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THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

(ECONOMICS DEPARTMENT)

# GRAZING ON TWELVE DAIRY FARMS

OUTPUT AND EXPENDITURE, 1952

C. W. ROBERTS

REPORT No. 12

December, 1953

6 BLYTHSWOOD SQUARE,

GLASGOW, C.2

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE

(ECONOMICS DEPARTMENT)

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STATEMENT D

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## GRAZING ON TWELVE DAIRY FARMS

### OUTPUT AND EXPENDITURE, 1952

A study of the grazing on twelve dairy farms was carried out in 1952 by the Economics Department of the West of Scotland Agricultural College in collaboration with their County Adviser colleagues in Ayrshire, Kirkcudbrightshire, Lanarkshire, and Wigtownshire. Foot-and-mouth disease hindered the enquiry, which had been requested by the Scottish Agricultural Improvement Council.

Probably the most surprising thing about these farms was that although they were selected for study because the County Advisers thought their grassland management of a fairly high order, the productivity of their cow pastures in the season of 1952 was on average barely 5% above the national annual average for all grass in the United Kingdom. However, high production was obtained from many fields, and the methods employed on these fields (as well as those used on the fields that did not do so well) are worthy of study.

The farms that got most out of the fields which they grazed with cows were the following. They are arranged according to the estimated feeding value per acre yielded by the fields mainly used by cows.

FARM A A Wigtownshire farm with a long grazing season and winter-dry cows, applying no nitrogen directly to the grass but encouraging clovers to provide nitrogen, never eating fields bare, and generally giving the cows access to about two-fifths of an acre a cow at a time. All the grass on the farm was grazed. On the cow pastures the cows gave 619 gallons an acre and charges for manures were 27/- an acre. Although the level of production from grass on this farm is high, it is possible that production towards the end of the season could be improved by modified manuring and management. If so, this would enable some concentrated feed to be dispensed with towards the end of the season.

FARM B Another Wigtownshire farm with a seven-months season, using the equivalent of  $1\frac{1}{2}$  cwts. Nitro-Chalk an acre on its grass, and much more of non-nitrogenous manures than Farm A, strip grazing, and mowing for silage or hay as opportunity arose. Manure charges were nearly £5 an acre. At 289 gallons, milk produced an acre was not high; but in addition, more than 300 gallons of milk could have been produced from the food value in hay and silage taken from the cow fields.

FARM C An Ayrshire farm with a shorter season, using the equivalent of 8 cwts Nitro-Chalk backed up by adequate non-nitrogenous manures, and strip grazing, grass drying, ensiling, or making into hay as seemed best. On the fields grazed by cows manure charges were about £9.10s. an acre; the cows gave 246 gallons an acre; and more than 600 gallons of milk per acre could have been produced from the food value in hay, silage and dried grass taken from these fields.

FARM D Another Ayrshire farm, the Auchincruive Farm of the College itself, using adequate and well balanced manures and managing grass and cows so that the cows went into the byres well prepared for high winter production. Though the season was only 6 months long, (about the average for these twelve farms), the cows gave 538 gallons an acre when on the cow pastures. The fields were grazed in rotation and their relatively small size facilitated control of roughness etc. Manure charges on all the fields studied averaged just over £3.

FARM E A Lanarkshire farm on heavy clay in the industrial belt, and using rather more manures, at a cost of £5 an acre, with fields split up to give good control and permit rotational grazing. Milk production from the cows on the cow pastures was 383 gallons an acre.

FARM F Another Wigtownshire farm, using less manure than any of the foregoing, but using an electric fence to ration the heaviest grass, partly to avoid bloat, and partly to avoid waste. Manures cost about 24/- an acre on all fields covered, (only 13/- on the cow pastures), and milk from the cows on the cow pastures averaged 348 gallons an acre.

The six farms which produced less an acre were the following.

FARM G A high Ayrshire farm bordering on a moss. 232 gallons an acre were yielded by the cows on unmown fields. These were grazed extensively and cost 30/- an acre in manures.

FARM H A good Ayrshire farm, building up its dairy herd. On the cow pastures, grazed extensively and costing 23 shillings an acre for manures, the cows produced 286 gallons an acre.

FARM J A Kirkcudbrightshire farm with patchy, rather poor, soil which introduced additional problems in the use of the electric fence. Manures cost nearly £5 an acre on the strip-grazed cow pastures, on which the cows gave 283 gallons an acre.

