DAIRY GRANT DEMONSTRATIONS IN NEW SOUTH WALES—FIVE CASE STUDIES.

by

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1. OBJECTIVES OF THE GRANT.

In February, 1948, the Minister for Commerce and Agriculture outlined the policy of the Commonwealth Government in deciding to make an annual grant of £250,000 for five years for the purpose of promoting improved practices in the Australian dairying industry. It was pointed out that, at the time of the decision, the Commonwealth Government was spending £6½ million per annum on subsidies to the industry and had entered into an agreement to guarantee the existing return to farmers for five years. At the same time, inefficiency was recognized within the industry and it was desired to increase the output of dairy products to meet a strong demand from the United Kingdom. The objective of the Dairy Industry Efficiency Grant, therefore, was to increase production by raising the level of efficiency within the industry and it was intended that this should be achieved by encouraging the adoption of techniques already known rather than by additional research which could be financed from normal funds. Thus, from the outset, the Grant has been regarded as an investment designed to improve the efficiency of existing dairy farms.

The specific purposes for which it was intended the finance should be used were herd recording, sire surveys, demonstration farms and plots, feeding demonstrations, films and literature for extension purposes and dairy farm competitions. Other activities were subsequently added to the original list; in New South Wales, for instance, it was decided to carry out a herd wastage survey, establish and conduct an artificial insemination centre and commence an investigation into sterility of dairy cattle. In 1951, arrangements were made under the Grant, for Mr. T. M. Jensen, Superintendent of Dairying in Victoria, and Mr. M. Cullity, Superintendent of Dairying in Western Australia, to proceed to the United States of America and Europe, respectively, for the purpose of examining extension methods and services as they relate to the dairying industry.

In the first year of the Grant the Commonwealth retained £50,000 to cover the cost of preparing suitable textbooks and films for extension purposes. Thereafter the annual allocations to the States were:—

	£
New South Wales	67,583
Queensland	68,583
Victoria	67,583
South Australia	19,125
Western Australia	18,125
Tasmania	9,000

In practice, the States did not spend constant amounts each year as it took some time to arrange demonstrations, etc., and it was necessary to arrange for amounts not spent in one year to be carried forward. The actual expenditure incurred in each State is shown in Table I.

TABLE I.

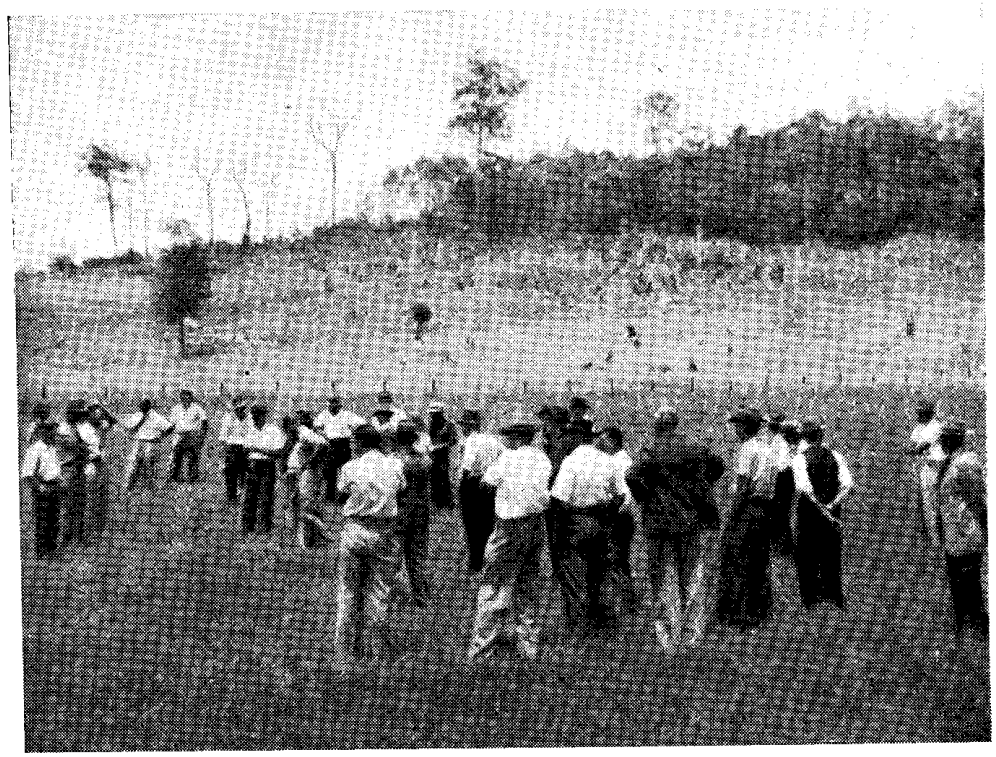
Actual Expenditure under the Dairy Industry Efficiency Grant, 1948-49 to 1952-53.

State.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£	£
New South Wales ...	8,691	48,561	61,937	89,528	83,457
Queensland	4,689	31,788	52,066	66,180	75,206
Victoria...	5,177	25,380	64,809	76,559	68,953
South Australia ...	2,805	10,493	14,894	19,300	18,611
West Australia... ...	5,539	16,226	20,556	16,662	19,076
Tasmania	2,720	4,943	6,189	8,646	7,218
Commonwealth ...	23	10,504	17,297	9,047	5,669

From an educational point of view, an important aspect of the scheme was the publication of a comprehensive handbook entitled *Dairy Farming in Australia* for distribution to dairy farmers. The State Departments of Agriculture assisted the Commonwealth to prepare a separate edition of the book for each State by contributing material having particular reference to local conditions. The Grant also facilitated an improvement in the equipment available for extension work in dairying districts. In New South Wales local officers of the Department of Agriculture have been provided with 16 mm. movie film projectors, 35 mm. film-strip projectors, 35 mm. cameras and pocket-size slide viewers.

2. DEMONSTRATION FARMS.

In the dairying districts of New South Wales 160 demonstrations had been completed or were still in progress at the end of October, 1953. These have been concerned mainly with pasture improvement and management, including the subdivision of large paddocks, rotational grazing, sowing of pastures and top-dressing with lime and superphosphate. While the greatest emphasis has been placed on pasture management, some of the demonstrations have been devoted to concentrate-feeding, disease control, weed control, dehorning of cattle and control of pests. The demonstration farms were selected on the basis of recommendations from local farmers' organizations and district officers of the Department of Agriculture.



Group of Farmers at a Field Day on a Dairy Grant Demonstration Farm.

The vast majority of demonstrations have been highly successful and by 1951 the value of the demonstrated improved practices had become increasingly evident to farmers in the dairying districts. Many dairy farmers throughout the State have shown great interest in the work and have sought further information by attending field days and discussing the techniques used with officers of the Department of Agriculture and the operators of demonstration farms. The success of demonstration farms has stimulated the adoption of improved practices in the dairying districts and contributed to the pronounced increase that has occurred in the area of sown pastures in the last two years. Thus the scheme has been valuable in improving farmers' knowledge of efficient farm practices.

From a farm management point of view, several important points emerge from a consideration of the work carried out in the first five years of the Grant, 1949 to 1953.[1] In the first place, it must be emphasized that the increased productivity on demonstration farms was achieved merely by applying known sound practices. However, the key to success in doing this was the elimination of impediments to the implementation of the planned improvements; technical problems were resolved by careful consultation between the farmers concerned and officers of the Department of Agriculture, while the Dairy

[1] In view of the success of the scheme in stimulating the adoption of improved practices, the Commonwealth Government decided in January, 1952, to continue the Grant for a further five years (that is, to June, 1958). As before, the expenditure will be £250,000 per annum, the Commonwealth retaining a total of £50,000 for specific projects such as the preparation of films and publications.

Grant assisted on the financial side. The advice of extension officers is always available to farmers but the work carried out on demonstration farms was carefully planned and closely supervized by Agronomists, Dairy Officers and Dairy Grant Organizers to ensure the most efficient utilization of resources in each case[2]. This continuous and detailed advice gave the operators of demonstration farms far greater assistance than is normally sought by farmers and the consequent increased managerial efficiency has been an important cause of the success of demonstrations. However, success has also depended upon the individual farmer's contribution to efficient management, particularly with respect to important details such as timeliness of operations, frequent inspection and appropriate treatment of pastures, efficient feeding of stock, culling of low producers and efficient utilization of pasture growth. The demonstrations have clearly indicated the importance of continuous attention to detail.

In addition to providing the operators of demonstration farms with the technical knowledge necessary to enable them to operate at a higher level of efficiency, the operation of the Grant has drawn attention to the importance of the availability of finance to ensure adequate investment in efficient farm management practices. Co-operating farmers, and others who have carried out similar improvements, are impressed with the improvement that has occurred in their financial status. Whereas they previously seemed to be constantly faced with financial worries which were continually hard to overcome, despite working long hours, they now have a more confident outlook, are not worried financially, have more leisure and take a more enthusiastic interest in the management of their properties. In short, the improvements would appear to have resulted in a more contented life for the farm family.

3. CONCLUSIONS.

The case studies which follow give some indication of the steps taken to develop particular farms, but it is not intended that these should be regarded as complete models for the improvement of other properties. As each farm represents a different combination of resources it is necessary for each operator to exercise great care in planning an improvement programme to suit his particular circumstances and plans should be sufficiently flexible to permit adjustments from year to year.

Nevertheless, it may be said that some of the main causes of increased productivity and profitability have been:

1. The availability of detailed technical assistance in planning and organizing farm enterprises.
2. Adequate investment.
3. Successful establishment of improved pastures.

[2] In New South Wales, the Grant has been administered by an Advisory Committee, comprised of the Chief of the Division of Dairying (Chairman), representatives of the Divisions of Plant Industry, Animal Industry and Information and Extension Services of the Department of Agriculture and a representative of the New South Wales Milk Board. The work carried out has been supervised by a Senior Agronomist, a Senior Dairy Officer and a Senior Organizing Officer. Detailed planning of demonstrations has been the responsibility of district field officers of the Department of Agriculture; specialist officers from the various Divisions of the Department have also assisted where necessary.

4. Controlled grazing following the subdivision of large paddocks.
5. Application of lime and superphosphate.
6. Efficient management of pastures, equipment and livestock.
7. Herd improvement and culling on the basis of herd testing results.
8. The provision of supplementary fodder.

In effect, the adoption of improved practices has created a more intensified system of farming. The successful establishment of improved pastures has caused a marked increase in carrying capacity, provided a longer season of good grazing and enabled milk yields to be maintained at a high level for a longer period. Pasture management has become more important in the farm organization and this development has facilitated a reduction in the area cultivated for fodder crops. This change has also been associated with the conservation of more, and better quality, pasture hay. The level of soil fertility has been raised by the establishment of more vigorous pastures, including legumes, and the ability of farms to carry more livestock has resulted in higher net incomes[3]. An additional feature of the improvement programmes is that the farmers concerned have been provided with a greater appreciation of the problems of farm management. They now realize more than ever before the importance of detailed planning, adequate investment and technical and economic efficiency in the management of soil, pastures, livestock and equipment.

As can be seen from the individual analyses, the costs associated with the increased profitability that has occurred were not unduly high. Dairy Grant expenditure over the period (1949 to 1953) on Farm No. 1, the most expensive included in the study, was slightly more than £1,500, of which approximately £400 was for machinery and fencing later purchased by the farmer. The important point is that the demonstrations have shown that the expenditure produced higher net returns.

