contributor of the labour which goes with these inputs, and on the other, the owner usually provides the capital outlay which is necessary (e.g., fertilizer spreaders);

- (b) in contemplating these capital outlays the sharefarm owner has a greater degree of uncertainty about the amount the item will be used and the care which will be taken with servicing, than has the owner-operator ;
- (c) purchases such as tractors, as well as having an economic value to owner-operators, may have value in increasing the farmer's leisure. This value will usually be of no consequence to a sharefarm owner, unless it is necessary to attract or keep a sharefarmer ;
- (d) a large portion of the expenses for fuel, oil and electricity arise in the milking shed and these expenses would, therefore, be expected to be partly a direct function of the number of cows milked and independent of the type of operation ; and
- (e) the residual value of seed and fertilizer is not usually compensated for on termination of the lease.

Points (a) and (b) lead to the expectation that inputs of the sharefarmer's labour and the owner's capital will be less than for an owner-operator's on the same farm, except when the two parties trust each other to make compensating inputs of the factors which they do not themselves control, or when additional income is valued more highly than it is by an owner-operator. In other words one exception occurs when the owner visualizes his capital as a complementary input to the labour of the sharefarmer and vice versa. Point (c) leads to the expectation that an owner of a sharefarm will be less willing to buy some types of equipment than would an

TABLE 17
*A Classification of Sharefarm Owners by Occupation
 and Relationship to their Sharefarmers*

Classification of Owner(s)	Is Sharefarmer a Family Member?		Total
	Yes	No	
Retired	4 (1)*	3	7 (1)
Widowed†	3	1	4
Estate	0	3 (1)	3 (1)
Executive employee or business owner‡ ..	1	4 (1)	5 (1)
Employee	0	2	2
Farmer or grazier§	1	6 (1)	7 (1)
Total || .. .. .	9 (1)	19 (3)	27 (4)

* The figures in parentheses show the number of instances where a second sharefarm is held by one of the sharefarm owners. See || below.

† Includes estates if sole beneficiary is widow of former owner.

‡ Includes one farm owned by business man's wife.

§ Includes two farms owned by farmers' wives.

|| Four of the owners had two sharefarmers included in the survey. In three of these the sharefarmer was not related to the owner, thus the survey includes a total of 22 sharefarmers, with the sharefarmer not related to the owner. In a further two instances only one sharefarmer was included but the owner had another sharefarm. One retired owner is also a beneficiary of an estate with five farms.

owner-operator on the same farm. Point (d) suggests that fuel and electricity expenses on a sharefarm cannot be reduced greatly below those on an owner-operator's farm. Finally point (e) suggests that sharefarmers will be more reluctant to invest time and money in seed and fertilizer than owner-operators.

A PROBLEM GROUP

Another approach is to suggest that the division of the sharefarm group on a basis which relates to the aspirations and needs of the owners will prove fruitful in explaining the differences in expenditure between the two groups and the source of some of the low income problems in the industry. Table 17 classifies the ownership of the sharefarms on an occupational basis and also gives a cross-classification of the instances where the sharefarmer is related to the owner.

The owners are classified more simply in Table 18; the first group includes only the retired and widowed owners. More specifically, the suggestion is that Group A provides more problems of low income than does Group B and that this difference is related to the resources, needs, and aspirations of the owners.

TABLE 18
A Simple Classification of the Sample Sharefarm Owners

Group	Number of	
	Owners	Sharefarmers
Group A— Owner relies on Sharefarm(s) as Main or Sole Source of Income	11	12
Group B— Owner has other Major Sources of Income ..	17	20

TABLE 19
*Average Size of Herd and Production for
Groups "A" and "B" in 1958-59*

Item	Unit	Group A	Group B
Cows	No. ..	50	57
Production	lb. c.b. ..	7,760	10,170
Production per cow	lb. c.b. ..	156	176
Sharefarm Owners	No. ..	11	17

Table 19 gives several measures of the scale of operations and productive efficiency for the two groups in 1958-59. There is a significant difference between the two groups in production per farm and per cow.⁴¹ Also, there is some reason to believe that the average size of herd is smaller for Group "A" than "B".⁴²

⁴¹ At 0.1 level of significance.

⁴² Level of significance is 0.15.

Table 20 shows differences in expenditure on the two groups of farms for the items which were discussed earlier. Substantial differences appear.

TABLE 20
Average Expenditure on Selected Items for Groups "A" and "B" in 1958-59

Item	Group A	Group B
	£	£
Repairs and Maintenance	51.7	90.4
Fuel, Oil and Electricity	68.5	71.9
Feed, Seed and Fertilizer	79.8	130.4
Veterinary and Herd Improvement	7.1	9.0
Miscellaneous	30.7	50.6
Total	237.8	352.3

TABLE 21
Average Net Income from Sharefarms for Groups "A" and "B" in 1958-59

Net Income to	Group A	Group B
	£	£
Sharefarmers	716	971
Sharefarm Owners	623	948

Finally, Table 21 has been prepared to show the differences in the net income of the sharefarmers and owners for the two groups. For the owners the net income relates only to the particular sharefarm or sharefarms included in the survey. In both cases the differences between the two groups are significant.⁴³ Before interpreting this data one reservation must be made. It will be noticed, with reference to Table 17, that Group "A" ("retired" and "widowed") includes seven cases where the sharefarmer is related to the owner, and Group "B" only two such cases. Where there is relationship usually it may be assumed that part of the sharefarmer's income is deferred. He will eventually receive a whole or part share in the title of the property. However, this future income must be discounted against the needs of the present time and they seem to be inadequately met.