FARM K A high Lanarkshire farm with some peaty soil, using the equivalent of 2 cwts. Nitro-Chalk an acre on the cow pastures, with adequate other manures. On one field, split into small paddocks and grazed almost exclusively by cows, manures cost 92/- an acre and the cows gave 324 gallons an acre.

FARM L A fairly big Lanarkshire farm with most of the grass on a black peat subject to water-logging in parts. Manuring was relatively light, costing £1 an acre on the cow pastures and, so far as manures applied directly to the grass on these fields were concerned, consisting only of Nitro-Chalk on the one field which was split into relatively small paddocks. Although the cows on this split field yielded over 600 gallons an acre, their average yield on the cow pastures was under 330 gallons an acre.

FARM M Another Lanarkshire farm, of only 86 acres, standing over 800' above sea level and bordering on a moss. Here the main objective is high production of winter milk from the 27 cows. On those cow fields which did not include any rough grazing, manures cost about 50/- an acre, the day pastures were split into small paddocks for rotational grazing, and the cows yielded 295 gallons an acre. Having regard to the soil and climatic conditions and the importance of winter milk production, production was good and cost per cwt of feeding value provided by the grass on the cow pastures was only slightly above the average for all the cow pastures studied.

Note: All the foregoing figures for manures are at standard 1953 prices.

Judging by the cost per cwt of feeding value (starch equivalent) derived by the cattle from the cow pastures, these farms fall into the following order, Farm B being omitted because all its fields were mown at some time:

L (where costs per cwt of S.E. were 4/-), A, F, G (where costs per cwt of S.E. were about the average of 6/5), H, D, M, E, K, J, C (where costs per cwt of S.E. were 14/4).

The list demonstrates fairly well that the cheapest producer is not necessarily the most successful where land is limited.

The findings of this study do not show that manuring always paid handsomely. For example, the third highest yield came from a field that had received the second lowest outlay on manures, and the 8th lowest yield occurred on a field receiving the second highest outlay on manures. Nevertheless there is clear evidence that good management of grassland, including manuring and controlled grazing and the utilization of grass surplus to the needs of the grazing stock, yielded good returns to these very varied farms.

That grazing is a very cheap source of food is well known and its cost is shown by this enquiry to be roughly a quarter of the cost of other home-grown foods in general. Even when the grazed grass cost more than twice as much as the average, as on Farm C above, the milk production was likely to be more profitable than if the grass had been less intensively treated and more foods had had to be bought.

On three of the six farms listed above, strip grazing with the aid of the electric fence was an essential feature of the management. On five others additional fencing (electric or other) was the means of improving the production from grass. Despite the fact that, for reasons fully described in Report 12 of the Economics Department of the College, two of the seven decided not to use their fences for rationing ordinary grazing in 1953, the general conclusion is that electric fencing solved many problems.

The full report on this enquiry contains 8 pages of text, 4 of definitions, 10 of general tables, 2 of diagrams, 14 pages of general description of the grass on the individual farms and 13 of tables about the individual grass fields. It gives many details of stocking, production, manuring, and total costs, and shows how much of the milk was produced from the grass as distinct from hand feed; and though the report does not make easy reading it contains information of value to those who wish to make the most of grassland, whether on their own farms or in the country as a whole.

#### SUMMARY OF THE REPORT

The following paragraphs summarize the main figures. In this summary, in which no attempt is made to define the terms used, figures are not given for individual fields, each farm's fields of a particular kind being treated as one. (Note: Manure costs in this Summary are not at 1953 prices.)

Of the twelve farms studied, 4 were in Ayrshire, 4 in Lanarkshire, 1 in Kirkcudbrightshire and 3 in Wigtownshire.

#### Fields used chiefly by cows and not mown

On average the grazing season lasted from about 28th April to 25th October, with a total of 184 days on average. It varied between the farms from 168 to 238 days.

On 47 fields which were chiefly used for cow grazing the average number of acres needed to carry a cow for a season of 184 days was 1.26 (approx.  $1\frac{1}{4}$ ). More correctly the number of cow-days per acre during the season averaged 146 (for a season of 184 days). From farm to farm the average varied from 110 (for a season of 168 days) to 204 (for a season of 238 days).

During the season the total milk yielded by cows at pasture on these cow fields averaged 376 gals. per acre, varying from 181 to 644.

Counting in young stock and sheep and equating these to dry cows, the number of stock (in terms of dry cow days) per acre was 164 and varied from 122 to 223.

