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DAIRY FARMING ON THE RED BASALTIC SOILS OF THE RICHMOND-TWEED REGION*

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The content of this article is based on information obtained directly from a sample of dairy farms located on the red basaltic soil area of the Richmond-Tweed Region, on the North Coast of New South Wales. The survey area is bounded roughly by the centres of Lismore, Dunoon, Mullumbimby, Ewingsdale, Tintenbar and Meerschaum Vale; it embraces an area of over 250 square miles.

* This report is based on a draft prepared by Mr. W. F. Owen, who designed the survey and supervised the field work. Mr. Owen resigned from the Division of Marketing & Agricultural Economics shortly after the field work was completed.

It is desired to thank the 78 participating farmers, whose ready co-operation made the survey possible. It is also desired to express appreciation of assistance rendered by Mr. S. R. Ballard, Regional Supervisor, Far North Coast.

1. OBJECTIVES OF THE SURVEY.

The survey was of a very detailed nature covering most aspects of the organization and operation of the farms concerned. It was planned originally because it was considered that a constructive approach to many of the prevailing problems of agricultural development and policy in Australia is prejudiced by a lack of information about what is actually going on at the farm level. A major aim of the survey was to isolate and describe existing conditions at the farm level which tend to affect the productivity response by farmers to actual or potential market opportunity. Particular attention was paid to the character and apparent aspirations of farm families, and the tenure relationships of farmers to the land they operated. It was considered that factors such as these are of prime significance, along with other economic factors, in determining the precise pattern of development of the Australian rural industries.

That there is a need for a better understanding of the nature of the management decisions made by the farm family may be illustrated by anticipating one of the results of the survey. It would be generally recognized that in recent years the dairying industry in New South Wales has known market opportunities as favourable as it has ever experienced. The results of this survey bear out this view both in terms of farm incomes and levels of farm indebtedness. Yet in spite of this the sample of farms taken is divided almost equally between farms on which, for one reason or another, the overall level of output was either showing signs of falling or appeared to be inherently static at the existing level, and farms on which output was either increasing, if only in a minor degree, or showing signs of likely expansion in the near future.

2. THE SURVEY AREA.

The survey area was chosen for three main reasons. In the first place the region has a high rainfall and a relatively long growing season. It is a small part of the limited section of Australia from which any considerable future advance in rural production will necessarily be obtained. Secondly, the area is used principally for dairying, an industry which, perhaps more than any other of our major rural industries, has failed to reflect continued growth after the early nineteen-thirties. Much of the explanation of the prolonged stagnation in Australian rural production is surely to be found in such an area. Thirdly, within the dairying lands of New South Wales the survey area presents one of the few areas of any significant size which is comparatively uniform in terms of soil type and topography, in land use and historical development. There would seem to be a considerable advantage in seeking to understand a limited area well, and accepting the risk of error in comparing the results with other locations. The alternative approach is to accept the risks involved in a widely scattered sample which, while drawn from a more comprehensive population in terms of a whole industry, promises less reliable results, particularly when applied to specific areas of the State.

Selecting the sample from the particular area chosen also had potential value in view of important research work currently being undertaken into technical problems associated with soil and pasture conditions in

the area, together with a recent re-organization of the local extension services. In both of these respects the survey promised to play a complementary role¹.

3. THE SAMPLE.

Initially a comprehensive list was drawn up of the individual livestock farm holdings located within an area embracing in full the red basaltic soils—the Big Scrub soils—of the eastern section of the Richmond-Tweed Region of New South Wales. On the basis of expert local opinion, holdings definitely known not to be located on red basaltic soil were excluded from this parent list.

From the residual farm list of 1,116 holdings, a sample of 84 properties, that is approximately 7.5 per cent. of the population, was selected for field investigation by the use of random numbers. The field survey work was begun toward the end of February, 1953, and continued over the succeeding three months². The distribution of the holdings in the survey area is illustrated in the accompanying map (Figure 1).

The sample of 84 farm holdings was found to fall into the groups indicated in Table I. Six holdings not located on the red basaltic soils were excluded from the field survey. Only limited information was collected in respect of the holdings not used for dairying and the holdings used only as dry runs. Main interest was centred on 71 of the remaining 72 holdings³.

TABLE I.
Classification of Sample Holdings.

Type of Holding.	Number of Farms.
1. Holdings not located on red basaltic soils	6
2. Holdings used for dairying, located on red basaltic soils—	
Complete operational units—	
fully consolidated	62
unconsolidated	3
Incomplete operational units—	
main holdings only	7
“dry runs” only	3
3. Holdings not used for dairying	75
	3
Total	84

¹ This research is being undertaken by the Faculty of Agriculture, University of Sydney, in collaboration with the Richmond River Research Council.

In 1953 the Department of Agriculture's extension services on the Far North Coast were re-organized on a regional basis with a regional supervisor (located at Lismore) in charge of all local extension officers.

² The field work was carried out by Mr. John Dillon, Assistant Economics Research Officer.

³ One farm was amalgamated with an adjoining property between the date the population was taken and the time the field survey was conducted; as a result, accurate comparable information for the original sample farm was not always available.

4. THE SAMPLE FARMS.

Farm Size.

One of the advantages of selecting a sample of farms from a single soil type is the fact that size-of-farm in terms of acreage is likely to be more meaningful than would otherwise be the case. It is not meant to suggest that the red basaltic soils of the Richmond-Tweed Region are fully uniform in fertility or workability. However, the variation is by no means as great as it is, for example, between this area and the surrounding lands also used for dairying.

The area of the complete operational units (72) varied in the sample from 50 acres to 350 acres. The average size was 142 acres; the distribution of sizes is shown in Table II. Thirty-five per cent. of farms were between 81 and 120 acres, and a further 28 per cent. were between 121 and 160 acres. A little over 15 per cent. of the farms were over 200 acres.

TABLE II.

Classification of Size of Sample Farms—Complete Operational Units.

Acreage Group.	Number of Farms in Group.	Acreage Group.	Number of Farms in Group.	Acreage Group.	Number of Farms in Group.
Acres.		Acres.		Acres.	
Under 40 ...	0	141-160 ...	14	261-280 ...	2
41- 60 ...	2	160-180 ...	5	281-300 ...	1
61- 80 ...	7	181-200 ...	2	301-320 ...	1
81-100 ...	13	201-220 ...	3	321-340 ...	1
101-120 ...	12	221-240 ...	3	341-360 ...	1
121-140 ...	6	241-260 ...	1	Over 361 ...	0
Total number of farms 72.					
Total land area 10,212 acres.					
Average farm area 142 acres.					

Topography and Arable Area.

The 70 holdings, 63 complete operational units and seven main holdings⁴, for which detailed information was available, comprised 9,600 acres in all. Five per cent. (485 acres) of this land was classed as land which could reasonably be considered as cultivable in purely physical terms; and 40 per cent. (3,859 acres) was classed as flat or gently sloping land.

⁴ In respect of three of these seven main holdings, the land worked in association (the dry run) constituted a completely independent holding in the original population of holdings. The remaining four cases obtained their additional grazing land on a part (only) of some other holding.

Only three farms listed stands of commercially valuable timber, and the total area involved did not exceed 20 acres. Most of the so-called uncleared or waste land consisted of steep or rough areas, gullies and creeks, and areas occupied by various weeds.

TABLE III.
*Percentage of Cultivable Land and Flat or Gently Sloping Land—
63 Sample Farms.*

Farm Acreage Group.	Number of Farms Having—				Number of Farms Having—			
	0-25 Per cent.	26-50 Per cent.	51-75 Per cent.	76-100 Per cent.	0-25 Per cent.	26-50 Per cent.	51-75 Per cent.	76-100 Per cent.
	Cultivable Land.				Flat or Gently Sloping Land.			
Acres.								
41- 80 ...	2	2	1	4	3	3	...	3
81-120 ...	7	5	4	6	9	6	5	2
121-160 ...	4	7	2	4	8	5	...	4
161-200 ...	3	...	1	2	3	2	1	...
Over 201 ...	5	...	...	4	5	1	...	3
Totals ...	21	14	8	20	28	17	6	12
Per cent. of total farms	33	22	13	32	44.5	27	9.5	19

Although only of a general descriptive value, Table III is presented to illustrate the distribution of cultivable and flat or gently sloping lands on the 63 complete operational units mentioned above. As the figures involved are farmers' estimates, they could be subject to some error, particularly in relation to cultivable area.