We may conclude that the hypothesis seems valid. Problems of low income appear more frequently on sharefarms if the owner is retired or widowed, and we can say that these owners are a group which are a problem to the industry. Of course, the solution of this problem is not nearly so obvious as its existence and manifestations. At this stage, perhaps, all that can be said is that its existence should be borne in mind.

⁴³ At 0.05 level of significance.

Two possible reasons why the retired and widowed owners have share-farms with the characteristics suggested are listed below:—

- (a) The owners' standards with regard to size of farm and herd, level of production per cow, etc., are more those of a past age than the present.
- (b) Incomes to the owners from the farms are low and generally they rely on the farms as their main source of income. Also, their need to plan for the future is less. These factors, together, lead to the expectation that these owners will try to maximize income with greater attention to the short run than the long run. The way they see of doing this is to try to keep expenditure to a minimum.

DISCUSSION

It is not pretended that this discussion of "the sharefarming problem" is exhaustive. The survey was not designed to give a rigorous investigation of the problem. Moreover, the information obtained has not been fully used. Statistical tests have been applied only where the use of averages appeared most doubtful. Thus, while it is believed that the conclusions would not be altered were these tests applied throughout, there is greater room for errors in judgment.

In summary it is suggested that:

- (a) The share agreements on the sample farms are closely similar to Heady's suggested perfect agreement with respect to most of the inputs which are easily variable in the short run. However, the owner generally provides capital other than land. Also, it is probable that the sharefarmer's labour cannot be regarded as a fixed factor.
- (b) The production of the sharefarms is almost as great as that for the owner-operator group.
- (c) Average expenditure on the short-run variable inputs on the share-farms is substantially less than for the owner-operator properties.
- (d) A variety of reasons are suggested for the differences in expenditure between the two groups on the basis of the way costs are shared and incurred.
- (e) However, another explanation appears to lie in the occupational status of the owners of sharefarms. Those who are retired or widowed more frequently have sharefarms which provide unsatisfactory incomes.

Points (a) and (b) seem to be logically related but point (c) confuses the issue. While it is possible to show that expenditure on certain items for the whole of the sharefarm group was much below that of the owner-operator group, and that the sharefarmers' incomes appeared more unsatisfactory than did those of the owner-operators, it was not possible to demonstrate that total net income was less on the sharefarms than on the owner-operator farms. In the author's opinion it would be misleading to draw any conclusion to the effect that owner-operators overspend on items such as fertilizer and fodder. The explanation appears to lie more in the neglect on the sharefarms of maintenance and repairs. As this disinvestment on the part of the sharefarm owners is naturally accompanied by

smaller demands on the sharefarmers' time for this item than for an owner-operator he is freed to engage in additional work to give production in the immediate future.

It is emphasized that while a problem group of owners of sharefarms has been defined there has been no attempt to suggest ways in which improvements with specific relation to this group can be made. Such improvements will be extremely difficult to achieve. However, any attempt at structural readjustment of the industry in the Region should be conceived with a knowledge of the existence of this group as a specific source of problems. We may add that there may be reasons why, where an owner in this group possesses a problem farm, he should be considered with more sympathy than an owner with a similar farm who also has a job or business.

In view of the strength and nature of the Committee of Enquiry's comments it is perhaps desirable to formulate a few principles which can be used as guides in an attempt to solve the problems sharefarming creates.

The first principle does not arise from the analysis of the survey data but from the principles of economics and commonsense. It is that the wide use of this tenure system arises mainly through economic forces; the laws of supply and demand, and the need of retired dairyfarmers to guarantee themselves an income with an investment which does not have the same uncertainties for them that other investments have. Psychological and social values, for instance the wish of many retired farmers to continue to own the piece of land they or their fathers cleared, are also important, but probably to a lesser extent. Thus, the use of the sharefarming system of farm operation is only a domestic problem to the industry in the same sense as efforts to improve herd quality through herd testing or artificial insemination.

The second is that any criticism of sharefarming as a tenure system must be made with the reservation that it can be, and frequently is, an excellent system in which an enthusiastic man can progress at a satisfactory rate towards the goal of farm ownership, if he can find a suitable farm and an enterprising owner. In other words it can be the means of combining an energetic man in his prime with a farm of adequate size and mechanization—a combination which would be quite impossible if he decided to become an owner-operator, before he had acquired a very substantial amount of capital. A number of instances were found in the survey in which the sharefarmer was obviously enthusiastic and the owner found it in his interests to push expenditure, apparently, as far as he would if he were an owner-operator, and further than that of many other owner-operators. In one of these instances, as mentioned before, the owner was committed to providing most of the variable expenses. His intention was to maximize returns in the longer term by attracting and keeping good sharefarmers. On the other hand the sharefarmer apparently saw his labour as part of joint or complementary resources. It is noteworthy that such co-operation gave outstanding financial results to both parties.