4. CASE STUDIES.

The following case studies provide details of the history and financial results of five demonstration farms in this State and indicate the methods adopted in carrying out successful improvement programmes. Since the first year of the Grant the Division of Marketing and Agricultural Economics has supervised the records kept by the operators of several demonstration farms and the financial data on which the present work is based was obtained largely from the Farm Record Books kept by five

[3] The advantage of having a high proportion of legumes and a high rate of stocking was also indicated in an analysis of the financial results of 57 farms in Illinois, U.S.A., over the ten-year period from 1925 to 1934. In this study it was found that the farms with the highest proportion of legumes, and the most livestock, produced higher average net incomes over the period than were obtained on the 20 farms with small areas of legumes. Moreover, the productivity of the 20 farms with the most legumes and livestock *increased* during the ten years while that of the 20 farms with the least legumes and livestock *declined*. See M. L. Mosher and H. C. M Case: *Farm Practices and Their Effects on Farm Earnings*, University of Illinois. Agricultural Experiment Station Bulletin 444, 1938. P. 560

of these farmers.[4] Where sufficient records were available the analyses have covered a longer period than the demonstration, but, in each case, financial and production records for the last four years (1949-50 to 1952-53) have been included.

As the farms included in the study are not claimed to be representative of different dairying districts, it is not intended that the results on one property should be compared with those on another. The main purpose of the case studies is to show how increased productivity, accompanied by higher net returns, has occurred through efficient farm management. In addition, the separate analyses serve to illustrate the intricate nature of decisions relating to the efficient utilization of the resources available to individual farmers.

In order to clarify the meaning of some of the terms used in the accompanying tables the following explanations are given:

1. The allowance for depreciation on plant and buildings is at the rate normally allowed by the Taxation Department and not at the higher rate permissible since 30th June, 1951.
2. An allowance of £800 has been made for each owner-operator's labour and management in 1952-53 with rates in earlier years reduced in the same proportion as the basic wage (Sydney). Where additional family labour was employed an extra allowance has been made on the basis of the relevant award wage.
3. *Net Income* is the difference between total receipts and total expenditure after allowing for depreciation and changes in the value of assets and liabilities between the beginning and the end of the year. The amount of *Farm Capital Earnings* is calculated by deducting allowances for the operator's labour and other family labour, from net income.
4. *Percentage Return on Farm Capital* represents farm capital earnings as a percentage of average equity which is the average difference (for each year) between total assets and total liabilities.

FARM No. 1—GLEN INNES DISTRICT.

"Earlie Rise" occupies 200 acres of poor to medium granite country with accompanying outcrops typical of the eastern fall of the Glen Innes area. The farm is owned and operated by Mr. E. I. Whan and is located 13 miles east of Glen Innes. As can be seen from Figures 1 and 2 the property is divided into two equal parts by the road leading to Glen Innes. The gently sloping paddocks on the northern half of the farm are watered by Skeleton Creek and the southern half, which is mainly steeper, is supplied with stock water from natural springs. Clumps of native trees provide good shelter for stock in all paddocks.

The country surrounding the farm is being used for grazing of beef cattle and sheep. Maize growing is also an important enterprise in the area, with smaller areas of navy beans, oats and vegetables. Thus the immediate area is not predominantly devoted to dairying.

[4] It is desired to thank the farmers concerned (Messrs. Whan, Bale, Emery, Hammond and Mann) for their enthusiastic co-operation in this work. The author also wishes to acknowledge with thanks the assistance he has received on the technical side from colleagues in the Department of Agriculture.

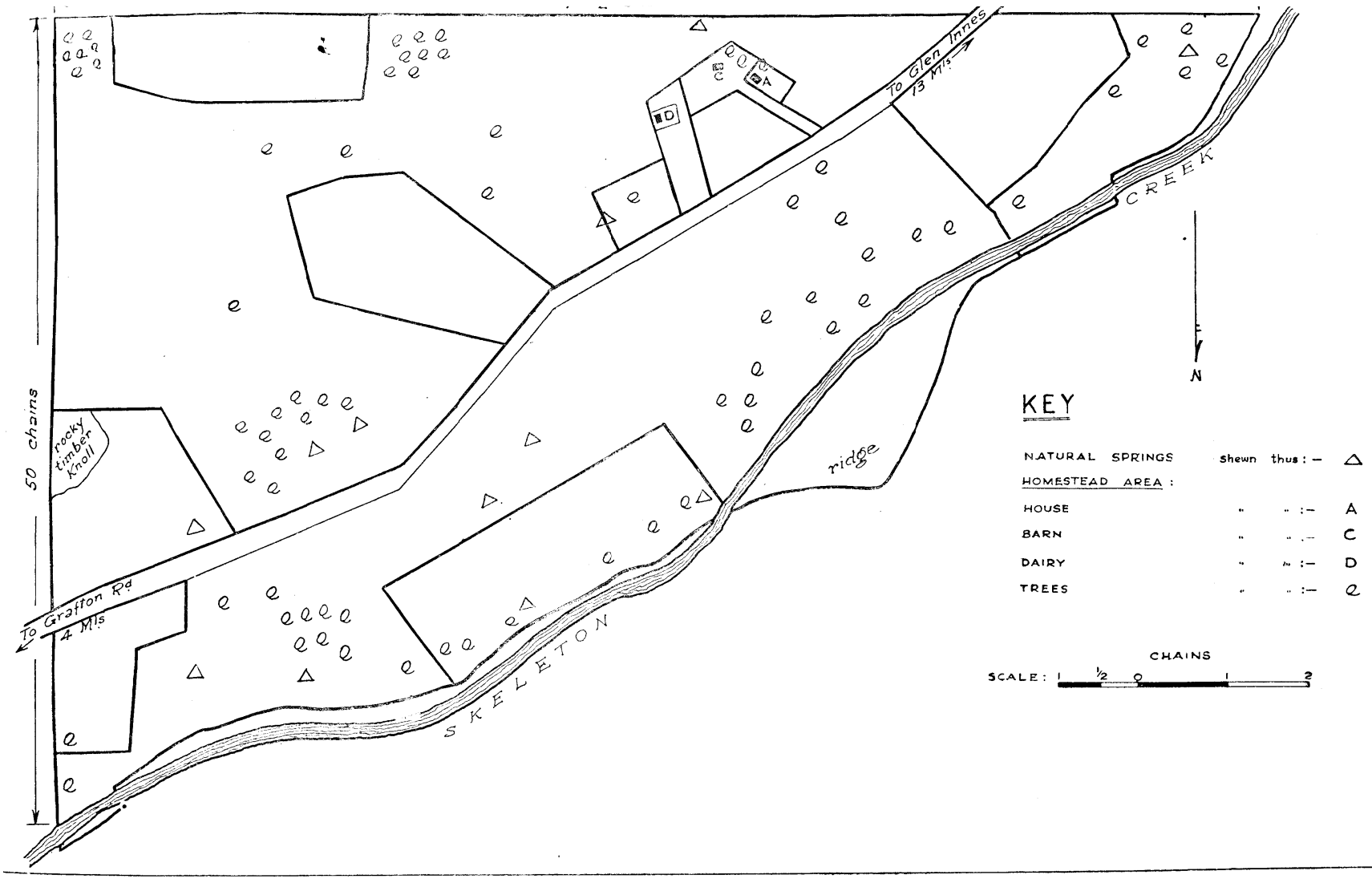


FIG. 1.—FARM NO. 1 PRIOR TO IMPROVEMENT.

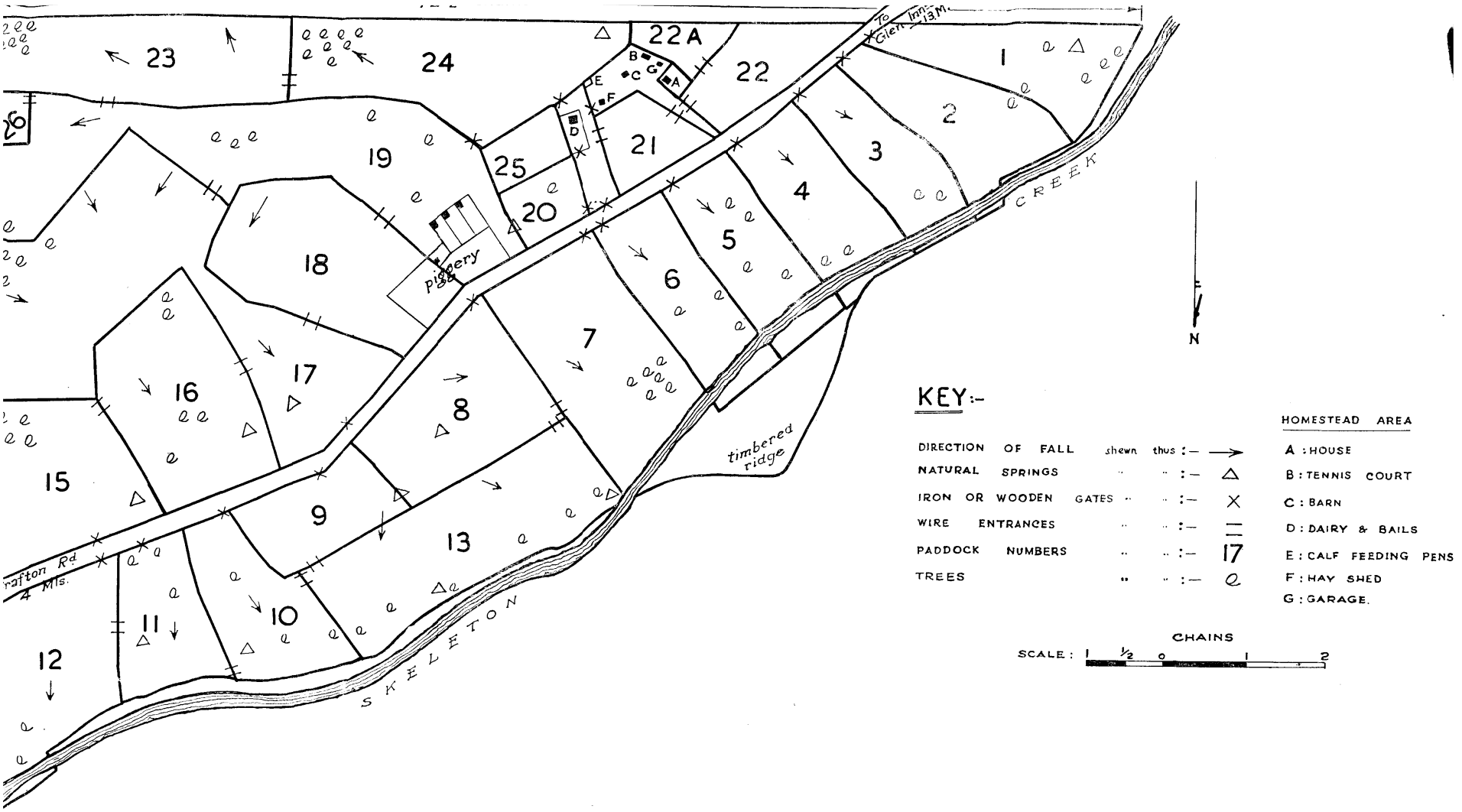


FIG. 2.—FARM NO. 1 AFTER IMPROVEMENT.

As the property was in a low state of productivity at the commencement of the demonstration a lot of work was required to improve the layout of the farm and the quality of pastures. Well-planned subdivision to provide 27 paddocks for grazing in rotation, was therefore, fundamental to the improvement programme and the subsequent increased carrying capacity of the farm. Some indication of the changes made in the layout of the farm can be seen from Figures 1 and 2 which show the plan of the farm before and after improvement. During the period of the demonstration a total of 180 acres of sown pastures was established.[5] Oats and turnips have also been grown for fodder crops, but these became less important as the area of improved pastures increased.

Changes in the Organization of Farm Enterprises.