The actual total area cropped on these 63 farms during 1952 amounted to only 156 acres, including double cropping. This will be analyzed more closely later. At this point it merely serves to emphasize the essentially "pastoral" nature of the dairying industry in the area. Natural pasture coverage is part and parcel of a farmer's land resource in the conditions under study, and an early analysis of the types of pasture growth is therefore appropriate.

Classification of Pastures.

Paspalum (*Paspalum dilatatum*) is by far the most important pasture plant in the survey area. Although not indigenous, this plant, introduced during the early years of settlement, has for many years constituted the "natural" pasture coverage of the region. An important fraction of this paspalum pasture land has been seriously invaded by Carpet grass (*Axonopus* sp.), a species of low grazing value. Next in importance to paspalum and competitive in terms of grazing value is the more recent introduction, Kikuyu grass (*Pennisetum clandestinum*). This species is proving more vigorous than paspalum over wide areas. A third grass established in the area in noteworthy degree

is Buffalo grass (*Stenotaphrum secundatum*). Other species, of minor importance only, which were recorded in the survey are Rye grass (*Lolium* sp.), Rhodes grass (*Chloris gayana*), Lamb's Tongue (*Plantago* sp.), Molasses grass (*Melinis minutiflora*) and certain indigenous grasses.

The relative importance of the various pasture species on 8,970 acres on 70 sample farms was as follows:

Mainly	Acres	Proportion of Total Pasture Per Cent.
Paspalum	7,641	85
Kikuyu	1,080	12
Buffalo	225	2.5
Other species	24	.5

Carpet grass was recorded in varying degrees of infestation in approximately 20 per cent. of the pasaplum pasture land. The evidence would suggest a heavy infestation in about 4 per cent. of the paspalum pastures. Although these figures should be taken only as close approximations, they do serve to give a clear picture of the relative importance of the main pasture grasses.

Trends in pasture types are also of interest. In no case did any farmer report an upward trend in paspalum acreages during recent years. On the other hand, over 80 per cent. stated that the trend is definitely downward. This was offset by an almost unanimous claim that kikuyu acreages have been steadily increasing year by year. The reports indicate that buffalo grass is either maintaining a steady acreage or declining slightly, and, while a few farmers have been working to eradicate carpet grass, on balance, its area is extending.

No attempt was made to record the extent of clover growth on farms, as it would be difficult to do this very objectively. It might be mentioned at this point that, while there is natural clover growth—mainly white clover (*Trifolium repens*)—through the pastures of the sample area, generally it is not sufficiently profuse or extensive to improve the grazing value significantly. In fact, it is widely held that the relative failure of clover growth in the red soil area has caused a progressive deterioration in pasture value through increasing nitrogen starvation. Important research work is being directed into this particular problem including some recent experiments with new types of clover in the area.⁵ Special attention has been paid to various strains of subterranean clover (*Trifolium subterraneum*) with promising results. The interest displayed by a number of sample farmers in this work denotes that there may well be a significant practical response to the development of a high yielding clover adapted to the local conditions, together with satisfactory techniques for establishment in the area.

⁵ See Footnote 1, page 30.

Weeds.

Mention has already been made of Carpet grass as a serious "weed" in the pasture land of the survey area. Of seventy holdings, 34 per cent. (24 holdings) had carpet grass infestation in varying degrees. The total area involved was some 1,400 acres, or a little over 15 per cent. of the total pasture area. In this sense carpet grass is a serious menace, particularly in view of its tendency to spread. It deserves to be rated as the most damaging weed in the area.

Two other weeds appeared to be significant in the survey area. These were lantana (*Lantana camara*) and bracken fern (*Pteridium aquilinum*). Fifty per cent. of farms recorded varying areas (1 to 20 acres) of lantana, and a little over 40 per cent. recorded the presence of bracken in areas also varying from one to 20 acres. Significant areas of both weeds were present on 14 per cent. of the farms, often on the same piece of land. A total of approximately 175 acres of land, on 70 holdings (comprising 9,600 acres), was largely in a non-productive state due to lantana. A further 75 acres was seriously handicapped by dense bracken growth.

Other weeds which were a problem on one or more farms were fireweed (*Senecio latus*) and Crofton weed (*Eupatorium adenophorum*). Both of these weeds threaten to become a serious problem throughout the whole area if the present centres of infestation are not cleared out.

Stocking Rates.

Improved pastures and other sources of supplementary feed play only a minor role in the economics of the livestock enterprise in the area and, as a consequence, existing stocking rates should provide a good general indication of the worth of the land and of the natural pasture coverage in the survey area.

In calculating stocking rates, a cow has been taken as the standard unit. Numbers of other stock have been corrected to the approximate grazing equivalent of a cow in accordance with the following scale:—Cows, heifers in calf, bulls and light horses have all been taken as equivalent to one grazing unit; other weaned heifers have been rated at one-half of a grazing unit, unweaned young stock at one-tenth of a grazing unit, and draught horses at $1\frac{1}{2}$ grazing units.

For 63 complete operational units, comprising a total area of 8,586 acres, the total stock population amounted to 4,172 cow equivalents. The average stocking rate was therefore 2.06 acres per cow unit. This figure would indicate the current carrying capacity of the country provided there is no general tendency to overstock or understock in the area. Individual farm figures were found to vary from 1.37 acres per cow unit to 3.14 acres per cow unit, with a heavy concentration of 75 per cent. of the farms within the range of one and one-half to two and one-half acres for each cow equivalent carried. Eighty-two per cent. of farms in the 81-160 acre group fell within this range. These figures indicate that the sample area has a reasonably uniform natural grazing capacity.

Farm Improvements.

In this section a description is presented of the main types of improvements to be found on the sample farms. These will be discussed under the three headings: subdivision, buildings and land improvement.

Subdivision.—The state of subdivision is taken first because this may reasonably be expected to be of key significance in a dairy farming area essentially based on natural pasture grazing. Under such conditions adequate subdivision would seem to be necessary before farmers can achieve even a minimum degree of efficiency in pasture and general livestock management.

Information collected from 63 complete operational units showed that for the 54 farms under 200 acres the total number of paddocks ranged from 5 to 17. Two-thirds of these farmers had between 7 and 12 paddocks. Each of the nine farms over 200 acres had between 12 and 34 paddocks, five having between 13 and 18 paddocks.

Of course factors other than the total number of paddocks are important. In an area such as this the effectiveness of rotational grazing depends largely on the size of paddocks. In this respect the relative scarcity of small paddocks on the survey farms is quite illuminating. Of the 63 farms mentioned, two-thirds did not have more than three paddocks under 5 acres, while over one-third (36.5 per cent.) did not have more than three paddocks under 10 acres.

Buildings.—The normal type of building improvements on the sample farms consisted of a house, a bails and dairy, and in most cases a barn or machinery shed, a set of pig sties and a fowl-house. In a few cases feeding stalls were also present.

Houses.—All of the 71 sample farms had at least one house within the boundaries of the farm. Ten farms (that is, 14 per cent.) had two houses; in four of these cases the main house was the older of the two. With only three exceptions the walls of the houses were constructed of weatherboards, the exceptions being one brick, one asbestos cement and one stucco wall construction. Two homes had tile roofs; the remainder were of corrugated iron.

A rough measure of the size of houses is given by the number of bedrooms. The following is a classification of the main houses on the 71 farms according to the number of bedrooms:—

2 bedroom houses	13 per cent.
3 bedroom houses	38 per cent.
4 bedroom houses	35 per cent.
5 bedroom houses	10 per cent.
6 bedroom houses	4 per cent.

The 71 houses were constructed during three main periods of building activity. Fifty-eight per cent. dated back to before World War I, almost 50 per cent. being constructed between 1900 and 1914. A further 22 per cent. were added between 1918 and the depression of the early 'thirties, mainly in the period 1918 to 1925. After the latter date there followed a period of almost complete stagnation in home building activity lasting for 13 years. The remaining 20 per cent. of the houses were built since 1938, approximately two-thirds of this latter group being built before 1945.

Some indication of the degree of home maintenance activity on the sample farms was gained by collecting information on the painting of houses and any substantial repairs or extension work. This information is summarized in Table IV for 67 main houses. The four main farm-houses under five years old have been excluded.

TABLE IV.

Record of Certain Home Maintenance Work—67 Farm-Houses.