The third follows from the first. Any attempt to reduce the low income problems arising in this sector of the industry must be made either through education or legislation designed to improve the working of the system. The remaining principles relate only to the former approach. A short discussion of the effect of the Agricultural Holdings Act, and the need for written agreements is also given.

EXTENSION

(a) In general the most satisfactory share arrangement, from the viewpoint of resource-use efficiency, will be if costs are shared on the same basis as income is shared. This is, of course, impossible for the labour and capital supplied to the business. Also, other criteria will necessarily apply, in particular that of ensuring a satisfactory income to both parties and other arrangements may be more satisfactory if they are designed for a specific purpose.

Note too, that it is more difficult to ensure equitable sharing of costs than receipts. "Fixed costs" may be partially variable at different levels of output; for instance, the part of machinery depreciation attributable to extent of use. Also, some costs may be postponed; for example, repairs to buildings. If this is so the sharing of running expenses but provision of new plant by the owner probably encourages the sharefarmer to minimize his outlay of time and money on repairs, thus accelerating the rate of machinery replacements, especially, at high levels of use.

On the other hand higher levels of machine use are advantageous to the owner in "spreading" the true "fixed costs" (reducing fixed cost per unit output).

(b) Special attention should be given to the management problem sharefarming creates and the way it affects other management problems. It seems that the extension services have neglected the specific problems of this group. The author proposes a publication relating to the intending sharefarmer's question: "How many cows should a sharefarm have so that it will return an income that is satisfactory to me?" There are many other points where advice could be given.

LEGISLATION

The Agricultural Holdings Act, 1941, does not have much effect as few share agreements are written. Apparently the majority of owners feel that the provisions of the Act are too much to their disadvantage. Some modification of the Act to encourage the more widespread adoption of written share agreements may be desirable but this would need to be a subject for detailed research.

The Dairy Industry Committee of Enquiry placed great emphasis on the need for written agreements. They stated:

"One main and widespread reason for this (that sharefarming is the root cause of many of the low income problems in the dairy industry) is the absence of written agreements and the consequent insecurity of tenure of the sharefarmer".⁴⁴

While this factor may be important to a degree it will be noted that much of the preceding discussion has been devoted to suggesting other reasons which may be equally fundamental.

12. PRODUCTION AND NET INCOME

The purpose of this section is to examine the relationship between net farm income and a single measure of farm size, total production of commercial butter, for those farms which were considered to derive all but a small amount of their income from pig and dairy enterprises. In effect

⁴⁴ *Report of the Dairy Industry Committee of Enquiry, op. cit.*

the farmers excluded were those with substantial beef or veal enterprises except for one farm which was excluded because the owner also derived income from a sharefarm. For the owner-operator group twenty-one farms were included in the analysis and six excluded, while for the sharefarm group all the thirty-one farms were included. Only the results of the 1958-59 season were included in the analysis as it is obvious that net income for a given level of production will be greater if seasonal conditions are particularly good. In other words the cost of achieving this level of production is lower in the better season.

That a correlation appears when it is hypothesized that, for this group of farms, net income is a variable dependent on the total production of butter is no surprise. Such a relationship is one of the ". . . crashing truisms of agriculture and economics . . ." ⁴⁵ However, the analysis is to be put to two uses ; to test the recommendation of the Dairy Industry Committee of Enquiry on a minimum production standard to be used in a proposed programme of farm adjustment and to provide a guide to the intending dairy farm purchaser or sharefarmer in the Richmond-Tweed region with respect to the production necessary to fulfil budgeted requirements for net income. This guide, which is not discussed here, may be of particular use to those who are not dairy sharefarmers at present but are contemplating the purchase of a farm.

THE COMMITTEE'S STANDARD

The Dairy Industry Committee of Enquiry considered that its directive ". . . to make recommendations . . . to place the industry on an efficient economic and stable basis for the future" could be partially fulfilled by suggesting a programme of structural readjustment for the industry in which the aim should be to achieve, as a minimum standard ". . . units that are producing or have the potential to produce at least 8,000 lb. of butterfat per annum or its equivalent." ⁴⁶

The data relating to the sample farm can be used to provide a test of how satisfactory this standard appears to be in the Far North Coast of New South Wales, for the two tenancy groups. Using the least squares regression technique, with net income denoted by (£)Y and production by X (lb. c.b.), the following equations were obtained ; ⁴⁷

$$\begin{aligned} (a) \text{ owner-operator group - } & Y_o = 111 + 0.128 X_o \text{ and} \\ (b) \text{ sharefarmer group - } & Y_s = - 36 + 0.099 X_s \end{aligned}$$

These lines and the points from which they are derived are shown in Figure 2.