Prior to taking over this property in February, 1946, the farmer was operating a poultry farm on a weekly rental basis. Insecurity of tenure under that arrangement was his main reason for buying the new property; poultry houses and stock were moved to the new farm with the intention of continuing poultry farming. However, by the end of the first month, he had 16 dairy cattle on the property and had decided to commence dairying and cash cropping, in addition to the poultry enterprise, in order to utilize the additional land available. Within two years it was found that the property was not well suited to poultry so this enterprise was eliminated and the equipment sold in May, 1948. A new dairy (and bails) was erected and, at this stage, the best plan was considered to be to increase the dairying enterprise and produce more fodder crops such as maize, swede turnips, oats, potatoes and Japanese millet. The increased cropping programme was intended mainly for cash crops with some for feeding to dairy cattle.

Thus, dairying associated with cash cropping was the system of farming in operation when the demonstration was commenced in 1949. After the first year of the demonstration, the farmer considered it preferable to eliminate cash cropping and concentrate on growing pastures and fodder crops for dairy stock. This plan is now being followed and it has been found that, with the development of good improved pastures, less supplementary fodder crops have been necessary for the dairy stock.

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[5] Two main pasture mixtures were used, one consisting of 4 lb. cocksfoot, 3 lb. perennial rye, 1½ lb. phalaris tuberosa, 2 lb. red clover, 1 lb. white clover per acre and the other 5 lb. perennial rye, 4 lb. red clover, 1½ bush. Algerian oats. Superphosphate was applied at the rate of one hundredweight per acre with each of these mixtures.

BUDGET I.

Receipts and Expenditure, 1952–53—Farm No. 1.

Enterprises—

(1) Milking 29 cows.
(2) Fattening 16 beef cattle.
(3) Raising 20 bull calves.

Receipts.	£	*Expenditure.*	£
Cream	1,206		
Bonus on cream for previous year	24		
Cattle sold (including bull calves, £94)	614		
Total Receipts	£1,844	Total Cash Costs	£953

Excess of Cash Receipts over Cash Costs : £891.

BUDGET II.

Estimated Receipts and Expenditure under an Alternative Organisation. 1952–53—Farm No. 1.

Enterprises—

(1) Milking 29 cows.
(2) Fattening 16 beef cattle.
(3) Fattening 60 pigs.

Receipts.	£	*Expenditure.*	£
Cream	1,206	Cash Costs as for Budget I	953
Bonus on cream for previous year	24	Pigs purchased	300
Cattle sold	520	Feed	60
Pigs sold	720	Additional interest	3
Total Receipts	£2,470	Total Cash Costs	£1,316

Excess of Cash Receipts over Cash Costs: £1,154.

All milk is separated on the farm and the cream supplied to the butter factory at Glen Innes. Skim milk is utilized by raising heifer calves and fattening pigs. All heifer calves are reared for herd replacements and in 1952-53, for the first time, eight surplus heifers were sold at 14 months. Heifer calves are fed on skim milk throughout the milking season and weaner pigs are purchased at monthly intervals during the months of heaviest milk production. The pigs are also given some wheat and grazed in two one-acre paddocks adjoining the piggeries but, as the calves are given first consideration in the disposal of skim milk, the number of pigs fattened for sale as porkers depends largely upon the quantity of surplus milk available.

In 1952-53 surplus skim milk was used to raise 20 bull calves instead of continuing the usual pig enterprise. The farmer did this because he thought it would produce a higher net return, in view of high beef prices in the previous season and a rise in the price of wheat. However,

the returns were not as good as anticipated and it is now apparent that best results may be expected by disposing of bull calves shortly after birth and using surplus skim milk to fatten pigs. It can be seen from a comparison of Budgets I and II that net income in 1952-53 would have been at least £263 greater under the latter system.

The only other enterprise contemplated is the fattening of beef cattle when surplus feed is available. An example of this practice occurred in 1952-53 when favourable seasonal conditions induced good pasture growth and it was possible to fatten seven cows and calves and two steers without prejudicing the dairying enterprise. Therefore, the main sources of income on the farm under the present organization are butter and pigs with beef cattle as a minor sideline. As there is no difficulty in disposing of surplus heifer calves it is anticipated that there will, at times, be some additional income from this source.

Livestock Management.

Changes in Carrying Capacity.

With the increased subdivision of the farm and the development of improved pastures, the carrying capacity of the property has increased greatly and heifers coming into production are larger, better formed and higher producing. The farmer summarized these benefits by saying: "Prior to the demonstration the carrying capacity of this farm would be 20 milkers, and five or six replacements, and the production of these would be approximately 125 lb. butterfat per head per annum. Now I can safely say production per cow has been doubled and carrying capacity trebled". This statement is borne out by the figures contained in Tables II and III.

TABLE II.

Livestock Numbers—Farm No. 1—1949 to 1953.

Livestock.	As at—				
	1st July, 1949.	1st July, 1950.	1st July, 1951.	1st July, 1952.	1st July, 1953.
Dairy Cattle—					
Cows	23	21	23	35	33
Heifers (over 1 year)	5	7	13	11	...
Bulls	1	1	1	2	2
Heifers (under 1 year)	10	10	11	15	13
Beef Cattle—					
Cows	...	...	...	...	7
Calves	...	...	...	...	8
Steers*	..	...	...	...	...
Pigs†	...	...	...	...	...
Draught Horses	3	4	3	2	2
Light Horses	1	...	...	...	...
Total	43	43	51	65	65

* Twenty-one steers were carried from November, 1952 to May, 1953.

† There are normally no pigs on hand at 1st July. The numbers of pigs fattened in 1949–50, 1950–51 and 1951–52 were 14, 72 and 93, respectively.

The policy followed with regard to stocking rates has been to stock to capacity as the farm was developed, with the objective of carrying the number of stock that would efficiently utilize pasture growth in an average season, other arrangements being made to meet seasonal variations in the amount of feed available from pastures. Under this system, the operator aims to rely mainly on grazing of improved pastures for feeding the dairy herd, drawing on conserved hay in the winter and in adverse seasons. In particularly good seasons excess pasture growth is utilized by conservation of hay and fattening beef cattle purchased in store condition. The objective of this method of management is to make maximum use of pasture grasses and legumes and eliminate the necessity of purchasing feed. The importance of this development can be seen from Table V; whereas the feed bills in 1949-50, 1950-51 and 1951-52 amounted to £168, £321 and £773, respectively, no feed was purchased in 1952-53.

Mr. E. I. Whan's Jersey Herd.—*Photo by courtesy of "Country Life", Sydney.*

Rearing of Herd Replacements.

The farmer has reared herd replacements each year since taking over the farm but more calves are being reared now than before the demonstration and eight surplus heifers were sold in 1952-53. Calf feeding pens have been erected near the dairy and calves are fed on milk until nine to ten months of age. In addition, grazing of calves is controlled to ensure that they are kept in a healthy condition. As a result of the close attention given to calf-rearing, it has been found that heifers can be brought into the milking herd in very good condition at two years. This is an outstanding achievement on this type of country where the usual practice is for heifers to enter the milking herd at three years.

Lactation Period.

Prior to the demonstration, the practice was to have cows freshen in October and complete their lactation during May. This gave a lactation period of no more than seven months and those cows calving later than October had an even shorter lactation. This programme was followed because it fitted in with cash cropping activities and, in any case, when relying on natural pastures, there was not much feed available before October. However, the development of improved pastures made possible a lengthening of the lactation period to ten months, from late in July to the end of May. Pastures are normally green, although short, in July but there is usually ample feed by the time the natural flush at the commencement of lactation begins to decline, and conserved hay is available in case of temporary shortages of pasture feed.

TABLE III.

Butter Production—Farm No. 1—1947-48 to 1952-53.

Year.	Number of Cows Milked.	Commercial Butter Production.	Average Production per Cow.
		lb. (c.b.).	lb. (c.b.)
1947–48 ...	17	2,583	152
1948–49 ...	23	4,075	177
1949–50 ...	26	5,834	224
1950–51	30	7,768	259
1951–52 ...	32	7,685	240
1952–53 ...	26	6,012	231

An important aspect of the management of this farm is centred around the problem set by the occurrence of very cold winters and the low nutritive value of natural winter pastures. Consequently, one of the objectives in the development of the farm has been to provide ample nutritious feed during the winter months and it has been found that with the progressive improvement of the property, and the use of supplementary fodder crops (chiefly turnips and oats), improved pastures and conserved hay, it has been possible to carry the stock through the winter in very good condition. Of particular significance in this connection is the value of feed available from paddocks that have been closed during the autumn. Such paddocks produce a good growth of red clover for feeding at the commencement of lactation in July, thus overcoming the protein shortage which is a problem in the area. The fact that it has been possible to increase the lactation period of the herd to ten months, compared with an average of five to six months on other dairy farms in the area, at the same time eliminating the use of protein concentrates, indicates the excellent feed value of the pastures.

It is also interesting to note that the average butterfat production per day of lactation for a group of twelve cows tested in 1950-51, 1951-52 and 1952-53 was .92 lb., 1.00 lb. and 1.04 lb., respectively.

Calving Index.

A calving index for the herd, calculated for the period 1949 to 1953, indicates that the average interval between calvings for each cow is $11\frac{1}{2}$ months. If the calving interval for a cow exceeds this period considerably, it is sold (unless it is an exceptionally good cow) and replaced by a heifer raised on the farm.

TABLE IV.

Statement of Farm Receipts—Farm No. 1—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Cream—First Grade Butter	664	1,000	1,299	1,206
Bonus—Butter for previous year ...	13	24	16	24
Calves sold	54	6	...	...
Other Cattle sold	34	235	...	614
Pigs sold	58	677	1,090	...
Bonus—Bacon for previous year ...	...	...	18	...
Turnips	17	...	...	...
Maize	351	...	...	...
Bags sold	...	...	33	...
Total Receipts	1,191	1,942	2,456	1,844

The breeding programme is arranged so that calving occurs from the end of July to the end of August and the herd is dried off at the end of the following May. Under this system, the cows are rested for about eight weeks in June and July (which are normally very cold months in the district) and the farmer and his family take three weeks' annual holiday during this period.

Herd Improvement.

The herd has consisted entirely of jerseys since the commencement of dairying, close attention being given to herd improvement by the use of pure bred jersey bulls and culling on the basis of production figures. Herd recording has been practised since the commencement of the demonstration and has been the main basis for culling. Two bulls are usually kept on the farm, the herd sire and a younger bull to control breeding from the herd sire's own stock. The herd sire is retained at least until some of his daughters have been herd tested.

The success of the pasture and fodder programme has facilitated an increase in the milking herd from 16 at the commencement of the demonstration to 34 for the 1950-51 season and the rearing of replacement heifers has been sufficiently successful to take care of all herd requirements. It is expected that there will be 33 milkers in the 1953-54 season.

Soil Conservation.

Under the system of farming in operation prior to 1949, involving larger areas of cash crops and fodder crops, soil erosion was becoming evident in some paddocks. This problem has now been overcome and the establishment of good pastures has facilitated the retention of a far greater proportion of the rain falling on the farm. The value of this factor was evident in 1951 when the effects of a drought were less severe on this farm than on others in the area; the improved pastures provided grazing for a longer period than was obtained from natural pastures and feed became available more quickly when the rain came.

As a result of contour furrowing in paddocks 19 and 24, it has been noticed that the run-off of water from the hills down toward the homestead has been greatly reduced. The contour furrows, which have been sown with grasses and clovers, have, therefore, had the effect of retaining more moisture on the farm.

In the course of the improvement programme some trees were cleared from heavily timbered areas in paddocks 10, 11 and 16. However, care has been taken to leave shelter trees in all paddocks. In particular, an area of about 15 acres of fairly heavy timber in paddock 19 is extremely valuable as protection for the stock from cold winds and snow in extreme winter weather.