Type of Work.	Percentage of homes on which work was last done :						
	0-5 years ago.	6-10 years ago.	11-15 years ago.	16-20 years ago.	21-30 years ago.	Over 30 years.	Never.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Roof painted	60	15	...	4.5	4.5	...	16
Outside walls painted...	49	24	6	7.5	4.5	4.5	4.5
Substantial renovations or additions	52.5	12	4.5	6	6	...	9

The main source of water supply to the farm home was rain water, collected by the iron roofs and fed into tanks which were also normally of iron construction; 48 per cent. of the farm homes relied entirely on this source of water. The capacity of the tanks attached to each house varied from 1,000 gallons to 5,000 gallons, with 41 per cent. of the houses having a tank capacity of 2,000 gallons and a further 32 per cent. having a tank capacity of 2,500 to 3,000 gallons. The remaining 52 per cent. of farm homes, while normally having rain water facilities, had additional sources of supply. This latter supply, obtained either with a windmill or power pump, was derived from wells (41 per cent. of cases), surface springs (35 per cent. of cases) and creeks or streams (24 per cent. of cases). As would be expected, one effect of these additional supplies was to reduce the tank capacity needed. Thus, whereas only 12 per cent. of homes relying on rain water had a tank capacity of less than 2,000 gallons, 31 per cent. of those with additional sources of supplies had tanks with a capacity less than this figure.

Cow Bails and Yards.—Each of 71 sample holdings (64 complete complete operational units and 7 main holdings) had one set of bails. In every case the construction comprised timbered walls and a corrugated iron roof with the exception of two farms on which the roofs were of fibro. In Table V, the bails on the sample farms are classified according to the period of construction.

The type of cow bails in the area followed a similar pattern, usually consisting of two or three double units of bails, together with an adjoining milk handling and washing-up room and a cream storage room or dairy.

In respect of the 60 bails more than five years old, the exterior surface had been painted within the last five years in 22 cases (36.6 per cent.); between six and ten years ago in 14 cases (23.3 per cent.); between 11 and 15 years ago in ten cases (16.6 per cent); over 16 years ago in five cases (8.3 per cent.), while in nine cases (15 per cent.) the exterior had never been painted.

On most of the 71 farms (almost 80 per cent.), two collecting yards—usually of post and rail construction—were available for the handling of cows during the milking operation. Two farms had only one such yard, 11 had three, one had four and one had five yards. On 14 farms one yard was paved and the remainder were not. Five farms had two or three paved yards each. Only six farms out of 71 had a covered yard in order to shelter the cows from rain immediately prior to milking, and only five farms had a set of feeding stalls.

TABLE V.
Periods of Construction of Cow Bails—71 Farms.

Period.	Age.	Number of Farms.	Percentage of Total.
	years.		
Before 1920 (1903-1919) ...	34-50	12	16.9
1920-1929... ..	24-33	14	19.7
1930-1939... ..	14-23	21	9.6
1940-1949... ..	4-13	17	23.9
1950-1953... ..	0-3	7	9.9

Barns and/or Machinery Sheds.—Eight of the 71 farms had no storage barn or machinery shed. That is, on these farms buildings were limited to a house, bails, a pig sty and fowl-houses. In respect of the remaining 63 farms, 42 had a building described by the farmer as a barn, ten had a building described as a machinery shed, and 11 had both. These buildings were normally of one storey, and were constructed of timber and iron. The amount of floor space varied considerably from about 100 square feet to a little over 1,000 square feet. In most cases, however, individual sheds ranged from about 180 to 300 square feet of storage space. The total storage space on all farms is classified in Table VI.

TABLE VI.
Total Storage Space in Barns and/or Machinery Sheds—71 Farms.

Storage Space.	Number of Farms.	Percentage of Farms.
Square feet.		
Nil	8	11.3
101-200	17	23.9
201-300	20	28.2
301-400	10	14.1
401-500	7	9.9
501-600	5	7.0
Over 600	4	5.6

The construction of the barns and machinery sheds mentioned took place in the following proportions during the periods stated:—Pre-1920, 20 per cent.; 1920-29, 28 per cent.; 1930-39, 20 per cent.; 1940-49, 28 per cent.; 1950-53, 5 per cent. At the time the survey was conducted, 44 per cent. of the barns and sheds on the sample farms were rated by the interviewer as being in good condition; 21 per cent. were rated as in only fair condition, and 34 per cent. were rated as in poor condition.

Pig Sties.—Pig sties were present on all but four of the 71 sample farms. The size of piggery varied from one to 13, the most frequent being four sties; 80 per cent. of farms had between two and six units. The construction of sties on the 67 farms took place as follows:—Pre-1920, 4.5 per cent.; 1920-29, 30 per cent.; 1930-39, 24 per cent.; 1940-49, 39 per cent.; 1950-53, 12 per cent. On six farms the sty was out of use at the time of the interview. Forty-two per cent. of the sties were in good condition; 36 per cent. in fair condition and 22 per cent. in poor condition.

Fowl-Houses. Fowl-houses were present on all but seven of the 71 sample farms. Fowl-raising, almost exclusively for the farmer's own use, was conducted with one fowl-house in 67 per cent. of cases, with two units in 22 per cent. of cases and with three units in 11 per cent. of cases. The fowl-house units were constructed on the farms as follows: pre-1920, 2 per cent.; 1920-29, 17 per cent., 1930-39, 22 per cent.; 1940-49, 48 per cent.; 1950-53, 11 per cent. At the time of interview the condition of fowl-houses on the various sample farms was rated thus: good condition, 39 per cent.; fair condition, 31 per cent.; poor condition, 30 per cent.

Land Improvement.

To complete this description of the nature and extent of the main farm improvements on the sample farms, some mention is made of the land improvements and activities other than sub-division, which are of direct significance to the productive capacity of the land.

First, it is noted that no sample farm had any facilities for the irrigation of crops or pastures, and none had an effective silo.

Mention has already been made of the degree of sub-division, an important factor in the effective use of the land both for grazing and for fodder and improved pasture production. It remains to summarize the actual extent to which farming operations on the sample farms were directed toward improving the productive capacity of the land through the establishment of improved pastures, and by building up soil fertility. The information which follows is based on records obtained from 70 sample farms, including 63 complete operational units and seven main holdings.

On 21 (30 per cent.) of the 70 sample farms the farmer did not engage in any work that could reasonably be classed as either a direct or indirect attempt to improve pasture productivity. On another 21 (30 per cent.) farms, small areas of crops (1-10 acres), such as maize, cow cane, saccaline, oats, poona peas, peanuts and bananas were grown each year. There was on these farms, however, no deliberate pasture improvement work other than that which might indirectly follow the cropping activity. On the remaining 28 (40 per cent.) farms the situation was as follows: 14 farmers were following a practice of establishing small areas of one to six acres of improved pastures each year; in eight of these cases the seeding of pasture normally followed cropping, whereas for the remainder (six cases) the new pasture tended to be established independently. In most cases the improved pasture comprised Italian rye grass and clover or kikuyu. Applications of superphosphate and/or

lime were usually made to the land during cropping operations. In addition, there were another eight farms where the farmers attempted to improve pastures with varying applications of superphosphate or lime or both to existing pasture land. The areas involved varied from one to eight acres. On the remaining six farms pasture work was limited to an annual operation of chain harrowing up to 30 acres each year, principally with a view to spreading droppings.

It would be difficult to determine the net effect of this work on the productive capacity of the land; obviously, however, it has been small. No significant areas of improved pasture, in the sense of re-established pastures involving new species, showed up in the inventory of pastures presented earlier. The amount of topdressing of existing pastures has been too small to have had any significant effect. The extent of land tillage was also very limited. On 70 holdings, comprising 9,602 acres, only 180 acres were cropped in 1952 on only 42 of the farms. Of this 180 acres, which includes double cropping, only 126 acres were devoted to fodder crops.

In general, very little has been done on the sample farms to materially affect the grazing value of the natural pastures. On the basis of the evidence obtained it remains an open question as to what extent the present pattern of management is due to an absence of satisfactory techniques for the improvement of the productive capacity of the land, as opposed to a lack of incentives to attempt improvements. In order to ensure that research directed at the former problem might produce fruitful results through a widespread practical application of improved techniques at the farm level, it is essential that the second problem should not be overlooked in the meantime.

Land Values.

In the majority of cases (85 per cent. of 62 farms), the improved capital value of the sample farms in 1952 had been determined by the Valuer-General at between £30 and £65 per acre, with the remainder exceeding the latter figure, and ranging as high as £94 per acre. For 55 of the sample farms the average improved capital valuation was £52 per acre compared with an average unimproved capital valuation of £18 per acre.

In 1953, the estimated farm sale values considerably exceeded the official determination of improved capital values. Estimates of the sale values were obtained for 32 farms. These ranged from £50 per acre to £150 per acre. Most of the farmers (75 per cent.) considered their land to be worth between £80 and £130 per acre on the existing land market. For 24 farms, for which both valuations were available, the improved capital value per farm averaged £54.7 per acre, whereas the estimated sale value per farm averaged as high as £97 per acre.