⁴⁵ K. O. Campbell, "Contemporary Agricultural Economics in Australia" (Proceedings of the Conference of Agricultural Economists, February, 1957), this *Review*, Vol. 25, Nos. 1-2 (March-June, 1957).

⁴⁶ *Report of the Dairy Industry Committee of Enquiry*, op. cit., p. 10. The Committee notes, "In this context income from pigs is considered dairy income".

⁴⁷ It was estimated that the analysis described 81 per cent and 83 per cent respectively of the variation in Y by its relationship to X. The true functions seemed to be quite satisfactorily approximated by straight lines.

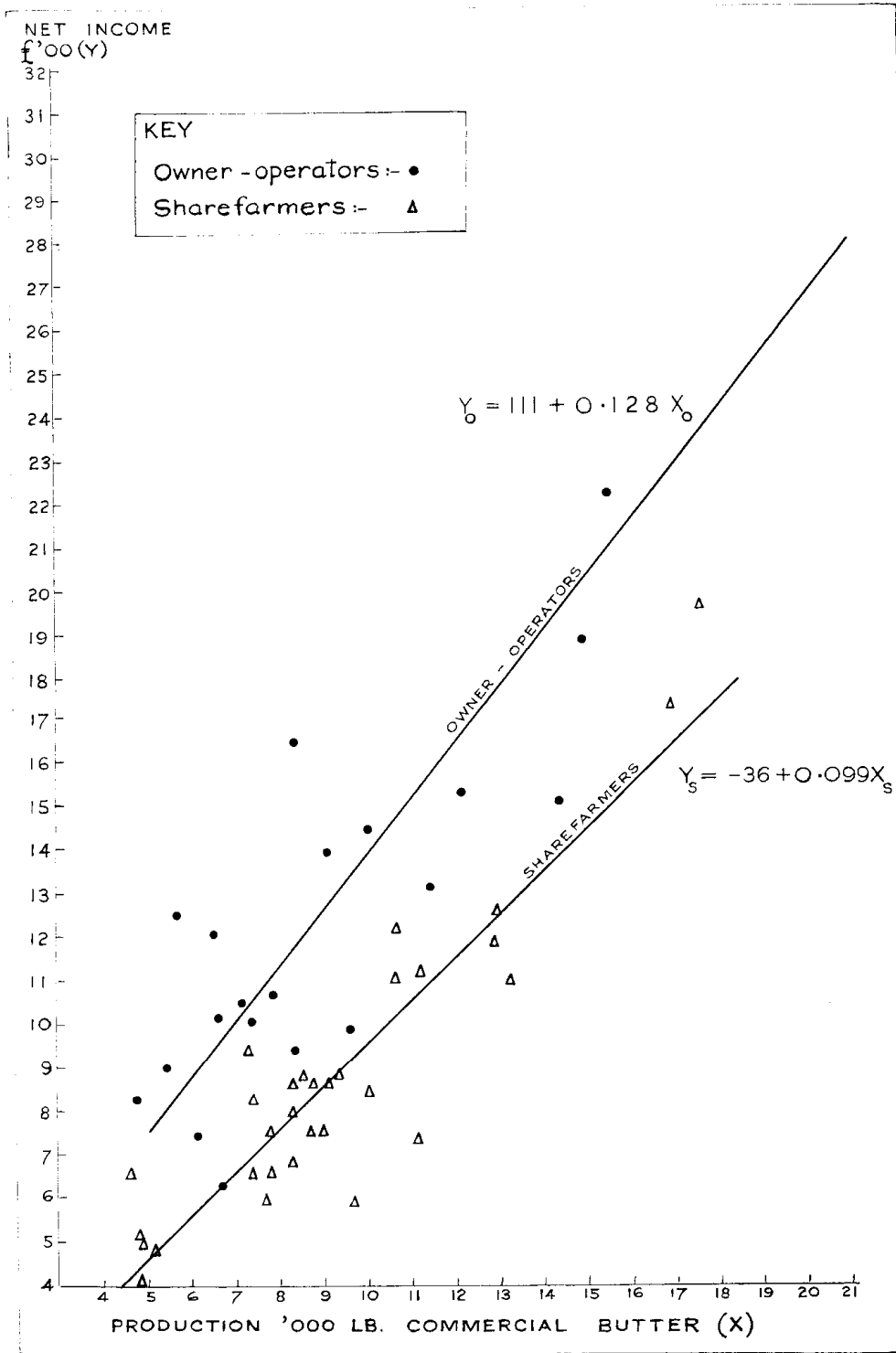


Fig. 2. Net Income and Production of Butter for Sample Farmers.

Table 22 was prepared from the equations and the accompanying analysis for confidence limits. For an owner-operator this net income must meet any interest and loan repayments, and provide any further developmental expenditure, as well as his living expenses. For a sharefarmer the net income, at a minimum, need only provide his living expenses and sufficient savings over his lifetime for the purchase of a house for his years of retirement. Note that the net income quoted for the sharefarm group does not include an allowance for house rental.