Fodder Conservation.

With the present organization of resources, haymaking is very important in the overall plan for pasture management. The main objective is to conserve hay from paddocks sown to red clover and rye grasses but surplus growth from other improved-pasture paddocks is also cut for hay. In the early stages fodder conservation was mainly from oats but it is now chiefly from red clover. There is a well-constructed hay shed on the farm, of an approximate capacity of 120 tons of baled hay, and this contained over 30 tons of good quality hay at the commencement of the 1953 winter.

TABLE V.

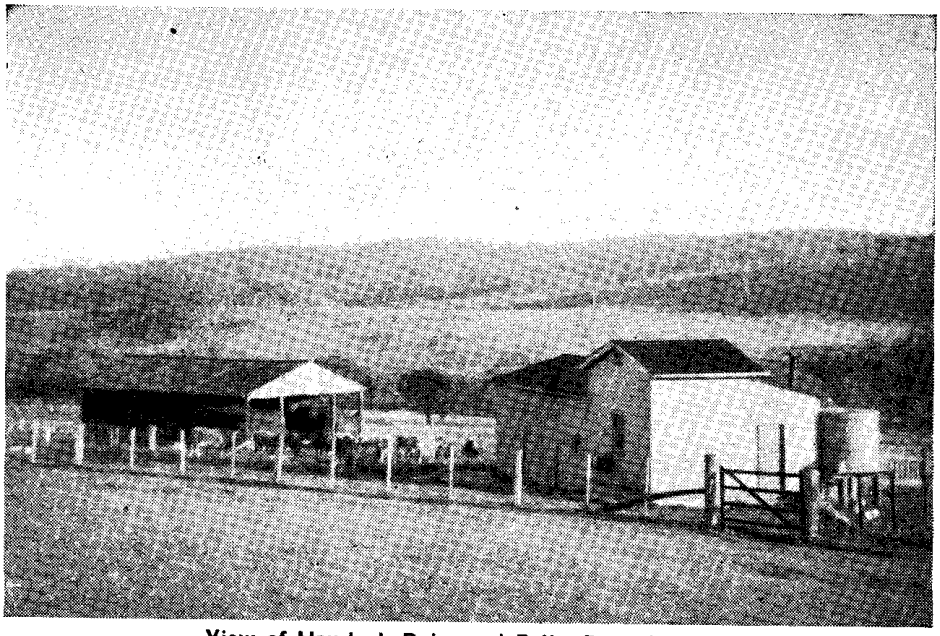
Summary of Farm Costs (including Dairy Grant Expenditure)—Farm No. 1—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Cash Costs—				
Feed	168	321	773	...
Seed	133	105	78	43
Fertilizer	89	211	125	93
Miscellaneous Livestock Expenses ...	...	15	24	76
Miscellaneous Crop Expenses ...	19	21	24	...
Contract Ploughing	51	...	...	...
Contract Hay Baling	...	...	...	63
Marketing Expenses	32	39	130	19
Cartage to Farm	132	58	45	33
Petrol, Kerosene, etc.	45	56	92	97
Pigs Purchased	31	154	280	...
Livestock Replacements	4	15	36	27
Beef Cattle Purchased	...	...	...	123
Cash Wages	78	29	71	137
Miscellaneous Expenses	65	15	10	31
Upkeep and Repairs—Improvements	7	9	32	11
Machinery ...	33	113	138	114
Rates	5	6	6	7
Insurance and Registration	9	5	38	35
Crown Dues	3	3	3	3
P. P. Board Rates	...	...	2	3
Interest	22	26	37	38
Total—Cash Costs	926	1,201	1,944	953
Allowances—				
Depreciation—Improvements ...	11	10	13	12
Machinery	84	76	151	150
Labour—Own Labour	450	516	706	800
Total Allowances	545	602	870	962
Total Cash Costs	926	1,201	1,944	953
Total Cash Costs and Allowances £	1,471	1,803	2,814	1,915

The regular practice now followed on the farm is to have three paddocks of short-term pasture which can be used for grazing or haymaking according to the season. An illustration of this practice can be seen by considering the history of paddock 23 (containing $7\frac{1}{2}$ acres) which was sown on 6th March, 1951, with the following mixture:—

60 lb. oats per acre.
4 lb. red clover per acre.
5 lb. perennial rye per acre.
5 lb. Italian rye per acre.
1 cwt. superphosphate per acre.

Grazing of this paddock was commenced in May and continued, in rotation with other paddocks, until September, 1951. It was closed at the end of September with the intention of using it for haymaking, but dry weather intervened and grazing was continued throughout the winter of 1952. The paddock was closed in mid-September, 1952, and mown in early December, yielding 11 tons of hay. The paddock



View of Hayshed, Dairy and Bails (Farm No. 1).

remained closed and yielded a further six tons of hay early in March, 1953. Thus approximately 17 tons of hay was conserved from this $7\frac{1}{2}$ acre paddock in the spring and summer of 1952-53. It was then closed to produce a good growth of red clover for winter grazing.

In order to be able to continue this practice it is proposed to sow a paddock each year with the pasture mixture mentioned above, the paddock chosen depending upon the condition of existing pastures. The pasture mixtures used have been very satisfactory and the objective of providing a balanced feeding ration of grasses and legumes throughout the year has been achieved.

Labour and Management.

One of the most important factors contributing to the successful development of this farm has undoubtedly been the thoughtful and energetic way in which the farmer has implemented the improvement programme. In addition to carrying out the work as planned by officers of the Department of Agriculture, he has made improvements on his own account and the increased productivity of the farm is attributable, to an important degree, to his careful attention to such details as frequent inspection and appropriate treatment of pastures, timeliness of operations, efficient feeding of stock, culling of low-producing cows and rabbit control.

TABLE VI.

Net Income and Return on Farm Capital—Farm No. 1—1949-50 *to* 1952-53.

Year.	Net Income.	Percentage Return on Farm Capital.
	£	per cent.
1949–50 ...	29	...
1950–51 ...	935	14
1951–52 ...	441	...
1952–53 ...	897	2

Pastures are chain harrowed at least once each year, top-dressed annually with superphosphate (1 cwt. per acre) and mown when necessary. As already mentioned excess growth in good seasons is utilized by conservation of pasture hay or fattening of beef cattle. Paddocks are grazed in rotation according to the condition of pastures, and there is no set night paddock. This system prevents overgrazing of individual paddocks, provides fresh grazing for the stock and ensures a fairly even distribution of animal manure.

Throughout the period of the demonstration the farmer has done most of the farm work himself, assisted in 1949-50 by his eldest son, (then seventeen years of age), and since that time by his second son, who is now aged seventeen. Outside assistance has, at times, been obtained for hay baling, erecting a hay shed, clearing land, chaff-cutting and ploughing. The major developments were completed by 1953 and the main farm work is now concerned with the maintenance and further improvement of pastures. There is no tractor on the farm, because the operator considers there is insufficient tractor work to warrant this investment and there is no difficulty in getting work done by contract if it cannot be done with horses.

TABLE VII.

Dairy Grant Expenditure—Farm No. 1—1949 to 1953.

	£
Superphosphate	354
Lime	136
Seed	344
Freight and Cartage	218
Contract Ploughing	49
Sulphate of Ammonia	10
Disc Harrow*	34
Mower*	73
Hayrake*	25
Fertilizer Spreader*	69
Pasture Harrows*	21
Fencing and Gates*	183
Total	£1,516

* Purchased by the farmer at the conclusion of the demonstration.

Financial Results.

Statements of *receipts* and *expenditure* for the period of the demonstration are contained in Tables IV and V and details of *net income* and *return on farm capital* are shown in Table VI. Dairy Grant Expenditure has been included in the *Summary of Farm Costs* (Table V) and a list of this expenditure is given in Table VII. Drought conditions in the spring and summer months caused a fall in net income in 1951-52; returns would have been higher in the following year if the usual pig enterprise had not been omitted. The fact that seven milking cows were affected by Bacterium coli mastitis in October, 1952, also reduced the farmer's income in 1952-53.

On the expenditure side, it will be noted that no feed was purchased in 1952-53, compared with an outlay of £773 in 1951-52. The elimination of this expenditure has been made possible, without loss of production, by the substitution of an efficient feeding programme based on improved pastures and conserved hay.

The financial results would have been considerably better in the last two years if the unfortunate circumstances mentioned had not occurred and it may be concluded that the extensive improvement programme has provided a firm basis for further increases in productivity and profitability.

Causes of Increased Production.

The main factors contributing to the increased productivity of the farm may be summarized as—

1. The fact that there was no problem involved in financing the programme of improvements.
2. The successful establishment of improved pastures.
3. Efficient management by the farmer in consultation with officers of the Department of Agriculture.
4. Controlled grazing following the subdivision of large paddocks.
5. Herd improvement and culling on the basis of herd testing results.
6. Provision of supplementary fodder.

FARM No. 2—TAREE DISTRICT.

This property, owned by Mr. R. Bale, is located at Moorland, about 20 miles north of Taree on the lower North Coast. It is typical of a large area of country in the district and is surrounded by similar holdings which are also being used for dairying. Of a total area of 87 acres, there are 33 acres of flats fronting Pipe Clay Creek, but the remainder of the farm consists of forest-ridge country.

The Improvement Programme.

When the present owner took over the farm in 1942 he immediately commenced a programme of improvements designed to increase productivity, the first steps being subdivision, herd improvement and drainage of a swamp occupying four acres. The original farm buildings were very old so a new house, barn, dairy and bails were erected by 1947-48. Early developments also included clearing dead timber, sowing improved pastures and sinking a dam. Thus considerable progress had already been made when the Dairy Grant demonstration was commenced in April, 1949. The significance of these changes, particularly with respect to subdivision, clearing and drainage can be seen from Figures 3 and 4.

Soil tests carried out at the commencement of the demonstration indicated a marked lime deficiency throughout the farm and it was apparent that the application of lime and superphosphate would be necessary to improve the productivity of pastures. Grazing paddocks were top-dressed with lime at the rate of two tons per acre in 1949 and superphosphate has been applied annually at the rate of one and a half hundredweight per acre. In future it is proposed to continue annual

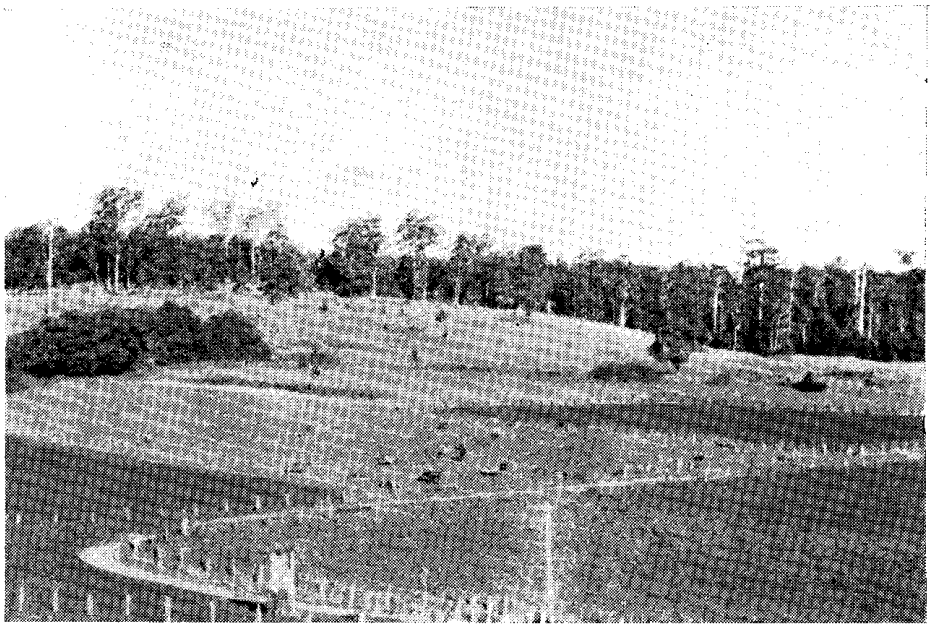


Illustration of Subdivision and Improved Pastures (Farm No. 2).

application of superphosphate, while lime will probably be applied every two or three years at the rate of about one ton per acre.