Machinery and Equipment.

Logically, the next thing to be considered in this general description of the sample farms is the type and relative importance of the different classes of machinery and equipment which the farmers used to facilitate operations. This section will be presented in three parts, namely, dairying equipment, field equipment and miscellaneous equipment.

Dairying Equipment. Of the 71 farms in the sample, only 10 (14 per cent.) were found to be without a milking machine. Of the remainder, 28 (40 per cent.) had a two-unit plant; 25 (35 per cent.) a three-unit plant; 5 (7 per cent.) a four-unit plant; and one each had a one-unit, six-unit and eight-unit plant. A total of ten different makes of milking machines was represented on the sample farms, although one make made up almost 48 per cent. of plants, and three others accounted for a further 37 per cent.

Fifty-seven farms (80 per cent.) had electric power supplied to the dairy and bails, while two other farms had their own lighting plant. All but three farms had a cream separator, but only one farm had a mechanical cooling unit. Ninety per cent. of the farms had cold running water, but only 35 per cent. had hot running water in the dairy; only 32 per cent. of the farms had a hose to assist in the cleaning of the bails.

Field Equipment. The various types of field equipment represented on the 71 sample farms, together with the total numbers of each type, were as follows:—

Tyne Harrows	..	..	..	..	..	..	63
Mouldboard Ploughs	..	..	..	..	..	..	60
Scufflers (row cultivators)	..	..	..	..	..	..	46
Disc Ploughs	..	..	..	..	..	..	20
Disc Harrows	..	..	..	..	..	..	14
Corn Droppers	..	..	..	..	..	..	14
Chain Harrows	..	..	..	..	..	..	8
Rotary Hoes	..	..	..	..	..	..	5
Mowers	..	..	..	..	..	..	4
Manure Spreaders	..	..	..	..	..	..	2
Weed Sprayers	..	..	..	..	..	..	2
Tractors	..	..	..	..	..	..	2

It is to be specially noted that only two farms had tractors; most of the farm implements were horse-drawn. The records for 70 sample farms show the most common position to be one where a farm had either two draught horses and one or two light horses (34 per cent. of farms), or one draught horse, usually together with one light horse (27 per cent. of farms). In more detail, five farms had no horses at all, 12 farms (17 per cent.) had no draught horses, 23 farms (33 per cent.) had one draught horse, 31 farms (44 per cent.) had two draught horses and four farms had more than two draught horses; 16 farms (23 per cent.) had no light horses, 35 (50 per cent.) had one light horse, 13 (19 per cent.) had two light horses, and 6 farms had more than two light horses.

On most farms (57), a horse waggon or cart was available for use in the fields. Some sample farmers had rotary hoeing (seven farms), ploughing (four farms), or mowing (one farm), done under contract. In some cases (not more than two or three farms in each case), implements such as mouldboard ploughs and disc ploughs, tyne and disc harrows, scufflers and corn droppers, were shared or borrowed.

Ten farms (14 per cent.) had no field equipment at all, other than a waggon or cart or a single harrow. On a further 32 farms (45 per cent.) field equipment was limited to one plough and one harrow (12 farms), together with a scuffler (18 farms) and a corn dropper (two farms). All the remaining 29 farms (41 per cent.) had additional cultivation equipment, 24 also having a scuffler and 11 having a corn dropper. One of the most fully equipped farms had the following items; disc plough and mouldboard plough, disc harrows and tyne harrows, rotary hoe, scuffler and corn dropper.

Other Equipment. On all but four of the 71 sample properties the farmer had a motor vehicle of some kind. Forty-four (62 per cent.) had a car only, 11 (15 per cent.) had a truck only, and 12 (17 per cent.) had both a car and a truck. It is interesting to note that out of a total of 57 cars, 20 (38 per cent.) were post-war models, 16 late "thirties" models; while the remainder (20) were pre-1935 models. Fifteen of the 20 post-war models were less than three years old. In respect of the total of 23 trucks and utilities, nine (39 per cent.) were post-war models, four late "thirties" models and ten (43 per cent.) dated from before 1935. Four of the nine post-war models were less than three years old.

The only other piece of equipment of importance on the sample farms was the chaff-cutter, which was found on 13 farms (18 per cent. of the effective sample). It might be mentioned, however, that two farms had an electric fence, and three farmers shared a borrowed rabbit exterminator, a cement mixer and a post hole digger with some other farmer.

Labour Resources.

In the particular area of study two main labour functions may be conveniently distinguished. These are the milking operation and the various jobs that fall into the category of general farm work. In the calculations that follow, a general-farm-work-unit is taken to be equivalent to an able bodied man available for general farm work during the period between milking operations. Where labour available for general farm work was not engaged in milking, an adjustment has been made in terms of the normal working day and the time devoted to milking on these farms. Adjustments have also been made in the calculation of general-farm-work-units such as were considered reasonable to take account of extremes in ages and bad health.

The number of regular milking-units of labour available on the 71 farms varied from one to six. On only three farms, however, did the number of milking units of labour exceed three. Twenty-seven per cent. had one unit, 49 per cent. two units, and 20 per cent. three units.

The average number of general-farm-work-units available on the sample farms varied from slightly less than one to slightly more than five. On only two farms did the labour exceed three units. Sixty-nine per cent. of the farms had approximately one unit of such labour and 25 per cent. approximately two units.

The difference between the distribution of milking-units and general-farm-work-units is largely to be accounted for by the effect of female labour. The latter, mainly wives of operators, commonly assist with the milking operation. The most usual combination of labour units on the sample farms was therefore two milking units and approximately one general-farm-unit; this applied on 32.4 per cent. of farms. Next came a group involving one milking unit and approximately one general-farm-unit comprising 25.4 per cent. of farms, followed by a group with two milking units to approximately two general farm units which made up 15.5 per cent. of farms. The remaining 26.7 per cent. of farms were divided more or less equally between groups; three or four milking units and approximately one general farm unit; three or four milking units and approximately two general farm units; and three or more milking units with three or more general farm units.

The labour force was comprised essentially of operator-family labour. On the 71 farms in 1952, the total permanent non-family labour employed by the sample farmers totalled only three men, one single girl and one married couple. Furthermore, two of the three single men were over the age of 60, while the male member of the married couple worked only part time on the farm concerned.

Temporary hired labour was more commonly used on the sample farms. The total amounts, however, were small. Forty-eight per cent. of farms recorded some temporary labour hired during the year, but on over half of these the amount of such employment did not exceed four weeks in the year. Only six farms out of the 71 engaged casual labour for more than two months, and the maximum was six months.

Farm Enterprises.

With few exceptions the output of dairy products constituted the central business activity on the sample holdings. The dairying enterprise will therefore be described in some detail, and this will be followed by a description of the complementary and supplementary enterprises. The relative importance of these sideline enterprises varied greatly from farm to farm. The breeding and/or fattening of pigs was the most important sideline activity, followed by livestock production involving either the output of meat animals or the breeding of dairy replacements, or both. A few farmers derived a small part of their gross income from the sale of crops. A summary classification of sample farms according to enterprises is provided in Table VII.

The Dairy Enterprise.

Numbers of dairy cows and bulls. The numbers of mature dairy cows varied from 25 to 140 per farm. An analysis of the distribution of herd size is presented in Table VIII. The average herd size was 52, a little over two-thirds of the farms having herds of between 30 and 60 cows. Every farm kept at least one bull. The average number of cows per bull in the different herd size groups is also presented in Table VIII. All herds of under 34 cows and 76 per cent. of herds of between 35 and 54 cows had only one bull; 50 per cent. of herds of between 55 and 64 cows had two bulls, and seven out of eight herds with 75 to 84 cows had two bulls.

TABLE VII.

Classification of Sample Farms According to Enterprise.

Sources of Gross Income.	Number of Farms—		
	Selling Dairy Stock.*	Marketing Fluid Milk.	Total.
Dairy Products and Cattle	1	4	5
Dairy Products, Cattle and Crops ... ..	...	4	5
Dairy Products, Cattle and Pigs	16	4	47
Dairy Products, Cattle, Pigs and Crops	6	...	15
Cattle and Crops only	1	...	1
Cattle only ... ..	...	...	2
Dry Runs to Dairying Holdings ... ..	...	...	3
Total	24	12	78

* At least part of sales of cattle were to dairy interests as opposed to meat interests.

TABLE VIII.

Distribution of Herd Sizes—Total Mature Cows—70 Farms.