TABLE 22

Estimated Net Income and Range of Net Income of Farms Producing 8,000 lb. Butterfat: Far North Coast Region, 1958-59

Tenancy Group	Mean Net Income	Number of Farms	95 per cent of Farms Have Net Incomes Lying Between		20 per cent of Farms Have Net Incomes Less Than
			Upper Limit	Lower Limit	
Owner-Operators ..	£ 1,350 ± 120	No. 21	£ 1,910	£ 790	£ 1,120
Sharefarmers ..	920 ± 50	31	1,220	630	800

The Committee presented their standard as a conservative minimum and as such it would appear satisfactory, in this region, given that prices received and paid remain approximately the same. However, the programme suggested by the Committee was partly to offset the effects of the proposed removal of the subsidy to the industry over a ten-year period. It appears reasonable to assume that the farms producing less than 8,000 lb. b.f., but with a potential to reach this figure, using the improvements suggested by the Committee, would, when they reach it, have costs at least as great as those of the hypothetical average 8,000 lb. farm from the regression analysis (with the same price conditions).

If the final column of Table 22 is recalculated excluding the subsidy from the butter return we obtain estimates that, for farms at this level of production, 20 per cent of the owner-operators would receive less than £870 net income and 20 per cent of sharefarmers would receive less than £675 (plus house rent). Thus, were the subsidy to be removed it appears that the production standard set by the Committee may not be high enough.

13. THE SAMPLE FARMS

This section is designed to describe some of the characteristics of the sample farms. Many of the questions asked about farm organization were intended to obtain information on the arrangements made to supplement feed supplies in critical periods of the year. The information obtained by these questions will be used, at a later date, as a part of that which is necessary to analyse the economics of the various alternatives for supplementary feeding, which are available to farmers in the region.

It was considered that any suggestions in this respect derived entirely from the survey data would not have a sufficiently sound basis and would prejudice the results of follow-up studies. The diversity of land types and climate in the region present serious restrictions to the meaningfulness of the data presented here. It should only be interpreted with careful reference to the description of the deficiencies of the sample in section 9 and to the distribution of the sample farms as shown by Map 3. Throughout share-farm and owner-operated farms are treated separately.

FARM SIZE⁴⁸

As no one measure gives a satisfactory description of farm size, in the sense of "size of business", four different measures are provided below:—

- (a) *Area*: Table 23 shows frequency distributions and averages of the total area of the farms and of "estimated useful area". (The latter figure which relates only to the dairy, beef and pig enterprises, is a rough approximation derived from questioning the farmers with reference to area with serious weed infestations, area under forest, and area of stony outcrops).
- (b) *Livestock Numbers*: The following tables comprise a description by frequency distribution and averages, of livestock numbers on the sample farms. The number of cattle is the average of the opening and closing inventories for each year. Size of milking herd was obtained by asking each farmer the question, "What was the maximum number of cows milked during the year?" It is assumed that, since calving is seasonal, this approximates to the true figure.

TABLE 23
Total Farm Area and Estimated Useful Area of Sample Farms

Size of Farm	Total Farm Area				Estimated Useful Area			
	Owner-Operators	Share-farmers	Total		Owner-Operators	Share-farmers	Total	
Acres	No.	No.	No.	per cent	No.	No.	No.	per cent
Less than 80	1	0	1	1.6	1	1	2	3.2
81—100	3	8	11	18.1	3	8	11	18.1
101—120	0	1	1	1.6	0	1	1	1.6
121—140	3	3	6	9.8	4	3	7	11.5
141—160	3	4	7	11.5	3	4	7	11.5
161—180	4	0	4	6.6	3	0	3	4.9
181—200	3	2	5	8.2	3	4	7	11.5
201—250	5	3	8	13.1	5	3	8	13.1
251—300	5	1	6	9.8	6	3	9	14.8
301—350	6	3	3	4.9	0	1	1	1.6
More than 350	2	7	9	14.8	1	4	5	8.2
Total Number of Farms	29	32	61	100.0	29	32	61	100.0
Average size	Acres 199	Acres 240	Acres 221	..	Acres 187	Acres 190	Acres 189	..

⁴⁸ For a criticism of the methods of description of farm size which are used here, and a suggested alternative, see J. N. Holmes, "The Derivation and Use of an Index of Dairy Potential", this *Review*, Vol. 29, No. 4 (December, 1961).

TABLE 24
Number of Cattle on Sample Farms

Number of Cattle	Owner-Operators		Sharefarmers	
	1958-59 No. of Farms	1959-60 No. of Farms	1958-59 No. of Farms	1959-60 No. of Farms
Less than 45	2	2	2	3
46—65	4	6	10	7
66—85	9	7	9	10
86—105	5	6	4	6
106—125	3	3	4	3
126—150	2	4	2	2
More than 150	2	1	0	1
Total	27	29	31	32
Average per Farm ..	No. of Cattle 89	No. of Cattle 87	No. of Cattle 78	No. of Cattle 78

TABLE 25
Size of Milking Herd on Sample Farms

Number of Cows	Owner-Operators		Sharefarmers	
	1958-59 No. of Farms	1959-60 No. of Farms	1958-59 No. of Farms	1959-60 No. of Farms
Less than 35	1	1	5	5
36—45	9	9	5	4
46—55	5	6	7	6
56—65	5	5	6	7
66—75	5	5	5	8
76—85	0	0	2	0
More than 85	2	3	1	2
Total	27	29	31	32
Average per Farm ..	No. of Cows 56	No. of Cows 57	No. of Cows 54	No. of Cows 56

The total livestock carried per useful acre has not been corrected for variations in herd composition because the farmers' records did not include details of numbers in different age groups; it must, therefore, be considered as a rough approximation.