As can be seen from Figure 4, there was some further subdivision during the period of the demonstration to provide a total of 24 paddocks. In addition to top-dressing natural pastures with lime and superphosphate, improved pastures were established in 10 paddocks during the period of the demonstration, the main species sown being rye grasses, cocksfoot and clovers (red, white and subterranean).

In recent years the owner has been able to do only light work due to ill-health, but his efficient management has been largely responsible for the successful improvement of the farm. It has been necessary to have ploughing done by contract, but most of the farm work has been carried out by the farmer's son who also shares in management decisions.

TABLE VIII.

Production—Farm No. 2—1948-49 to 1952-53.

Year.	Number of Cows Milked.	Production in Terms of Commercial Butter*	Average Production per Cow.
		lb. (c.b.)	lb. (c.b.)
1948–49	32	6,442	201
1949–50	35	7,440	212
1950–51	37	8,152	220
1951–52	38	8,403	221
1952–53	35	8,100	231

*Conversion factors:—83 lb. of butterfat = 100 lb. of commercial butter; 2·075 gallons of whole milk = 1 lb. of commercial butter.

The Organization of Farm Enterprises.

In his first four years on the property, the farmer's income was derived from cream, pigs and the sale of surplus heifers. The pig enterprise was eliminated in 1946 when there was a change to marketing wholemilk instead of cream. Corn, saccaline and turnips were grown for fodder during the early stages of development but, since the commencement of the demonstration, cropping has been reduced to about three acres of saccaline each year for the maintenance of dry stock. Under the present organization, practically all income is derived from wholemilk, with the sale of surplus heifers and other cattle providing some additional receipts.

Livestock Management.

The herd consists entirely of Jerseys, with a registered herd sire. The improvement of the farm has been accompanied by a gradual increase in the size of the dairy herd and in production per cow. As indicated in Table VIII there has been an increase in the number of cows milked, from 32 in 1948-49 to a record of 38 in 1951-52 and the average production per cow has increased from the equivalent of 201 lb. commercial butter in 1948-49 to 231 lb. in 1952-53. These figures

do not give a true indication of the increased carrying capacity of the farm as an additional 30 acres of creek flats was rented until a few months before the commencement of the demonstration. This additional area enabled the farmer to run a larger herd than would have been possible prior to the improvement of the home property. It is also important to remember that the work carried out prior to 1949 was an essential part of the improvement programme and contributed to the subsequent increased carrying capacity.

TABLE IX.

Statement of Farm Receipts– Farm No. 2—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Milk*	1,127	1,540	2,217	2,246
Heifers Sold	137	...	23	...
Other Cattle Sold	34	79	94	30
Total Receipts ... ... £	1,298	1,619	2,334	2,276

* Portion supplied to the N.S.W. Milk Board and the remainder to the Manning River Co-operative Dairy Company Ltd., Taree.

Herd replacements are reared on the farm and the objective has been to improve the herd standard by culling on the basis of herd testing results. Since the change to supplying wholemilk, calves have been fed on decreasing quantities of wholemilk for five months, with calf meal added after the first month. After approximately five months the calves are maintained on pastures, care being taken at all times to ensure that they are well reared. All heifers are dehorned and inoculated against Brucellosis and Blackleg diseases; and they usually enter the milking heard at two years. Bull calves are not reared.

The average length of lactation for the herd is estimated to be nine and a half months. The general practice is to have some cows milking each month with the majority commencing lactation in the June-July-August period to milk through spring and summer, when pasture growth is normally best.

Pasture Management.

As already indicated the improvement programme for this farm involved subdivision, drainage, clearing, sowing of grasses and clovers and the application of lime and superphosphate. In addition to this work, however, it must be emphasized that the increased productivity that has been achieved is largely due to careful attention to pasture management practices, particularly the extensive use of chain harrows, mowing of rank pasture growth, renovation of natural pastures, rotational grazing and controlled grazing through the use of an electric fence. Pasture growth is controlled as closely as possible by grazing and mowing when necessary.[6]

[6] In one year, three paddocks were mown 10 times each within a period of six months.

TABLE X.

Summary of Farm Costs (including Dairy Grant Expenditure)—Farm No. 2—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
Cash Costs—	£	£	£	£
Feed	2	21	12	...
Seed	38	30	33	38
Lime and Superphosphate	667	63	160	103
Miscellaneous Livestock Expenses ...	12	12	12	21
Miscellaneous Crop Expenses ...	7	...	45	44
Contract Ploughing	47	67	32	...
Marketing Expenses	63	94	192	124
Freight and Cartage to Farm... ...	8	16	31	19
Petrol, Kerosene, etc.	18	44	40	63
Power Charges	...	...	...	11
Cash Wages	113	24	28	...
Miscellaneous Expenses	3	12	9	10
Upkeep and Repairs—Improvements	...	19	4	2
Machinery ...	19	20	53	27
Rates	5	6	8	8
Insurance and Registration	2	2	2	9
Interest	20	21	...	...
Total Cash Costs	1,024	451	661	479
Allowances—				
Depreciation—Improvements ...	16	16	16	19
Machinery	30	28	29	32
Labour—Own Labour	450	516	706	800
Total Allowances	496	560	751	851
Total Cash Costs	1,024	451	661	479
Total Cash Costs and Allowances £	1,520	1,011	1,412	1,330

These practices facilitate maximum utilization of pastures and, in addition, enable the farmer to conserve hay from surplus growth. His policy is to understock slightly with the objective of conserving pasture hay as a reserve against dry spells and adverse seasons. This policy doubtless arises from the unreliability of rainfall, especially in the late winter and early spring months. In this area, the rainfall in the latter period may be expected to be less than that required to maintain plant growth above the wilting point one year in every three or four.[7]

Financial Results.

Statements of *receipts* and *expenditure* for each year of the demonstration are contained in Tables IX and X and details of *net income* and *return on farm capital* are shown in Table XI. These figures reveal a conspicuous increase in net income as the farm was developed and,

[7]This estimate is based upon figures obtained from the Commonwealth Meteorological Bureau. The importance of considering rainfall variability, in addition to other problems of farm management, was discussed in a recent issue of this journal. See: John Rutherford, "Rainfall Variability and Supplementary Irrigation in Coastal New South Wales," *Review of Marketing and Agricultural Economics*, Vol. 21, No. 1. March, 1953. Pp. 73–106.

by 1951-52 a return of 20 per cent. on farm capital was achieved. The cash costs involved in producing this return were not great, being approximately £660 in 1951-52 and £480 in 1952-53. Some of the main cash costs (for superphosphate, lime, seed and ploughing) were largely financed by the Grant, but this expenditure has been included in the *Summary of Farm Costs*. A summary of Dairy Grant Expenditure, totalling £1,303 in connection with this demonstration is given in Table XII. In view of the results obtained it is clear that borrowing to finance such improvements would be profitable.

TABLE XI.

Net Income and Return on Farm Capital—Farm No. 2—1949-50 to 1952-53.

Year.	Net Income.	Percentage Return on Farm Capital.
	£	per cent.
1949–50 ...	45	...
1950–51 ...	976	12
1951–52 ...	1,636	21
1952–53 ...	1,757	20

TABLE XII.

Dairy Grant Expenditure—Farm No. 2—1949 to 1953.

	£
Superphosphate	592
Lime	422
Seed	108
Contract Ploughing	103
Freight and Cartage	62
Electric Fence*	16
Total	1,303

* Purchased by the farmer at the conclusion of the demonstration.

Causes of Increased Production.

The main causes of increased productivity on the farm may be summarized as—

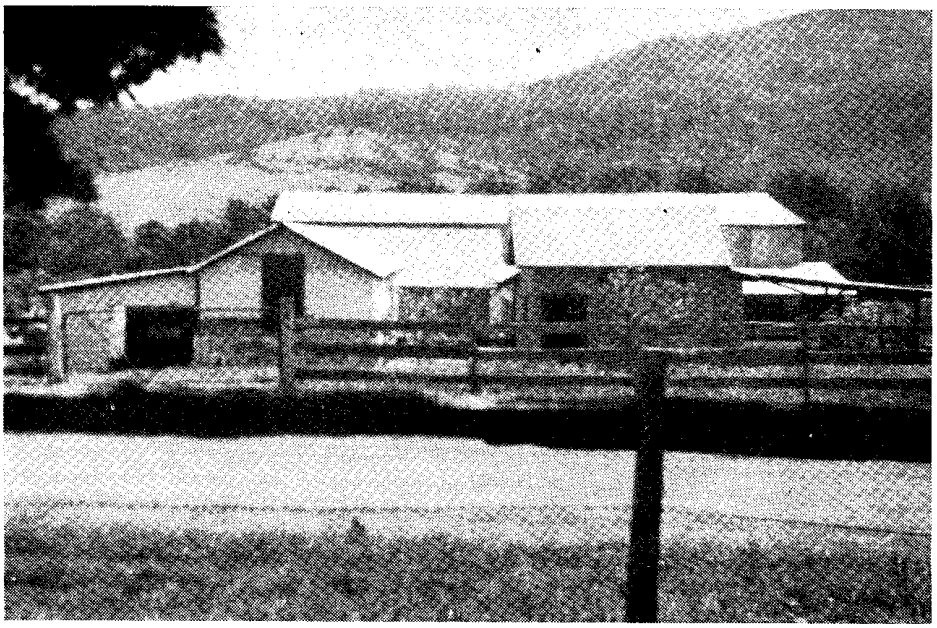
1. Efficient management by the farmer in consultation with officers of the Department of Agriculture.
2. An increase in the area of sown pastures.
3. Application of lime and superphosphate to natural and improved pastures.
4. Rotational grazing, following the subdivision of large paddocks, and the use of an electric fence to control grazing.
5. Herd improvement on the basis of herd testing results.

FARM NUMBER 3—GERRINGONG DISTRICT.

This farm is located at Foxground, four miles north of Gerringong in the South Coast dairying district. It consists mainly of undulating to hilly country with a total area of 100 acres. The Foxground road divides the main part of the farm from the homestead portion which has a narrow frontage to Broughton Creek.

The Improvement Programme.

The present operator, Mr. C. R. Emery, purchased the property in 1946 and commenced dairying in February, 1947; in the interim he let the farm and devoted his time to erecting a dairy, bails, feeding stalls and a small barn. He immediately planned to improve the property by subdivision, pasture improvement, the erection of farm buildings and fodder conservation. The programme to be followed was worked out in detail at the outset and discussed with the farmer's bank manager. In the last four years (1949 to 1953) the original plans were supplemented by an improved pasture demonstration carried out under the Dairy Grant on 32 acres of the property and practically all of the planned improvements had been carried into effect by the end of 1952-53. The work financed by the Dairy Grant included sowing 30 acres of pastures (mainly rye grass and clovers), establishment of two acres of lucerne, erection of 20 chains of fencing and top-dressing of the 32 acres of pastures and lucerne with lime and superphosphate. The farmer established a further 34 acres of pasture and the farm has been divided into 18 paddocks ranging in size from one to 15 acres, depending on location. In general, the largest paddocks are on the steepest slopes and are used for grazing dry or young stock.



Conveniently Located and Well Planned Farm Buildings (Farm No. 3).

TABLE XIII.