Number of Cows in Herd.	Number of Farms.	Percentage of Farms.	Average Number of Cows per Bull.
25- 34	13	18.6 *	32
35- 44	12	17.2	32
45- 54	18	25.7	40
55- 64	14	20.0	40
65- 74 ... ..	...	...	...
75- 84	8	11.4	43
85- 94	4	5.7	31
Over 94 ... ..	...	...	...
135-144	1	1.4	47
Total	70	100.0	...

Dairy cows per unit of labour available for milking. The average number of mature dairy cows per milking-unit of labour was approximately 26 (based on 66 farms). However, the number of cows handled per milking-unit of labour varied between the wide extremes of 13 and 60 cows.

Proportions of dairy cows bred on the farms. The proportion of dairy cows bred on farms was analysed in respect of 40 complete operational units which had been under the same management for over four years. It was found that the farms fell into four almost equal groups. On approximately one-quarter of the farms, over 90 per cent. of the existing dairy herd had been bred on the farms concerned. On another quarter, from 51 to 90 per cent. of the dairy herd had been bred on the farm, while the remainder of the farms fell into two almost equal groups on which from 11-50 per cent. and under 11 per cent., respectively, of the dairy herd had been bred on the farm.

It would be expected that the proportion of the herd bred on the farm would be highest on the larger properties, and in fact it was found that on 64 per cent. of the farms (22) with an area of over 140 acres, more than half of the herd was bred on the farm, whereas for the 18 farms of less than 140 acres the corresponding percentage was only 37 per cent. However, on four of the 18 farms under 140 acres over 90 per cent. of the herd had been bred on the particular farm.

Breeds of Dairy Stock. The Australian Illawarra Shorthorn (A.I.S.) and the Jersey were the leading breeds on the sample farms. Both of these breeds enjoyed a similar degree of popularity, and together made up about two-thirds of the dairy stock on the farms. In terms of the total number of herds the next most important group was grade cattle involving crosses between the A.I.S., the Jersey and the Guernsey. A few herds were comprised of a mixture of breeds and crosses without any one breed predominating. The Guernsey breed was found to have a definite influence in the area while the Ayrshire was also represented. No Friesian herds appeared in the sample. The breed was represented on only one farm which had a mixed herd. A classification of the breeds recorded is presented in Table IX.

No major change in the breed structure on the sample farms appears likely in the near future. A tendency toward a change in breed structure was noted on 19 farms, but losses and gains largely offset one another with respect to any particular breed.

Output of Dairy Products. Of 71 farms, 12 (17 per cent.) marketed their dairy production mainly in the form of fluid milk. The remainder (83 per cent) marketed cream. Only one farmer retailed his own milk. Dairy produce was marketed through one co-operative and one proprietary concern, namely, Norco Co-operative Limited and Foley Bros. Pty. Limited. Factories were located at Lismore, Byron Bay, Dunoon and Mullumbimby. Lismore provided the main outlet (58 per cent. of farms), followed by Byron Bay (30 per cent.).

The average production of commercial butter per mature dairy cow on 49 sample farms was 185 pounds during the 12 months ended March, 1953. The farms excluded from the calculation included 11 which had experienced a change in management during this production period, and ten for which there was doubt or some anomaly regarding production figures or cow numbers. An adjustment of cow numbers for the 49 farms was made to take account of changes due to death, culling and additions or replacements during the twelve months.

TABLE IX.

Breeds of Dairy Stock—70 Farms.

Breed of Herd.	Number of Farms.	Number of Stock.
Australian Illawarra Shorthorn (A.I.S.)—		
Entirely	18	1,090
Mainly	4	225
Jersey—		
Entirely	19	954
Mainly	7	354
Guernsey—		
Entirely	3	154
Mainly	4	195
Ayrshire—		
Entirely	1	50
Grade Stock—		
Mainly	8	442
Mixed Breeds—		
Mainly	6	294
Total	70	3,758

It should be noted also that the period taken for the above calculation was one of fairly satisfactory seasonal conditions in the survey area. The figure of 185 pounds of commercial butter per cow should therefore represent a close estimate of the average productive efficiency of dairy stock on the 49 farms under "average" management and seasonal conditions. However, there was a considerable variation in productivity per cow on the 49 farms taken individually. Production of commercial butter per cow ranged from 119 pounds to 276 pounds; 82 per cent. of producers fell within the range of 140 to 240 pounds per cow, and 47 per cent. within the range of 160 and 200 pounds per cow.

The average production of commercial butter per acre for the 49 farms was 71 pounds. Production on individual farms ranged from 39 pounds per acre to as high as 118 pounds per acre. Fifty-five per cent. of the farms fell within the limits of 50 and 80 pounds per acre. There was no significant difference in productivity per acre between the farms above and the farms below median size.

Naturally, production of commercial butter per farm showed great variation. During the twelve months ended 31st March, 1953, the lowest farm output recorded on the 49 farms was 4,436 pounds and the highest 26,792 pounds. On the basis of the guaranteed price for butter of 49.22 d. per pound during most of 1952-53, the contribution made by butter to the gross incomes produced on these two farms would be £910 and £5,494, a difference of £4,584. However, despite this wide range, almost 60 per cent. of the farms produced between 7,000 pounds (approximate gross value to farmer, £1,426) and 11,000 pounds (£2,256) of commercial butter. A further 26 per cent. of the farms

produced more than 11,000 pounds of butter during this twelve-month period. The overall average for the 49 farms was 10,660 pounds (£2,186).

Contribution of Dairy Products to Gross Farm Income. The source and approximate value of gross income was obtained for the 12 months ended 30th June, 1952, for 58 farms on which there had been no change in management during the period. On 90 per cent. of these farms the sale of dairy products contributed over half of the gross income, while on 79 per cent. of the farms the contribution ranged from 50 to 75 per cent.

The Effects of Dry Conditions on Dairy Production. Serious drought conditions prevailed throughout the survey area from July, 1951, until February, 1952. It is important, therefore, to take this into account when studying the abovementioned production figures, since there is ample evidence that the output of milk from the sample farms was drastically reduced by this period of climatic adversity.

For 47 of the holdings for which records are available, the total output of commercial butter equivalent during the 12 months ended 30th June, 1952, was only 77 per cent. of that produced during the 12 months ended 31st March, 1953. It has been established that the drought was responsible for a loss in production of about one-quarter of the output that could reasonably have been expected from the farms, given good seasonal conditions.

TABLE X.

Supplementary Feeding and Natural Pasture Grazing—71 Farms.

Type of Farm.	Number of Farms—		Total Number of Farms.
	Not Feeding Concentrates.	Feeding Some Concentrates.	
(A) Farms growing no fodder crops and carrying out no significant pasture improvement work	16	12	28
(B) Farms growing some fodder crops and/or carrying out pasture improvement work	23	20	43
Total	39	32	71

In view of these factors, it is considered that the aforementioned analysis understates the contribution to gross farm income made during more normal periods by revenue from the sale of dairy products. To more correctly represent the normal situation in this respect, the percentage figures covering the contribution to gross income by various farm enterprises should be raised by five per cent.

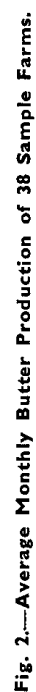
The marked vulnerability of the dairying industry to dry conditions, especially during critical seasons, is illustrated in Figure II. This diagram summarizes for 38 sample farms the average monthly production of commercial butter over the four-year period, 1949 to 1952. These 38 farms were selected because in no case had there been a change of management in this period.

Figure II demonstrates the manner in which monthly output has followed monthly variations in district rainfall. In interpreting this data, it should be remembered that it is usual on the Far North Coast for farmers to have their herds calve between July and December with the bulk of the cows coming into production during August, September and October. The entire seasonal production pattern extending from the spring into the late summer is particularly sensitive to inadequate supplies of feed from pastures during the spring period, and it is for this reason that adequate falls of rain between late winter and mid-summer are so vital. It will be seen from Figure II that falls of rain well above the calculated "effective" (minimum) amounts^a were received during the critical production months of 1949-50, 1950-51 and 1952-53. These same years were characterized by a normal pick up of production after the winter period and a sustained output until the autumn months. In striking contrast to these conditions was the manner in which poor production accompanied the low rainfalls received during the period June, 1951, to January, 1952.

Supplementary Feeding Practices. Very little activity was directed toward meeting the problem of seasonal variations in the grazing value of pastures. Apart from small amounts of maize stored on the cob and utilized mainly as pig or fowl feed, the storage of farm-produced feeds was negligible. Neither were farms equipped to undertake any significant fodder conservation work. Furthermore, there were no facilities for supplementary irrigation of pastures, a conceivable alternative approach.