The number of pigs per farm, which is more a measure of intensity of operation than farm size, is discussed under the heading "The Pig Enterprise".

TABLE 26
Number of Horses on Sample Farms at June 30, 1960

Number of Horses	Owner-Operators	Sharefarmers
	No. of Farms	No. of Farms
0	8	10
1	6	8
2	7	6
3	3	3
4	0	4
5	3	1
6	2	0
Total	29	32

TABLE 27
Number of Cattle per Useful Acre on Sample Farms, 1959-60

Cattle per Acre	Owner-Operators No. of Farms	Sharefarmers No. of Farms
0.21—0.40	8	13
0.41—0.60	10	9
0.61—0.80	11	7
0.81—1.00	0	1
Total	29	32

PRODUCTION PER FARM

A frequency distribution of production per farm for 1958-59 was given in Section 9 and this measure of size is not repeated here. For some farms production was given in terms of butterfat or gallons of milk, instead of commercial butter. The conversion factors used were 1 lb. b.f. = 1.2175 lb. c.b. and 1 gal. milk = 0.500 lb. c.b.

With reference to the discussion of farm size in Section 12 it is interesting to compare the number of farms for which production fell either below or above the suggested standard of 8,000 lb. b.f. This is done for 1958-59 in Table 28. It was estimated that five of the owner-operator farms and three of the sharefarms, with production below this figure, received sufficient income from enterprises, other than the dairy and piggery, to bring their net income to a point of equivalence with that from a solely dairy-pig farm producing 8,000 lb. b.f.

TABLE 28
Number of Farms with Production Falling Above or Below 8,000 lb. b.f. in 1958-59

Tenure Groups	Above 8,000 lb. b.f.	Below 8,000 lb. b.f.
	No. of Farms	No. of Farms
Owner-Operators	12	15
Sharefarmers	12	19

CAPITALIZATION

The method of determining capital investment for imputing interest charges and the limitations of the methods used were described in Section 10. It will be recalled that valuation of plant was not done with reference to market value and that valuation of livestock was done in an arbitrary way.

TABLE 29
Estimated Average Capital Values of Sample Farms

Tenure Group	Improved Capital Value	Value of Plant	Value of Livestock	Total
	£	£	£	£
Owner-Operators	8,700	1,000	2,300	12,000
Sharefarmers	7,900	700	2,000	10,600

Table 29 shows average capital values for the two tenure groups. In this case improved capital value includes the owner's house. For the owner-operator group total estimated capital ranged from £5,700 to £20,900; for the sharefarm group the range was from £5,800 to £22,000.

Two special aspects of capitalization are referred to below:—

- (a) *The Milking Shed*: The milking sheds were typically of three double bails (i.e., providing accommodation for six cows) and with three-unit milking machines. While the main variations in this pattern were differences in size of shed and number of units, the most interesting alternatives found were two sheds with elevated bails of the "herringbone" type. The owners of these sheds both expressed satisfaction with them, and ease and rapidity of milking was clearly good when the author observed the evening milking in one of them. It is proposed that this alternative in milking shed design be the subject of an economic appraisal in the near future.
- (b) *Mechanization*: A superficial idea of the degree of mechanization of the sample properties can be obtained from details of the number of tractors used which are shown in Table 30. "One shared" means a farm which shares a tractor with another farm. For comparison reference should again be made to Table 26, which showed the number of horses. In that table hacks were included as well as draught horses, although their number would be considerably less than one per farm.

TABLE 30
Number of Tractors Used on Sample Farms

Tenure Group	Nil	One shared	One	Two	Total
	No. of Farms	No. of Farms	No. of Farms	No. of Farms	No. of Farms
Owner-operators ..	15	0	13	1	29
Sharefarmers ..	11	5	15	1	32

YIELD PER COW

Table 31 shows a frequency distribution and average yield per cow for 1958-59 and 1959-60. In a previous report on the Richmond-Tweed dairying industry reference was made to the relationship between yield per cow and number of cows in the following terms:—

“Traditionally it has been very widely accepted that high production per cow and economic success are closely related. In this study the relationship between net incomes and cow yields was found to be very tenuous . . . It seems likely that under some conditions dairy farming can be financially more successful by concentrating on milking the maximum number of cows even though this entails producing less per cow . . .”⁴⁹

TABLE 31
Yield per Cow on Sample Farms

Production lb. c.b.	Owner-Operator		Sharefarm	
	1958-59 No. of Farms	1959-60 No. of Farms	1958-59 No. of Farms	1959-60 No. of Farms
Less than 120	1	0	2	5
121—160	11	8	14	5
161—200	8	9	7	13
201—240	7	8	5	6
241—280	0	2	3	2
More than 280	0	2	0	1
Total	27	29	31	32
Average Production of c.b.	lb. c.b. 174	lb. c.b. 194	lb. c.b. 171	lb. c.b. 181

For the purpose of testing this claim with the survey results the farms in each tenure group were ranked into three groups on the basis of “Net income per adult male worker”. Production per cow and number of cows for each of these groups is compared in Table 32.