Livestock Numbers—Farm No. 3—1948 to 1953.

Livestock.	As at—					
	1st July, 1948.	1st July, 1949.	1st July, 1950.	1st July, 1951.	1st July, 1952.	1st July, 1953.
Dairy Cattle—						
Grade Cows	15	26	30	19	26	15
Heifers (over 1 year)	14	1	12	26	...	...
Heifers (under 1 year)	3	10	6	...	2	2
Stud Cows	...	...	4	16	18	19
Heifers (over 1 year) ...	...	...	...	3	5	14
Calves	...	...	3	4	9	7
Bulls	...	1	1	1	3	4
Horses: Draught	2	2	2	2	1	1
Total	34	40	58	71	64	62

There was no permanent water supply on the property when it was taken over but five dams have subsequently been sunk in gullies and there are permanent springs in each of these. An electric pressure system has been installed to supply water from Broughton Creek to cattle troughs, the dairy and bails and to the house. Thus the farm is now well served with water but more dams may be constructed later and a future development is likely to be the erection of a large dam to provide water for spray irrigation.

The property is now very well equipped with farm buildings. In addition to the buildings erected in 1946, a large hay shed, capable of storing 100 tons of hay, has been erected and there is another shed for storing fodder concentrates and machinery. These buildings provide excellent storage for purchased or farm-grown feed and enable the farmer to purchase feed for storage when it is cheap. Calf feeding pens have been built into one end of the hay shed and there is also a hay rack to give the calves access to hay if they want it. The farm buildings are close together in the homestead area and are all conveniently located and well adapted to the farmer's needs. A large proportion of the flooring has been concreted and this work has been extended outside the bails to provide about three square chains of concreted yards.

The Organization of Farm Enterprises.

Since commencing dairying in 1947, the farmer's main source of income has been from wholemilk supplied to the New South Wales Milk Board, the only sideline being the production of small areas of vegetables. As can be seen from Table XV there has also been some income from sweet cream and surplus milk. In his first year on the property the operator grew 25 acres of maize, saccaline and Japanese millet, mainly for green fodder, but in later years fodder crops have been gradually eliminated in favour of improved pastures. Two or three acres of maize are still grown for feeding in the form of grain.

TABLE XIV.

Production—Farm No. 3—1948-49 to 1952-53.

Year.	Number of Cows Milked.	Milk Production.	Average Production per Cow.
		lb.	lb.
1948–49	26	123,087	4,734
1949–50	34	160,913	4,733
1950–51	39	194,339	4,983
1951–52	39	200 383	5,138
1952–53	30	176,534	5,884

Mr. C. R. Emery's Guernsey Herd.

Guernsey stud cattle were introduced in 1949-50 and the stud portion of the herd has been further developed to occupy an important place in the livestock programme. A few registered bulls, from high producing cows, are reared for sale and there is usually a good market for surplus heifers.

Livestock Management.

Changes in Carrying Capacity.

The progressive improvement of the farm has been accompanied by an increase in the number of livestock carried from 34 in 1948 to over 60 in the last three years (see Table XIII). Until 1953 the plan was to "understock" slightly with the objective of conserving hay

from surplus pasture growth, but, due to the risk of wet weather preventing haymaking, consideration is now being given to increasing the stocking rate and using the additional income to buy lucerne hay. Under this system, it is believed there would still be opportunities to conserve pasture hay in good seasons. However, the farmer's changed attitude toward the rate of stocking is not associated *only* with the risk involved in haymaking. The provision of adequate facilities for storing hay and concentrates has enabled him to build up feed reserves when prices are favourable, thus insuring against adverse seasonal conditions by maintaining reserves of purchased or farm-produced feed rather than by understocking pastures.

An Excellent Growth of Grasses and Clovers (Farm No. 3).

Lactation Period.

There is usually no difficulty in obtaining a lactation period of at least nine months. On the contrary, in order to provide a break of six to ten weeks between lactations, it is sometimes necessary to dry off cows producing at a fairly high level.

Herd recording figures for the farm suggest that cows calving in June or July are the heaviest producers and those calving in December or January are least productive. Consequently, the farmer plans to have slightly more cows commence lactation in the period from June to August than in the other months. However, he also prefers a fairly constant level of production throughout the year, and, therefore, ensures that there are a few cows calving each month. The calving index for the herd is estimated to be approximately $11\frac{1}{2}$ months.

TABLE XV.

Statement of Farm Receipts—Farm No. 3—1947-48 to 1952-53.

Item.	1947–48.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£	£	£
Wholemilk	348	1,084	1,223	1,885	3,109	2,782
Sweet Cream	8	...	...	...	...	...
Cream for Butter ...	...	...	250	54	...	...
Surplus Milk	4	...	...	156	90	441
Calves	4	13	10	2	24	12
Beans and Peas	...	14	141	...	...	...
Potatoes	...	...	2	4	...	...
Bags, etc.	...	...	4	12	11	24
Discount Received (on feed)	...	...	11	11	14	20
Total Receipts £	364	1,111	1,641	2,124	3,248	3,279

Feeding.

Concentrates have been fed to milking cows since the present operator took over the property. He considers the practice pays but, as a long-term objective, aims to reduce the feed cost by more intensive use of pastures and by the conservation and storage of feed. An additional area of 180 acres (one half-mile from the present farm) was leased in May, 1953, to be worked in conjunction with the home farm and, by growing improved pastures, maize and lucerne on the leased land, it is expected that it will be possible to carry more stock and at the same time reduce dependence on purchased feed.

Controlled grazing of improved pastures, supplemented with concentrates, has contributed to stability of milk production on the farm and it is proposed to purchase an electric fence to further increase the efficiency of grazing. Prior to the acquisition of the additional area the usual practice was to grow about three acres of maize for grinding and feeding to cows and it is anticipated that it will be possible to extend this practice in the future by growing at least eight acres of maize each year on the leased area.

The new calf feeding pens are conveniently located near the dairy and the present plan is to feed calves on wholemilk for the first month, a milk/water mixture for a further three months and then a mixture of concentrates and lucerne chaff until they are six or seven months of age. Calves also have access to hay and improved pastures.

Pasture Management.

Careful attention is given to pasture management, ensuring in particular, that paddocks are not "overgrazed" or allowed to become rank and unpalatable. Since the commencement of the demonstration, pastures have been top-dressed with 180 pounds of superphosphate per acre annually, while one to two tons of lime per acre has been applied during the period of the demonstration. Paddocks are renovated with pasture harrows when necessary and excess growth and weeds are controlled by mowing. In good seasons some paddocks are closed for hay-making purposes. Manure from the dairy has been distributed in paddocks that have been cropped intensively in earlier years and care is taken to maintain the quality of pastures by giving a light sowing of rye grass or clover, whichever is lacking.

TABLE XVI.

Statement of Farm Costs (including Dairy Grant Expenditure)—Farm No. 3—1947-48 to 1952-53.

Item.	1947–48.	1948–49.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£	£	£
Cash Costs—						
Feed	175	406	493	561	1,092	1,090
Seed	8	23	59	57	48	25
Fertilizer	9	...	61	84	42	77
Lime and Limespreading ...	3	...	19	...	62	...
Misc. Livestock Expenses ...	1	4	19	40	12	35
Misc. Crop Expenses	27	10	49	37	31	6
Contract Cropping	...	...	28	73	...	...
Marketing Expenses*... ...	...	...	21	7	...	1
Freight and Cartage to Farm...	55	50	79	89	128	144
Petrol, Kerosene, etc. ...	...	...	21	36	101	94
Power Charges	8	20	34	32	34	40
Cash Wages	5	...	...	...	2	4
Misc. General Expenses ...	4	26	28	29	47	51
Upkeep and Repairs—						
Improvements	65	31	9	62	40	29
Machinery	20	17	55	67	106	211
Rates	19	22	22	30	37	55
Insurance and Registration ...	6	6	3	4	18	23
Rent (Dry Run)	...	...	20	40	20	58
P.P. Board Rates	...	...	...	...	2	5
Interest	86	111	121	120	146	114
Total Cash Costs ...	491	726	1,141	1,368	1,968	2,062
Allowances—						
Depreciation—Improvements*	...	...	32	32	34	52
Machinery* ...	...	...	74	75	132	134
Labour—Own Labour ...	379	413	450	516	706	800
Total Allowances ...	379	413	556	623	872	986
Total Cash Costs... ...	491	726	1,141	1,368	1,968	2,062
Total Cash Costs and Allowances ... ... £	870	1,139	1,697	1,991	2,840	3,048

* Not known prior to 1949–50.

Financial Results.

The development of this farm has involved considerable investment in buildings and improvements which will enable the farmer to carry out a more intensive system of farming in the future. As already outlined, well-equipped farm buildings have been erected for storing feed and with these facilities it should be possible to stabilize production at a higher level than has been achieved in the past. The development of a Guernsey stud to replace grade cattle may also be regarded as an additional form of intensification. This change has contributed to the higher level of investment at which the farmer is now operating, but it has also introduced what is, in effect, an extra enterprise, namely, the sale of registered stock.

Statements of *receipts* and *expenditure* during the period of the demonstration are contained in Tables XV and XVI, and details of *net income* and *return on farm capital* are shown in Table XVIII. A summary of Dairy Grant Expenditure on the farm is given in Table XVIII.

TABLE XVII.

Net Income and Return on Farm Capital—Farm No. 3— 1949-50 to 1952-53.

Year.	Net Income.	Percentage Return on Farm Capital.
	£	per cent.
1949–50 ...	406	...
1950–51 ...	377	...
1951–52 ...	1,546	20
1952–53 ...	1,262	8

TABLE XVIII.

Dairy Grant Expenditure—Farm No. 3—1949 to 1953.

	£
Superphosphate	106
Lime and Lime Spreading	175
Seed	86
Ploughing and Bulldozing	102
Freight and Cartage	15
Mower*	58
Harrows*	15
Fertilizer Spreader*	55
Gates*	15
Fencing*	63
Total	£690

* Purchased by the farmer at the conclusion of the demonstration.

The benefits of the improvement programme became evident in 1951-52 when a return of 20 per cent. on farm capital was obtained. The decline in net income and return on capital invested in 1952-53, as shown in Table XVII, was due mainly to a reduction in the number of cows milked and an increase in the proportion of young stock to milking cows.[8] The fact that the Milk Board took a smaller proportion of the milk produced than in the previous year, leaving a greater proportion paid for at the lower rate based on butterfat content, was also partly responsible for the reduced farm income in 1952-53. However, the financial results have already been very satisfactory and it may be anticipated that there will be a further improvement if the feed bill can be reduced.

[8] The farmer reduced the number of cows milked in 1952–53 to enable him to devote more time to the erection of farm buildings. It is anticipated that approximately 40 cows will be milked in 1953–54.

Causes of Increased Production.

The main causes of increased productivity on the farm may be summarized as as—

1. Efficient management of pastures, livestock and equipment.
2. An increase in the area of sown pastures.
3. Top dressing of pastures with lime and superphosphate.
4. Herd improvement on the basis of herd testing results.
5. Adequate investment.

Surplus Growth of Grass and Clover Cut for Hay (Farm No. 3).

FARM No. 4—COMBOYNE DISTRICT.

This farm, operated by Mr. T. Hammond, is 3 miles east of Comboyne on the Lower North Coast and consists of 190 acres of undulating to steep country with red volcanic soil. In addition, the farmer rents an adjacent area of 100 acres, mainly for the use of the house and dairy buildings. The farm is typical of a large area of country east of Comboyne, where dairying and beef cattle raising are the main farm enterprises. The area is about 2,000 feet above sea level, with an average annual rainfall of 67 inches. The farm is adequately served with patches of natural scrub growth, which provide excellent shelter for the cattle. This is important because of the relatively high altitude and the fact that the area is subject to extremely cold winds, which cause loss of production and have caused loss of stock. Excellent stock water and irrigation facilities are available from Upsel Creek, which runs through the property.