Mention has already been made of the fact that limited pasture improvement work and some fodder crop production was being carried out by certain farmers. Whilst these activities could hardly be classed as drought safeguards, they did entail a supplementing of natural pastures, often during critical periods.

^a The "effective" rainfall figures shown in Figure II have been calculated by the Commonwealth Weather Bureau as the monthly rainfalls required at Lismore to maintain plant growth above the wilting point. As such, these figures are less than that required to maintain supplies of feed adequate for reasonable butter production.



In terms of area, the most important fodder crops grown on the farms were maize, oats, poona peas, cow cane and saccaline. The total area of these crops grown in 1952 on 70 farms was 132 acres, of which 56 acres were sown to maize. To the extent that a large part of the maize was used as pig and fowl feed, and the peas were often utilized as a green manure crop, oats (32 acres)—mainly a winter feed—, cow cane and saccaline (27) acres), should, perhaps, be viewed as the main farm-produced supplementary fodder for dairy stock. However, the areas involved and the overall importance of fodder crops were small, particularly when it is realized that over half of the farmers grew no maize or other fodder crops, and on only one-third of the farms did the total areas devoted to these crops exceed two acres. No definite trend in cropping plans was evident from the records of recent years or the expressed future intentions of the farmers.

Some farmers (17 per cent.) further supplemented their limited fodder crop areas with purchased dairy concentrates, and another 28 per cent. relied entirely on such concentrates for supplementary feeding purposes. The general practice on these farms was to feed at the rate of from one to four pounds (most commonly, three to four pounds) of concentrates per day per head of milking stock. Normally most farmers fed concentrates only in the winter and during drought periods. Many farmers claimed the feeding of concentrates to be generally uneconomic at existing prices. However, a few keenly supported concentrate feeding and practised it throughout the year, varying the feeding rate according to condition and the production standing of the cow. Concentrates fed were usually commercial mixtures, and were fed in the bails during the milking operation.

The extent of supplementary feeding operations on the sample farms is shown in Table X. The survey has demonstrated that supplementary feeding was very limited and was not usually directed specifically toward offsetting periodic dry seasons, particularly during the spring and early summer. In most cases supplementary feeding was confined to the winter months, which are not so very important in the yearly production pattern.

In concluding this section, it may be of interest to mention the type of supplementary feeding practised by one of the sample farmers who was most active in this regard. The particular farmer normally grows about two to three acres each of maize and cow cane for feeding to the milkers during June, July and August. He usually also grows an acre or two of oats as winter feed, and establishes an acre or two of Italian rye grass each year following the maize crop. In addition, he regularly feeds a commercial concentrate, together with oats and lucerne chaff to the milking herd, according to production. He endeavours to spread the risk of seasonal conditions and labour requirements by aiming at an even number of milkers throughout the year. However, the farmer was an exception. He explained that his action was necessitated by his small acreage (70 acres).

Trends in Cow Numbers. Trends in cow numbers is probably the most significant factor affecting the development of dairy production on the sample farms. Changes in the size of herds during both the

twelve-month period and the three-year period immediately preceding the field survey work, together with farmers' future stocking plans, are shown in Table XI.

The figures quoted in Table XI for each separate period are not strictly comparable, as the number of farms varied throughout the period. This is due to the exclusion of farms which underwent a change in management during the three-year period. However, it is apparent that there is an overall tendency toward increasing cow numbers, which might well be reflected in a slight increase in dairy output in the survey area in the near future.

TABLE XI.
Trends in Dairy Cow Numbers on the Sample Farms.

Direction of Change in Cow Numbers.	Last Three Years.			Last Twelve Months.			Immediate Future.		
	Number of Farms.	Percentage of Farms.	Number of Cows.	Number of Farms.	Percentage of Farms.	Number of Cows.	Number of Farms.	Percentage of Farms.	Number of Cows.
Increase	12	26	+ 87	28	42	+ 123	23	33	+ 156
Decrease	9	20	- 57	22	33	- 65	5	7	- 30
No change	25	54	...	17	25	...	42	60	...
Total	46	100	+ 30	67	100	+ 58	70	100	+ 126
Increase in cow numbers as a percentage of total cows on farms	1.14			1.64			3.45		

The Pig Enterprise.

In terms of gross farm income, pig raising was the most important sideline enterprise. On 58 farms dairy products contributed an average of 64 per cent. to the gross income in 1951-52. This would probably have been a little higher under more normal seasonal conditions. On these same farms pig raising contributed an average of 25 per cent. to gross income; the remainder was derived from the sale of cattle and crops.

Of 70 sample farms, 60 raised pigs⁷. Of these, eight farms limited their activities to the fattening of purchased stores, whereas 52 farms (74 per cent.) engaged in both breeding and fattening. Most farmers raised their own pigs, and the enterprise was directed mainly towards the production of baconers. Approximately 1,700 baconers (average weight, 141 pounds) were marketed during 1952 from the 60 farms, together with 1,120 porkers (average weight, 78 pounds) and approximately 650 store pigs (average weight, 38 pounds). Purchased stores numbered about 500. The net output of pigs of all types was approximately 320,000 pounds.

In Table XII, the relative size of the pig enterprise on the sample farms is shown in terms of total sales of pigs made during 1952. In Table XIII the scale of the pig breeding enterprise is compared in terms of the number of breeding sows on sample farms.

⁷ The remaining two sample dairy farms also had a pig enterprise, but they have been excluded from most of the following calculations due to a lack of precise details.

The pig enterprise was complementary to the dairying enterprise on most farms in that it provided an outlet for skim milk. Only four of the 12 farmers who marketed fluid milk bred or fattened pigs. On the other hand, only two of the 60 farmers who marketed cream did not keep pigs; these two exceptions were due to special circumstances existing at the time of the survey. On some farms maize grown on the farm was used to supplement skim milk as a pig feed. Of 61 farms keeping pigs, 19 (31 per cent.) grew some maize. The area of maize grown per farm varied from half an acre to six acres; two-thirds of the 19 farms grew between two and four acres. Due to the small number of farms involved, and the fact that not all of their maize production was so utilized, farm-produced maize played only a minor role as a supplementary pig feed. At the same time it might be noted that only three of the farms without a pig enterprise grew any maize in 1952, and in each of these cases the area involved was only half an acre.

TABLE XII.

Net Sales of Pigs (All Types) and Number of Farms Purchasing and Selling Stores.

Total Net Sales.	Number of Farms.	Percentage of Farms.	Number of Farms Purchasing Stores in 1952.	Number of Farms Selling Stores in 1952.
lb.				
Under 3,000 ...	16	27	7	5
3,001- 6,000 ...	27	45	5	11
6,001- 9,000 ...	12	20	2	4
9,001-12,000 ...	2	3	...	...
12,001-15,000 ...	...	...	...	...
16,001-21,000 ...	3	5	1	...
Total ...	60	100	15	20

TABLE XIII.

Numbers of Breeding Sows on Farms Having Pigs and Number of Farms Purchasing and Selling Stores.

Number of Sows.	Number of Farms.	Percentage of Farms.	Number of Farms Purchasing Stores in 1952.	Number of Farms Selling Stores in 1952.
Nil ...	8	13	8	...
1- 3 ...	11	18	2	2
4- 6 ...	31	52	3	15
7- 9 ...	7	12	1	3
10-12 ...	2	3	...	...
13-15 ...	1	2	1	...
Total ...	60	100	15	20

Purchased pig feeds proved to be a more common supplement to skim milk than farm-produced crop products. By far the most important of these purchased feeds was crushed wheat, some of which was purchased by all but two of the farmers raising pigs in 1952. A few farmers (five) also purchased some pollard and bran for pig feed, while one farmer utilized factory whey. More farmers purchased supplementary feeds for use in the minor enterprise of pig raising than for the major enterprise of dairying. Fifty-nine of 61 farmers with a pig-raising enterprise purchased some pig feeds (mainly crushed wheat), whereas only 28 (46 per cent.) purchased any supplementary feeds (mainly commercial concentrates) for their dairy stock.

Minor Enterprises.

Sales of Cattle. In dealing with cattle sales it is appropriate to refer first to the three sample holdings which were not used for dairying. (See Table I.) Two of these holdings were used for grazing beef stock; one of the operators concerned was actively engaged in cattle dealing as a business, while the other had additional beef raising interests, and his sample holding (80 acres) was used principally for fattening purchased or transferred stores. The third holding (56 acres) was devoted to cash crop production, in association with the rearing of dairy stock. At the time of interview this holding was stocked with 20 dairy heifers and one bull.