When deductions are made for the cattle which could have been maintained on the hay and other bulk foods fed to the grazing stock during the grazing season, the number of stock carried (in terms of dry cow days) was 150 per acre on average; it varied from 120 to 179.

Making similar deductions for the milk which could have been produced from the concentrated foods fed to the stock during the season, the number of gallons produced from the grass itself, was, on average, 302 per acre; it varied from 122 to 515.

It is estimated that the feeding value derived by the stock from the grass itself was equivalent on average to 17.8 cwts starch equivalent, varying from 11.5 cwts to 24.7 cwts.

The 1952 share of the cost of manures on these fields, whether applied in 1952 or in previous years, averaged 44/- per acre and varied from 20/- to 108/-; and total costs of producing the grass, erecting electric fences and so on (but not the costs of the electric fence equipment) averaged £5.13s. per acre, and varied from £4.19s. to £12.16s.

#### Fields mown and grazed

Similar figures for 26 fields mown and grazed were also arrived at for 9 of the farms.

On these fields the cows were carried for only part of the season. During this part of the season the average number of stock carried was equivalent to 94 cow days per acre for that part season; it varied from farm to farm from 19 days to 163 days.

While grazing these fields the cows gave 130 gallons of milk per acre on average, varying from 44 gals. to 289 gals.

If deductions are made for concentrated and bulky foods fed and when the feeding value of the hay, silage or dried grass produced is added in, the total feeding value derived from the grazing and from the harvested grass is estimated to have been equivalent on average to 23.9 cwts. S.E., varying from 16.0 cwts. to 33.5 cwts.

Net costs of manures on these fields averaged £5.2s. per acre and varied from £1.19s. to £10.13s. Total costs (excluding depreciation of electric fences and excluding costs of harvesting and making hay, silage or dried grass) averaged £9.11s. per acre, and varied from £4.13s. to £18.15s.

#### Fields grazed chiefly by young stock etc. and not mown

On 12 fields grazed principally by other stock than cows and not mown - usually fields of lower quality than those used for cows - costs and output were in general lower. On average, the estimated feeding value derived by the stock is put at 11.4 cwts S.E; manures cost £1. 7s. per acre and total costs were £5.

#### All these fields

Excluding the cost of harvesting the grass that was mown, and excluding the quite small depreciation of electric fences, the cost of producing the grass on the whole of the fields covered (other than rough grazing) can be put at 7/4 a cwt. S.E. This is roughly a quarter of the average cost of other homegrown cow foods of similar protein content, which is estimated to be about 31/- a cwt. S.E. at 1953 prices. Even when costs of harvesting and conserving are allowed for, grass is a relatively inexpensive food.

All the seven farmers who used electric fences were satisfied that the fences had enabled them to use the grass concerned more efficiently than they could have done without the fences. There were, however, no trials of ordinary grazing and restricted grazing on identically treated land. It has been impossible, therefore, to make direct comparisons of costs and returns from the use of the fences. For similar reasons it has not been possible to compare the efficiency of rotational grazing with that of ordinary grazing. Two of these seven farmers decided in 1953 that the advantages of the fence (except on foggage) were not sufficient to outweigh its disadvantages; but the other five were still satisfied with its use.

It is suggested that a study of individual farms over several years might well lead to valuable comparisons of alternative methods.

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Grazing on twelve dairy farms:  
output & expenditure, 1952.

In response to a request made by the Scottish Agricultural Improvement Council in December 1951 that the College might collect information about the economics of the intensive management of grassland on farms where it was already practised, it was arranged that a study of the methods and results of intensive grazing on a few farms should be made in 1952. Under this arrangement the staff of the Economics Department of the College, already in touch with dairy farms during costing studies, were to do most of the field work, while the County Advisory staff were to collaborate on the more technical aspects of the enquiry.

The farmers who provided the very detailed information and gave facilities for inspection of their fields prefer to be anonymous: the County Advisers whose work is represented in this report are Dr. Robert Laird, (Ayrshire), Mr. Ian Mitchell, (Kirkcudbrightshire), Mr. James Walker-Love (Lanarkshire) and Mr. John Wilson, (Wigtownshire). The fieldwork and preliminary tabulation of results were done by Miss M.K. Bowie, Mr. I.J.H. MacLennan, Miss G. Picken and Mr. R.M. Sturgeon. To all these, to other colleagues with whom points have been discussed, and especially to the farmers concerned, sincere thanks are tendered.