TABLE XIX.

Production—Farm No. 4—1948-49 to 1952-53.

Year.	Number of Cows Milked.	Production in Terms of Commercial Butter.*	Average Production per Cow.
		lb. (c.b.)	lb. (c.b.)
1948–49	40	4,909	122
1949–50	40	8,364	208
1950–51	39	8,291	213
1951–52	40	8,455	210
1952–53	46	8,948	194

* Conversion factors: 83 lb. of butter fat = 100 lb. of commercial butter; 2·075 gallons of wholemilk = 1 lb. of commercial butter.

The Improvement Programme.

The present operator, assisted by his son, commenced dairying on this property in 1947[9]. He immediately began to subdivide the cleared area (90 acres) to make 16 paddocks; this work was mainly completed before the commencement of the demonstration. The farmer financed all of the subdivision and later erected a rabbit-proof fence around the area. At the commencement of the demonstration, the farmer carried out some pasture furrowing work over about 50 acres of the property in order to improve the conservation of soil and moisture.

Before improvement the farm was in a low state of fertility and it was badly infested with bracken fern. Thus the objective of the demonstration was to increase the production by improving pastures and raising the level of soil fertility. Throughout the period of the demonstration improved pastures were established in old cultivation paddocks and poor quality pastures were renovated by harrowing, the application of lime and superphosphate and the sowing of grasses and clovers. Lime was applied at the rate of two tons per acre on the demonstration area in the first year and there have been annual applications of superphosphate at the rate of one bag (187 lb.) per acre. Owing to the steepness of the country, the loose, friable nature of the soil and the high rainfall in the area, erosion is severe on ploughed and well cultivated land. In view of this, disc harrowing was adopted in preference to ploughing for seed bed preparation on this property. Mowing of ferns was very important in the early stages of the development of improved pastures and the erection of rabbit-proof fences was essential. The main species of grasses and clovers sown were cocksfoot, Italian and perennial rye grasses and red, white and subterranean clovers.

[9] Mr. Hammond, senior, retired from active farm work in June, 1953, leaving his son to manage the property. At the beginning of 1953–54 it was arranged for another son to share in the operation of the farm and it is now planned to continue the programme of subdivision and pasture improvement on the remainder of the freehold portion of the farm, with a view to further increasing the carrying capacity and productivity of the whole farm.

TABLE XX.

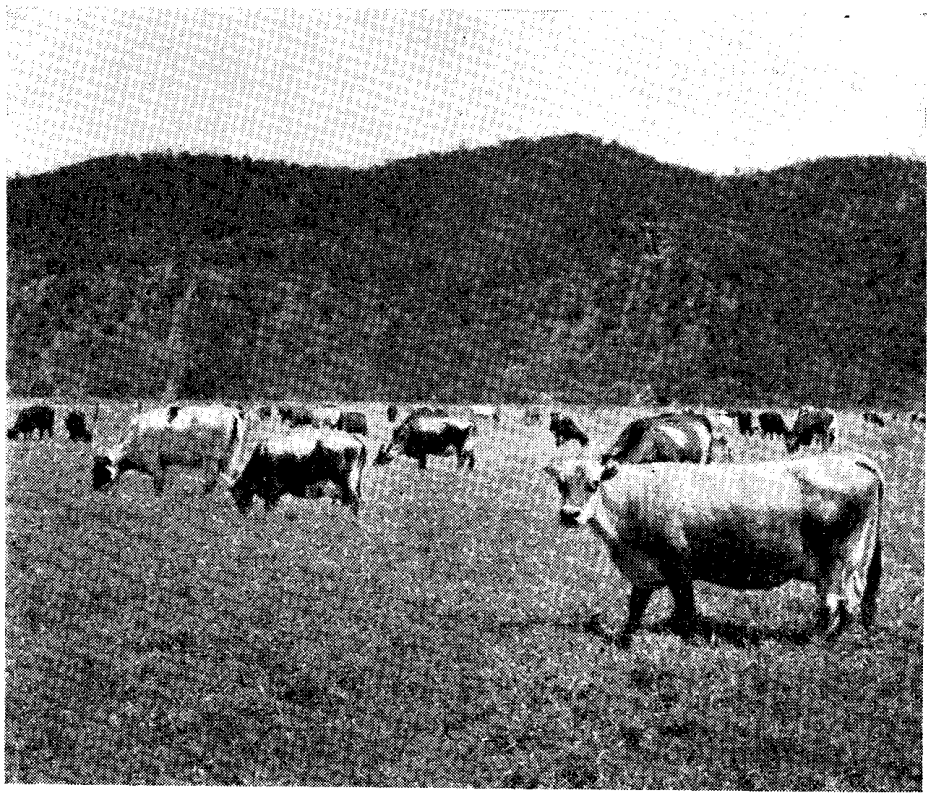
Statement of Farm Receipts—Farm No. 4—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Cream	885	745	6	...
Milk*	...	624	2,632	3,133
Deferred Pay (from Cream for previous year)	101	...	...	...
Calves Sold	28	97	12	32
Pigs Sold	148	137	...	...
Total Receipts ... ... £	1,162	1,603	2,650	3,165

* Portion supplied to the New South Wales Milk Board and the remainder to the Manning River Co-operative Dairy Society Ltd., Taree.

Organization of Farm Enterprises.

Until late in 1950, the farmer supplied cream to the Comboyne Rural Co-operative Society and used the skim milk for raising heifer calves and pigs. In December, 1950, he commenced supplying wholemilk to the Manning River Co-operative Dairy Society Ltd., Taree; since January, 1951, a proportion of his output has been supplied to the New South Wales Milk Board. Since this change the farmer has



Cattle Grazing on Irrigated Improved Pastures.

eliminated the pig enterprise and now only raises enough calves for herd replacements, whereas his previous practice was to raise all heifer calves and sell those surplus to herd requirements. In his first few years on the farm, he usually grew about eight acres of maize (mainly for pigs), two to five acres of turnips and an occasional small crop of potatoes, but with the development of improved pastures and the elimination of the pig enterprise, there has been a reduction in cropping operations. Maize is no longer grown, but there is usually a small area of turnips for cattle feed.

TABLE XXI.

Statement of Farm Costs (including Dairy Grant Expenditure)—Farm No. 4—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
Cash Costs—	£	£	£	£
Feed	48	77	384	30
Seed	111	78	61	45
Superphosphate	93	86	92	114
Lime	136	242	...	...
Miscellaneous Livestock Expenses ...	10	17	23	23
Contract Cropping	37	...	...	...
Marketing Expenses	35	70	190	268
Cartage to Farm	67	21	34	23
Petrol, Kerosene, etc.	88	196	267	236
Pigs Purchased	20	...	...	...
Miscellaneous Expenses	8	13	19	11
Upkeep and Repairs—Improvements	...	1	...	7
Machinery ...	37	49	121	216
Irrigation Licence	...	...	...	6
P.P. Board Rates	...	...	2	2
Rates	22	22	28	33
Insurance and Registration	1	17	23	32
Rent	66	26	26	26
Interest	33	58	34	30
Total Cash Costs	812	973	1,304	1,102
Allowances—				
Depreciation—Improvements ...	16	16	23	22
Machinery	70	184	187	197
Labour—Own Labour*	625	704	945	1,060
Total Allowances	711	904	1,155	1,279
Total Cash Costs	812	973	1,304	1,102
Total Cash Costs and Allowances £	1,523	1,877	2,459	2,381

*Allowance for son working full-time on farm work and father working half-time.

Pasture Management.

As already indicated, the improvement programme on this property has been based on subdivision, establishment of improved pastures, topdressing with lime and superphosphate, control of bracken fern and eradication of rabbits. Maximum benefit of the improved pasture growth has been obtained by the use of an electric fence to control grazing, while a portable irrigation plant has been used to stimulate growth in dry spells.

Pastures are maintained in good condition by chain harrowing and mowing when necessary and each paddock is resown about every fourth year. This resowing programme, which is carried out in the autumn, also has the advantage of providing good growth of rye grasses through the winter. Haymaking is difficult in this area due to the high rainfall, but the farmer proposes to make silage from excess pasture growth when the remainder of the farm is improved.

Livestock Management.

Although it is expected that the size of the herd will be further increased by developing the remainder of the farm, it can be seen from Table XIX that the improvement programme has resulted in higher production per cow and an increase in the number of cows milked, from 40 in 1948-49 to 46 in 1952-53. The quality of the herd has also been raised by culling on the basis of herd testing results.

TABLE XXII.

Net Income and Return on Farm Capital—Farm No. 4—1949-50 to 1952-53.

Year.	Net Income.	Percentage Return on Farm Captal.
	£	per cent.
1949–50 ...	343	...
1950–51 ...	370	...
1951–52 ...	1,064	2
1952–53 ...	1,935	14

At the commencement of the demonstration, the herd consisted of crossbred cattle (mainly Jerseys and Australian Illawarra Shorthorns) with a registered Jersey bull, but since the change to supplying whole-milk, the farmer has introduced a Friesian sire with the objective of giving greater emphasis to milk output. Breeding is arranged so that there are some cows milking each month, but a change in the main calving period has recently been introduced in order to obtain maximum benefit from the more favourable price received from the Milk Board. As the Board normally takes more milk from this area during the winter months, the farmer's present practice is to have most cows commence lactation in the early winter, whereas the majority of calvings were previously in the spring.

To date the property has been stocked to capacity, but the farmer intends to understock slightly in future and plans to make silage from surplus pasture growth. This will provide a form of insurance against adverse seasons and it is planned to reduce the drought risk further by a continuation of pasture improvement work and an extension of irrigation facilities. Another advantage seen in these proposed developments is the prospect of eliminating the necessity of buying concentrates.

Financial Results.

Details of *receipts* and *expenditure* for the years of the demonstration are contained in Tables XX and XXI and details of *net income* and *return on farm capital* are shown in Table XXII. From these figures it can been seen that expenditure in the early stages resulted in a higher level of income as the improvements became effective and in the last financial year, 1952-53, there was a return of 14 per cent. on farm capital. Dairy Grant Expenditure, totalling £1,020, on superphosphate, lime, seed and freight has been included in the *Statement of Farm Costs* and the allocation of this finance can be seen from Table XXIII. Under the system of farming that has been developed, the main cash costs are for lime, superphosphate, seed, freight, marketing expenses, cartage to the farm, fuel and repairs to machinery and equipment. As already indicated, the farmer proposes to keep feed costs down by maintaining good pastures, slightly understocking and conserving silage.

TABLE XXIII.

Dairy Grant Expenditure—Farm No. 4—
1949 to 1953.

	£
Superphosphate	360
Lime	378
Seed	214
Freight and Cartage	68
Total	£1,020

This policy may, of course, be changed in the future if it could be expected that expenditure on concentrates would result in at least a proportionate increase in income from milk.

Causes of Increased Production.