⁴⁹ Gruen, *op. cit.*, the conclusion given here was also referred to in Part I.

The result is that no clear relationship emerges. Number of cows may be a more important determinant of net income but even if this generalization is true it is apparent that it cannot be applied as a "rule of thumb" in extension work. The correct decision for any farmer must be made with reference to the individual characteristics of his farm situation.

TABLE 32
Comparative Analysis of Relationship of Net Income per Adult Male Worker to Yield per Cow and Number of Cows

Income Classification	Average Net Income per A.M.W.	Production per Cow	Number of Cows
	£	lb. c.b.	No.
Owner-Operators—			
Low	883	185	53
Moderate	1,227	191	57
High	1,623	187	61
Sharefarmers—			
Low	568	162	51
Moderate	760	175	47
High	1,073	184	61

TABLE 33
System for Controlling Grazing on Sample Farms

System of Grazing	Owner-Operator	Share-Farmer	All Farms
	No. of Farms	No. of Farms	No. of Farms
Grazing Continuous over Whole Farm ..	2	1	3
Grazing Continuous but on Separate Night and Day Paddocks	6	11	18
Rotational Grazing but with a Continuously Grazed Night Paddock ..	2	7	9
Rotational Grazing but with a Separate Night and Day Paddock	16	10	26
Strict Rotational Grazing	3	1	4
Continuously Rationed Grazing with an Electric Fence	0	1	1
Total	29	32	61

GRAZING CONTROL

Reference was also made in Part I to Gruen's⁵⁰ conclusion that controlled rotational grazing appeared to be associated with higher net income. Table 33 shows details of the method of controlling grazing which were used on the sample farms. It should be noted that many of the farmers who claimed to use rotational grazing did so in a very limited sense. The widespread use of "night" paddocks (i.e., paddocks usually near the milking shed, to which the cows are confined at night) in part arises from the "difficult to work" shape of many of the farms, particularly the steeper ones.

Some of the farmers also used an electric fence for strip or rationed grazing of special pastures and fodder crops. Table 34 shows numbers of farmers using this technique.

TABLE 34
Rationed Grazing with Electric Fence

Method of Grazing	Number of Farms
Used to Ration all Pastures	1
Used to Ration Improved Pastures	10
Used to Ration Vetch Crop	5
Total Using Electric Fence	16
Number not Using Electric Fence	45

SUPPLEMENTARY FEEDING PRACTICES. In a livestock industry a farmer has a decision to make which may be described by the question—Will I rely solely on the growth of the present or "natural" pastures as the source of feed for the cattle? If he decides to supplement the feed from the pastures in particular periods of the year he normally has a number of alternative methods to choose from. In this respect an interesting point is that, in contrast to many dairying areas of Australia, in the Far North Coast the making of pasture hay is generally considered to be one of the more impractical alternatives. One sample farmer on the extreme western boundary of the area claimed he made about 30 tons a year, another with a farm near Lismore has made a small amount of loose hay in favourable seasons. The use of pasture or crop silage is also very restricted. None of the sample farmers used this method. Table 35 shows the number of farmers using various alternatives as their main source of supplementary feed. The "other crops" used included poona peas, velvet beans, oats, sweet sudan, corn, etc. Improved pastures were considered as a source of supplementary feed if the species used had a different growing period to that of *paspalum* and *compressum*.

⁵⁰ *Ibid.*

TABLE 35
Number of Farmers using Particular Alternatives as Main Source of Supplementary Feed

Source of Feed	Number of Farms
Vetch	9
Irrigated Pastures	8
Other Crops	7
Improved Pastures (not Irrigated)	5
Concentrates	4
No Substantial Effort to Provide Supplementary Feed	28

A brief description of the use of two of these alternatives, irrigated pastures and the vetch (or golden tare, *Vicia sativa*) is given below.

Spray Irrigation: Table 36 shows the number of farmers in the sample who had irrigation plants at the time of the survey and the number of the remaining farms with apparent potential for use of this technique. It is not implied that its adoption in any of these cases would necessarily be desirable.

TABLE 36
Number of Farmers with Irrigation Plants and Number of Farms with Potential for Use of Irrigation

	Number of Farms
Farmer had Irrigation Plant	13
Farmer was Planning to Install Irrigation Plant	3
Farm had Potential for Irrigation from River or Creek	19
Farm had Potential for Irrigation from Dam	6
Farm Apparently had no Potential for Satisfactory Irrigation Plant	20

Eight of the farmers, with irrigation plants, reported use of ladino white clover, as an important component of their irrigated pastures. Only one reported use of unimproved white clover-paspalum pastures.