Of the three sample holdings which were used as dry runs to separate dairying holdings, one (75 acres) was used partly for grazing beef stock. The others (50 and 90 acres) were used for grazing dairy stock only. Only two other sample farms ran any beef-breed stock apart from bulls. These two farms carried ten and seven beef-breed heifers respectively. The presence of beef-breed bulls on some of the dairying holdings deserves special mention. Altogether seven out of 71 sample dairy holdings kept a beef bull. On four farms this bull was a Hereford, on two it was a Devon, and on one a Red Poll. Five of these farms did not have a dairy-breed bull at all. The primary purpose of keeping a beef bull was to rear young stock for sale to beef raisers.

The turn-off of calves from 67 farms in 1952 averaged approximately 35 per farm or 66 per cent. of the total number of cows concerned. However, in spite of the number involved, calf sales made but a small contribution to total gross farm incomes. The average return was between 10s. 0d. and 20s. 0d. per calf in 1952. More important in terms of the value of stock sales were culled mature dairy stock sold to beef interests. These consisted mainly of cows (92 per cent.), and during 1952, constituted a little over 14 per cent. of the total number of productive cows on 69 farms. Approximately 45 per cent. of the culled dairy cows were sold in fat condition, the remainder being sold as stores.

In addition to cull dairy stock sold to beef interests, some stock were marketed as dairy replacements. The numbers so involved in 1952 were only slightly in excess of one-third of the numbers of mature stock sold to beef interests. Furthermore, less than a third of the sample farmers sold any stock to dairy interests, whereas all disposed of some animals

to beef interests. The class of stock involved also differed. Slightly over 80 per cent. of the stock sold to dairy interests in 1952 were heifers over six months old. Of the latter, slightly more than half were between 6 and 12 months old at the time of sale; the remainder ranged from 12 months old to springers.

The total number of stock sold by 67 sample farmers to dairying interests was more than balanced by their purchases of replacements and herd additions. Nearly two-thirds of these farmers purchased some stock of this type in 1952. Approximately 35 per cent. of the purchases were cows and 58 per cent. heifers. Purchase of heifers and bulls approximately balanced the numbers sold. The number of cows purchased was considerably in excess of the number sold. In addition, the majority of heifers purchased were more than 12 months of age.

Production of Cash Crops. The sale of crops made only a very small contribution to the average gross income of the sample farms, only two per cent. in 1951-52. As has already been mentioned, this was an extremely dry season; nevertheless it is unlikely that the relative importance of cash crops is significantly higher in better seasons. In the more favourable 1952-53 season only 21 (29 per cent.) of the 72 sample dairy farms grew any cash crops.

The most important cash crop grown in 1952-53 was peanuts. Altogether 17 farmers grew this crop in areas of from $\frac{1}{2}$ -acre to ten acres. The next most important cash crop was bananas, which were grown on three farms (ten acres in all), followed by potatoes, also on three farms (seven acres).

Land Tenure.

During the survey an attempt was made to determine the actual pattern of land tenure arrangements on the sample farms. It was considered that different forms of land tenure exert a considerable influence on management decisions. In addition, an almost complete lack of reliable empirical data about the degree and the characteristics of farm tenancy in the dairying areas of New South Wales has prejudiced any evaluation of the existing situation. This has made it difficult for administrative authorities to design suitable tenancy legislation.

A descriptive classification of the different types of tenure status of the farmers in the sample is set out in Table XIV. It is to be noted that almost 42 per cent. of the farms were operated by sharefarmers or tenants, including nearly 28 per cent. which were operated by sharefarmers or tenants with no family relationship to the owners of the farms. In addition, among the family-owned and operated farms 40 per cent. involved the active operational participation on a full time basis of children of the owner-operator.

TABLE XIV.

The Tenure Status of the Sample Dairy Farmers.

Tenure Group of Operator.	Characteristics of Tenure Groups.	Number of Farms.	Per cent. of Farms.	Per cent. of Farms.
Owner-Operators ...	Farms operated by the owner of the land. Farms on which any labour engaged other than the owner (and wife) was hired: non-family labour (other than any part-time work by children of school age)	25	34.7	
Family-Partnerships ...	A variable group including all farms on which parent(s) and children were both actively involved in day-to-day management and operation, including: (a) farms on which the interest of the participating children was limited to cash payments at discretion of the parents; involving one single son (4 farms) and 2 single sons (1 farm) ... (b) farms on which a profit-sharing arrangement was in operation between participating children and parents:— Involving one single son (5 farms) or daughter (1 farm) ... Involving one married son ... Involving one married and one single son	5 6 3 3 —17	23.6	
Independent Family-Sharefarmers.	Farms operated by the son of an owner who did not participate in the day to day management and operation of the farm:— (a) farms on which any labour engaged other than the family sharefarmer (and wife) was hired, non- (share-farmer) family labour (b) farms on which a son of the family sharefarmer was jointly engaged with the latter in full-time operation of the farm	4 1 —5	6.9	
Family Cash-Tenants ...	Farms on which the operator paid a definite cash rent to his parent(s) or the estate of his parent(s) for the right to operate the farm. (On such sample farms no children participated in the full-time operation of farm)	4	5.6	70.8

TABLE XIV. (continued.)

Tenure Group of Operator.	Characteristics of Tenure Groups.	Number of Farms.	Per cent. of Farms.	Per cent. of Farms.
Non-family Partnerships.	Farms on which the owner together with a non-relative participated jointly in full-time management and operation under a profit sharing arrangement	1	1.4	1.4
Independent Non-family Sharefarmers.	Farms on which the owner did not participate in the day-to-day management or in the operation of the farm but shared the profits with a non-relative operator: (a) farms on which any labour engaged other than the sharefarmer (and wife) was hired, non- (share-farmer) family labour (b) farms on which one son (4) or two sons (1) of the sharefarmers jointly engaged with the latter in the full-time operation of the farm (sons in each case unmarried)	8 5 —13	18.1	
Non-family Cash Tenants.	Farms on which the operator paid a definite cash-rent to a non-relative owner for the right to use the farm: (a) farms on which any labour engaged other than the tenant (and wife) was hired non- (tenant) family labour ... (b) farms on which a son (unmarried) of the tenant was engaged with the latter in the full-time operation of the farm	4 1 —5	6.9	
Sharefarmers with Cash-tenant Intermediaries.	Farms on which the operator had a profit-sharing arrangement with a second person who in turn had a renting arrangement with the owner. (In the sample cases the tenant was no relation to the owner; did not participate in the operation of the farm; was a relative—father-in-law and foster-father—of the operator) ..	2	2.8	27.8
	Total	72	100.0	100.0

It might be noted that the term, *profit-sharing arrangement*, used in Table XIV, refers to an arrangement whereby the owner and the operator both share in the expenses and receipts of the farm business according to an agreed formula.

5. THE POTENTIAL FOR DEVELOPMENT.

In concluding this article, farmers' attitudes towards the potential expansion of farm output will be discussed. Consideration will be given to the direction in which the individual farmers themselves believe the potential for farm development lies, the extent to which the farmers are carrying out developmental programmes, and the obstacles they face.

Attitudes to Development.

Farmers were asked just what developmental projects it would be necessary to implement on their farms in order to increase farm output. In each case an attempt was made to determine which project the farmer considered most essential.

The results (based on 71 farms) showed that farmers regarded greater sub-division and more pasture improvement as the two most important means of increasing production. However, it is significant that most commonly (21 cases) it was sub-division and not pasture improvement (12 cases) which was given first priority. It is also interesting to note that an improved water supply and its reticulation for stock drinking purposes, was usually linked with sub-division proposals. Among 32 farmers who claimed that sub-division warranted first or second priority in any future farm development work, 23 linked this with improved water reticulation. In many instances available natural water supplies had obviously prejudiced adequate sub-division in the past. A further 11 farmers considered that while sub-division on their farms was adequate, improved stock and dairy water supplies warranted first or second priority in their development plans.

Next in importance to sub-division and improved pastures was certain building activity. Nine farmers ranked building needs in first priority and another nine gave them second priority. The building mentioned involved pig sties, cow bails and yards and houses, in approximately equal proportion.

A few farmers mentioned other types of work as deserving first or second priority. These were, the clearing of land and the eradication of weeds (5 farmers); herd improvement (5 farmers); facilities for the conservation of fodder (3 farmers) and facilities for the irrigation of small areas of pastures or fodder crops (3 farmers). Seven farmers considered their properties were already fully developed or else had no definite opinion.