The main causes of increased productivity on the farm may be summarized as—

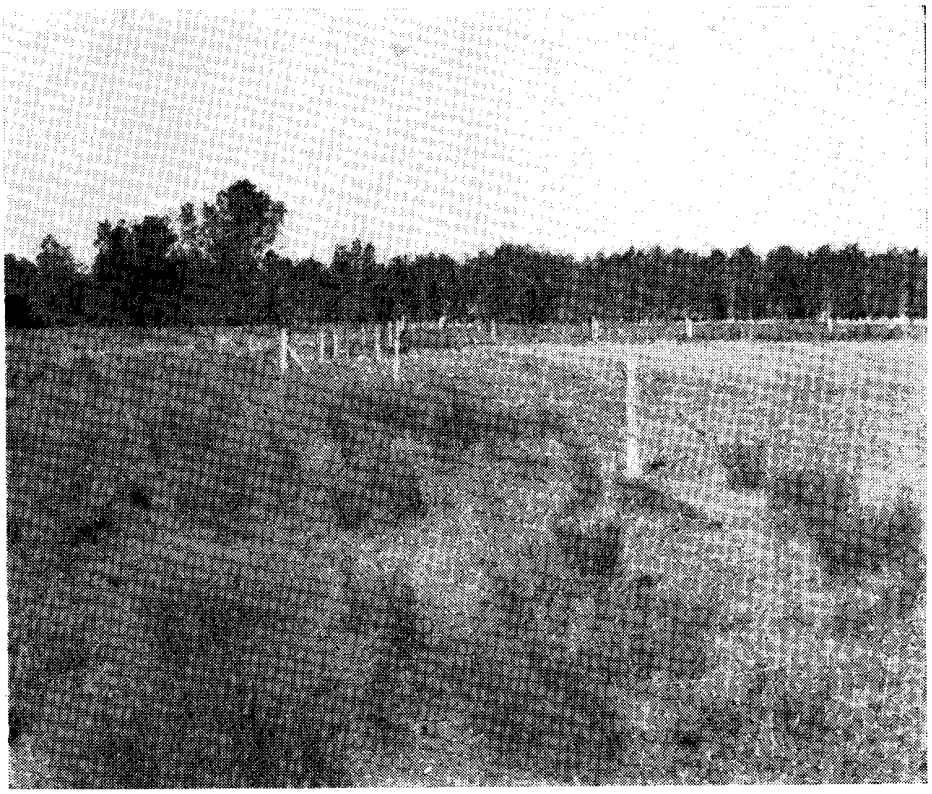
1. Top dressing with lime and superphosphate and the establishment of improved pastures.
2. Subdivision of large paddocks, control of bracken fern and the eradication of rabbits.
3. Efficient management by the farmer in consultation with officers of the Department of Agriculture.
4. Maximum utilization of pastures through controlled grazing and the use of supplementary irrigation to stimulate growth in dry spells.

FARM No. 5—TAREE DISTRICT.

This farm of 139 acres is on the Wallamba River, approximately 17 miles south of Taree on the Lower North Coast. The present owner-operator is Mr. J. Mann. Typical of a large area of country on the Lower Wallamba River, the whole farm is low-lying and drainage is essential in several places to make paddocks safe from anything but a major flood. The effective farming area on the property is about 75 acres, the remainder being subject to tidal flooding.

The Improvement Programme.

Prior to the demonstration the farm was well subdivided but it was in a low state of soil fertility and the paddocks were badly infested with rushes. Thus the objective of the improvement programme, which was commenced in the autumn of 1950, was to increase production by improving the quality of pastures. Within the first few months a mower was acquired to control the growth of rushes; pasture improvement work was commenced immediately, the plan being to progressively replace poor quality pastures with better species. Paddocks containing couch grass required thorough cultivation before sowing the grasses and clovers, but the improvement of other paddocks was less difficult. Some old cultivation paddocks were sown to Poona peas in the spring in preparation for sowing to pastures in the following autumn and paspalum pastures were improved by harrowing and the application of lime and superphosphate. All paddocks were limed at the rate of two tons per acre at the commencement of the demonstration; most pastures have since received annual applications of one bag (187 lb.) of superphosphate per acre. By June, 1953, improved pastures were established on practically all of the usable area of the farm (75 acres), the main species being white, subterranean and red clover, Italian rye, perennial rye and cocksfoot.



Photograph taken in the Early Stages of the Development of Farm No. 5 Showing a Thick Growth of Rushes on the Left and Newly Established Pastures on the Right.

TABLE XXIV.

Livestock Numbers—Farm No. 5—1950 to 1953.

Livestock*	As at—			
	1st July, 1950.	1st July, 1951.	1st July, 1952.	1st July, 1953.
Dairy Cattle—				
Registered Cows	30	29	39	37
Grade Cows	6	6	6	6
Heifers (over 1 year)	4	10	7	10
Heifers (under 1 year)	8	10	13	17
Bulls	2	2	2	2
Draught Horses	4	4	4	4
Light Horses	1	1	1	1
Total	55	62	72	77

* Excluding pigs.

TABLE XXV.

Production—Farm No. 5—1949-50 to 1952-53.

Year.	Number of Cows Milked.	Production in Terms of Commercial Butter*.	Average Production per Cow.
		lb. (c.b.)	lb. (c.b.)
1949–50	32	5,464	170
1950–51	32	7,832	244
1951–52	32	8,842	276
1952–53	39	11,119	285

*Conversion factors: 83 lb. of butterfat=100 lb. of commercial butter; 2·075 gallons of wholemilk=1 lb. of commercial butter.

The introduction of clover and rye pastures has provided a good supply of feed for a longer period; pastures are now well grown by July and August, whereas previously it was often October before growth was good. Prior to the demonstration, the farmer thought pasture improvement would lead to increased production, but he was not sure whether it would pay. He now believes that it would pay to borrow money to carry out such a programme and he considers that most farmers could do this by spreading the investment over a period of three or four years. He has found that the combination of increased investment and a higher level of managerial efficiency has given him a greater feeling of confidence and has resulted in an improvement in his financial status.

Organization of Farm Enterprises.

Since acquiring the property 15 years ago the present owner has used it for dairying and pig raising. He has not grown cash crops, but prior to the demonstration saccaline and maize were grown as a regular practice for green fodder and grain for livestock. Until 1949 the farmer's income was derived from cream and the sale of pigs raised from three breeding sows. In 1949-50 and 1950-51 income was derived mainly from cream supplied to Cape Hawke Co-operative Dairy Company Ltd. (Tuncurry) and wholemilk supplied to milk vendors at Tuncurry. In 1952 there was a change to supplying wholemilk to the Manning River Co-operative Dairy Society Ltd., while since February, 1952, a proportion of the milk has been taken by the New South Wales Milk Board. This has resulted in the elimination of the pig enterprise, which depended largely on the supply of skim milk. The cessation of separating milk on the farm also caused a change in the method of feeding heifer calves; whereas calves were fed on skim milk for six months when it was available, they are now raised on wholemilk for three months and calf meal for a further three months. The farmer considers heifers grow better under the former system of feeding, but whether he would revert to separating milk depends on the proportion of wholemilk for which the more favourable Milk Board price is received. If the proportion taken by the Milk Board were to fall to a low level he would probably separate the evening milk in summer and use the skim milk to raise calves and pigs. This would be done because the farmer considers it would be more profitable than supplying wholemilk for processing in view of the slight difference between the price received for milk for processing (paid on the basis of butterfat content) and the commercial butter price.

TABLE XXVI.

Statement of Farm Receipts—Farm No. 5—1949-50 to 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Cream	351	623	...	...
Milk	328	478	2,286	3,214
Pigs	64	65	30	...
Calves	...	5	...	...
Eggs	15	8	14	...
Total ... ... £	758	1,179	2,330	3,214

Pasture Management.

As already indicated the quality of pastures has been greatly improved on this farm by draining low areas, sowing improved pastures and the application of lime and superphosphate. Of equal importance has been efficient pasture management, particularly with respect to judicious grazing, mowing of rushes and rank growth, and chain harrowing to distribute manure. Additional subdivision of the farm has facilitated efficient grazing and the use of an electric fence has enabled the farmer to make maximum use of pasture growth. In order to maintain grasses and clovers in good condition the farmer plans to renovate and resow paddocks as this becomes necessary. Thus it is anticipated that one or more paddocks will be resown each year.

Livestock Management.

The farmer has a Jersey herd, consisting mainly of registered cows, and a registered Jersey herd sire. All herd replacements are bred on the farm and since the commencement of the demonstration the herd has been improved by culling on the basis of herd testing results. The farmer has always fed concentrates in the colder months (March to August), but the establishment of improved pastures has caused a great improvement in the economic efficiency of feeding practices on the property. Due to the limited working area and the poor quality of pastures before improvement only 20 cows were carried on the farm in the winter months, whereas it is now possible to carry all stock (totalling 77 in 1953) throughout the whole year. In addition, the availability of better quality pastures has reduced the necessity of purchasing feed; in fact, it was possible to conserve a small quantity of pasture hay in 1951 and approximately 12 tons in 1952.

The improvement programme facilitated an increase in the number of cows milked, from 32 in 1949-50 to 39 in 1952-53, the policy being to stock the property up to the carrying capacity of average pasture growth.

TABLE XXVII.

Statement of Farm Costs—Farm No. 5 (including Dairy Grant Expenditure)—1949-50 *to* 1952-53.

Item.	1949–50.	1950–51.	1951–52.	1952–53.
	£	£	£	£
Cash Costs—				
Feed	51	53	206	224
Seed	70	58	12	17
Fertilizer	50	62	69	71
Lime and Lime Spreading	...	336	268	...
Miscellaneous Livestock Expenses ...	1	5	16	8
Contract Ploughing	42	...	20	...
Marketing Expenses	3	2	107	150
Cartage to Farm	9	23	25	23
Petrol, Kerosene, etc.	...	1	4	3
Livestock Replacements	10	...	...	...
Cash Wages	...	...	...	208
Miscellaneous Expenses	4	4	...	61
Upkeep and Repairs—Improvements	3	75	...	40
Machinery ...	17	1	48	41
Rates	13	14	16	24
Interest	27	22	18	12
Total Cash Costs	300	656	809	882
Allowances				
Depreciation—Improvements ...	9	12	15	33
Machinery	19	20	27	52
Labour—Own Labour*	800	893	1,184	1,320
Total Allowances	828	925	1,226	1,405
Total Cash Costs	300	656	809	882
Total Cash Costs and Allowances £	1,128	1,581	2,035	2,287

* Allowance for father and son.

It will also be noticed by reference to Table XXV that there has been a continual increase in the average production per cow during the period of the demonstration, from 170 lb. commercial butter in 1949-50 to 285 lb. in 1952-53. This increase is, of course, partly attributable to herd improvement.

TABLE XXVIII.

Net Income and Return on Farm Capital—Farm No. 5—1949-50 to 1952-53.

Year.	Net Income.	Percentage Return on Farm Capital.
	£	per cent.
1949–50 ...	648	...
1950–51 ...	532	...
1951–52 ...	1,635	12
1952–53 ...	2,281	22

TABLE XXIX.

Dairy Grant Expenditure—Farm No. 5—1949 to 1953.

	£
Superphosphate	251
Lime and Lime Spreading	604
Seed	147
Contract Ploughing	42
Freight and Cartage	64
Electric Fence*	13
Mower*	73
Tidal Flaps and Pipes*	66
Wire*	28
Total	£1,288

* Purchased by the farmer at the conclusion of the demonstration.

Financial Results.

As can be seen from Table XXVII, the cash costs associated with the increased production that has occurred on this farm have been relatively small. The effect of the improved practices on the financial position on the farm can be seen from Table XXVI which reveals an increase in net income from £648 in 1949-50 to £2,281 in 1952-53. It will also be noted that there was a return of 12 per cent. on farm capital in 1951-52 and 22 per cent. in 1952-53. Efficient management and increased expenditure to improve the quality of pastures has clearly resulted in higher net returns on this property.

Causes of Increased Production.

The main causes of increased productivity on the farm may be summarized as—

1. Top dressing with lime and superphosphate and the establishment of improved pastures.
2. Mowing to control the growth of rushes and rank growth.
3. Efficient management by the farmer in consultation with officers of the Department of Agriculture.
4. Maximum utilization of pastures through rotational grazing and the use of an electric fence.