The farms with irrigation plants are classified in Table 37 on the basis of area irrigated in the spring of the 1960-61 season, a particularly dry period. A number of farmers with irrigation plants did not irrigate in the survey period because of the good seasonal conditions. One farmer, in the Kyogle district, who has had an irrigation plant for over twenty years claimed that he irrigated on the average only once in every three years.

Vetch (or Golden Tare): An alternative source of supplementary feed which has rapidly attained prominence, in some parts of the Far North Coast, during the last three years is vetch. This legume crop is grown as a source of high quality supplementary feed for the late winter and early spring period.

TABLE 37
Area Irrigated on Sample Farms, Spring, 1960

Area	Number of Farms
Acres	
0—4	2
5—9	4
10—14	3
15—25	3
26—35	1

The number of sample farmers using this practice is shown by Table 38, while method of sowing is shown in Table 39. Fertilizer usage and seeding rates were generally in accord with the Department of Agriculture's recommendations.

TABLE 38
Number of Sample Farmers Growing Vetch and Area Grown in Last Three Seasons

Year	Number of Farms	Total Area
		Acres
1958-59	8	54
1959-60	12	123
1960-61	13	122

TABLE 39
Method of Sowing Used by all Sample Farmers that Grew Vetch in the Last Three Seasons

Method	Number of Farmers
Sod-seeding	10
Prepared seed bed	5
Broadcasted seed and chisel ploughed ..	3

One farmer gave the following details of costs associated with a crop of 30 acres of vetch. In 1959-60 fertilizer was applied at 2 cwt. per acre (12 acres with "Pasture No. 1" fertilizer (superphosphate and dolomite) and 18 acres with potash fortified "Pasture No. 1"). The seeding rate was 25 lb. per acre. The stand obtained provided the daytime grazing for 65 head of cattle, including 40 cows, for approximately 11 weeks.

Another farmer in the same district had 2 acres sod-seeded by contract, with seed and fertilizer provided by the contractor, for £10 per acre.

TABLE 40

Costs Associated with Sowing of Thirty Acres of Vetch Crop, 1959-60

Item	Total	Per Acre
	£ s. d.	£ s. d.
Seed and inoculum	54 16 0	1 16 6
Fertilizer	104 0 0	3 9 4
Contract sod-seeding	48 0 0	1 12 0
Total	206 16 0	6 7 10

SIDELINE ENTERPRISES

By far the most important avenues for sideline production arose out of the use of skim milk on all farms except the six which supplied whole-milk to the factories, or the one which supplied a city milk vendor. Table 41 shows details of the disposal of skim milk on the farms. Use of it to feed calves for herd replacements has been ignored. Other sidelines used at any substantial level, either alone or in combination with others in either table, are set out in Table 42.

TABLE 41

Disposal of Skim Milk on Sample Farms, 1959-60

Skim Milk Fed to:—	Number of Farms
Sows and Litters	33
Store Pigs Bought for Fattening	8
Sows, Litters and Store Pigs	6
Sows and Vealers or Dairy Heifers (for Sale)	2
Store Pigs and Vealers or Dairy Heifers (for Sale)	3
Dairy Heifers or Vealers	2

TABLE 42

Other Sidelines used on Sample Farms, 1959-60

Nature of Sideline	Number of Farms
Beef Cattle	5
Broom Millet	2
Potatoes (English and Sweet)	1
Land Leased for Bananas	4
Banana Growing	1
Vegetables	2
Sleeper Cutting	1
Stock Transport	1

The Pig Enterprise: The following tables comprise a partial description of the pig enterprises on the sample farms. In each case the figures cannot be regarded as accurate because the farmers had no reason to keep the detailed records which would be necessary for accuracy. The Table of sow-cow ratios only applies to those farms on which most of the skim milk was used for sows and their litters. The sow-cow ratio is regarded as a measure of the intensity of the pig enterprise. It would also be desirable to calculate feed costs and gross income per sow but these could not be determined accurately enough for publication, because, on the one hand, a number of the farmers grew grain for the pigs, and on the other, the feed expenses for a number of the farms had to be estimated from total feed used for pigs and cows.

TABLE 43

Number of Sows on Sample Farms, 1959-60

Number of Sows	Owner-Operators	Sharefarmers
	No. of Farms	No. of Farms
0	12	8
1	0	0
2	3	3
3	4	2
4	3	4
5—7	3	13
8—10	2	1
11—15	1	1
16—20	0	0
21—25	1	0
Total	29	32

TABLE 44

Sow-cow Ratio on Sample Farms, 1959-60

Sow-cow Ratio	Owner-Operators	Sharefarmers
	No. of Farms	No. of Farms
1 :		
Less than 4	1	0
4·1—6	1	1
6·1—8	0	3
8·1—10	6	8
10·1—15	4	8
15·1—20	1	2
20·1—30	4	1
More than 30	0	1
No Sows on Farm ..	12	8
Total	29	32