It is noted particularly that only three farmers claimed that insufficient land was the primary obstacle to increased production. Each of these had farms of less than 80 acres. However, a further ten farmers did not consider their farms to be adequate either as a living area or in terms of operational efficiency; with only one exception the area of their farms was less than 100 acres. In most cases the additional areas regarded as desirable ranged from 20 to 50 acres, this generally being sufficient to bring the total area of the farm up to about 120 to 130 acres.

Immediate Plans for Development.

It is significant that only about one-third of the farmers indicated that they intended to carry out in the immediate future any part of the developmental programme which they themselves considered necessary to increase output.

It is evident that sub-division, linked with improved stock water supplies, will be the most common improvement carried out in the area under existing economic conditions; it may also be the most rewarding in terms of increased production. Building improvement activity, except in the case of pig sties, will be directed largely towards improving existing facilities rather than towards an increase in the scale of operations. Until satisfactory pasture species to suit the area are developed by research workers, accelerated pasture improvement programmes must be severely limited. Ultimately, the effective application of any improved pasture techniques which may be developed will be largely dependent upon adequate sub-division. Ways and means of encouraging and assisting farmers to go ahead with sub-division and associated water supply improvements warrant further investigation.

In addition to the need for more adequate sub-division, there is also a considerable back-log of work needed on the replacement or substantial repair of existing fences. That this is the case is indicated by the fact that of the sample farmers' fencing plans in the immediate future, over half involved replacement work as opposed to new fencing. However, these planned replacements involved only a very small proportion of the fencing which farmers considered was in need of replacement or substantial repairs.

Problems of Development.

An attempt was also made to obtain some information about factors affecting both farmers' attitudes to the developmental programme which they considered to be most adequate for their farms, and their ability to carry the programme into effect. Lack of finance was stated by a number of farmers (40 per cent. of the sample) to be a major factor limiting the implementation of their proposed programme. This suggests the need for a detailed examination of existing price and credit policies, with particular reference to the availability of investment capital in the area.

Apart from lack of finance, farmers gave a number of reasons for not going ahead more rapidly, or at all, with their developmental proposals. In some instances more than one of the inhibiting factors applied on the one farm. These barriers to increased production, which are set out below, have been classified into six groups.

(a) Cases where the farmer or effective manager was past retiring age (over 65), and had no reason or desire to develop the farm any further as a business enterprise (13 per cent. of sample). With these may reasonably be associated a further group of farmers who were suffering from ill health, which prejudiced any implementation of their proposed programme (10 per cent. of sample);

(b) Cases where the farmer, or effective manager, expressed the general point of view that, while age or ill health was no problem, his farm was being operated at an optimum level of production in present circumstances. That is, the farm was producing an adequate income, and further developmental work did not warrant the effort and re-organization which would be involved (21 per cent.);

(c) Cases in which the farm tenure situation or tenure complications inhibited developmental work (involving family tenure relationships—10 per cent. of sample; involving non-family tenure relationships—20 per cent. of sample).

(d) Cases in which the farmer claimed that insufficient or inadequate labour presented a real obstacle to developmental work (10 per cent.);

(e) Cases in which the farmer stated that he was waiting for a satisfactory pasture improvement technique to be developed (9 per cent. of sample);

(f) Cases where other reasons were given, including off-farm debts, dislike of farming as an occupation, high taxation, incomplete or disrupted home life (11 per cent. of sample).

It is clear that institutional factors, the structure and outlook of the farm family, and other personal considerations play an important part, in the short term at least, in determining the farmer's response to any price or other economic incentives designed to encourage an expansion of farm production. For this reason more detailed studies of the effects of these various institutional and personal factors affecting the farmer's production plans would be warranted.

On the basis of observations made by the field investigator during the survey, the farms were also classified in four groups according to the broad trend of development on the farm. The four categories, and the proportion of farms in each, were as follow:

(a) Farms on which overall production appeared likely to follow a downward trend in future seasons, in spite of the maintenance or improvement of existing market opportunity (8 per cent. of sample);

(b) Farms on which overall production levels appeared to be inherently static and which were unlikely to move up or down in response to a maintenance or improvement of existing market opportunity without major organizational changes (44 per cent. of sample);

(c) Farms on which certain factors appeared to be only temporarily inhibiting further farm productive development (4 per cent. of sample);

(d) Farms which appeared to be involved in an expansion of overall production (44 per cent. of sample).

KEY:

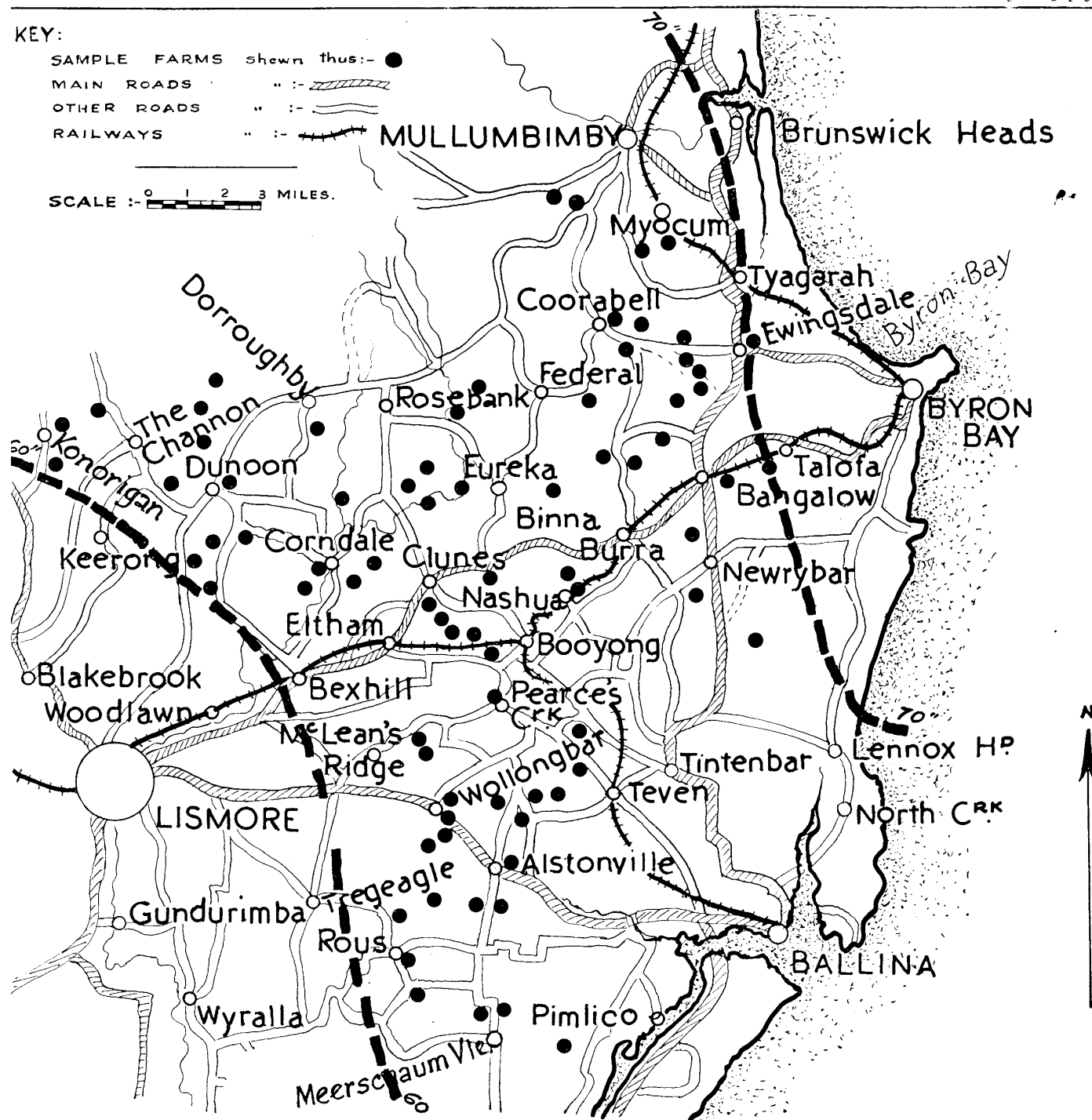
SAMPLE FARMS shown thus:—●

MAIN ROADS " :—/ / / /

OTHER ROADS " :—/ / / /

RAILWAYS " :—+ + + +

SCALE :—0 1 2 3 MILES.



DISTRIBUTION OF SAMPLE FARMS.

E.H.B.