The scope of the enquiry

The general plan of the enquiry was to study the methods of grassland management, the expenditure on manures etc, and the output obtained in 1952.

In order to use the limited resources of staff to best advantage it was agreed that the study should not cover the problems of the production of grass for preservation or of preservation itself. Since, however, the modern tendency is to harvest a mown crop from a pasture if growth is likely to be beyond the capacity of the livestock which can be brought to the field, it was necessary to include in the survey fields which were mown in such circumstances. In general, nevertheless, the enquiry was to be concerned with pasturage. On some of the farms stocking arrangements were so intricate that it was necessary to limit the recording to the fields grazed by cows.

There are difficulties in arriving at sound estimates of the value obtained from grazing, even when comparisons are to be made amongst pastures all used for the same sort of grazing stock; but when the stock varies from deep-milking cows on the one hand to dry, in-calf cows, young stock, and sheep on the other hand; when the amount of supplementary food fed varies from a full ration to nothing; and when the land and climate vary from rich soils of Ayrshire and the favourable climate of Wigtownshire to upland pastures of high Lanarkshire; then any attempt to find a measure of production and of the relation of production to expenditure is bound to be very difficult. The actual recording is itself necessarily fairly detailed, if expenditure and return are to be examined on individual fields as distinct from whole farming units.

The method of recording and evaluating the grazing

On whatever fields were studied the type of seeds mixture used was to be ascertained, as also were the age and length of the lea, the rotation and method of seeding, the manuring and cultivation practices, the system of stocking and controlling grazing, and the methods of removing surplus grass. Notes were to be made of any apparent effect of the system of management upon the herbage, and estimates were to be made of the total production of grass, of the feeding value obtained from the pasture, and of the cost of production of the grass. These were to be based upon records of the numbers of stock carried from day to day, of bulky and concentrated foods fed to the grazing stock and on estimates of the weights of grass crops harvested.

The number of each class of livestock grazing day by day and night by night on each field was noted and the number of gallons of milk yielded and the weight of each kind of food used was recorded. Later the grazing, milk and food were apportioned between the fields used in any 24 hours; this apportionment was made on the assumption that a night's grazing was as valuable

as a day's grazing, and that ordinarily the individual outputs of fields grazed together were of equal quality and quantity per acre. When cows were housed at night and grazing during the day the fields were credited with the full day-and-night's grazing and milk. The numbers of cows and of other stock carried were converted on the scale set out on p.12 to stock units, the stock unit representing the daily requirements of a dry Ayrshire cow. These figures appear in the later tables as Stock Units.

Because all farms used some feed at some time during the main grazing season the next step was to subtract from the stock units carried the stock units that could have been supported by the bulk foods used for the stock. Similarly the milk production (in gallons), was reduced by the gallons of milk which could have been produced from the concentrated foods fed. These two steps resulted in the Net Stock Units carried and the Net Gallons produced which the grass itself provided for.

These two quantities of Net Stock Units and Net Gallons were then combined into their estimated equivalents in terms of the starch equivalent necessary to maintain or produce them. The assumption is that this starch equivalent represents the feeding value which the cattle themselves derived from the grass. (In some studies of grazing this has been called the Intake of Starch Equivalent from Grazing).

The use of the well established concept of the starch equivalent has seemed to be the most convenient and generally acceptable method of appraising production. This is not, however, to say that its use is entirely satisfactory. For it certainly does not take account of protein production (except in so far as protein itself is equivalent to starch in energy production), and all average relationships cover wide variations. Any attempt to include an assessment of protein production would have made the enquiry too complex.

Where grass crops were harvested the estimated yields of these crops were converted to their estimated starch equivalent content. This starch equivalent harvested was added to the starch equivalent represented by the net stock units and the net gallons produced, to give the starch equivalent produced by the pasture during the grazing season.

#### The recording

Plans were made for the members of the Economics Department to visit the farms frequently to assist the farmers and, if necessary, to make up the records. However, in early May, when the risk of spreading foot-and-mouth disease had made visits undesirable, this arrangement was cancelled. Although most of the individual farmers and their assistants carefully maintained the records of the grazing, there were some gaps in the records which had to be repaired rather late in the season.

#### This report

This report has been written with a view to meeting the wishes of the County Agricultural Advisers for as full information as possible, to supplying basic information and comments to the Agricultural Improvement Council, to giving back to the co-operating farmers themselves some of the valuable information they provided, and to providing a background for further work.

#### The farms

In all, the grazing on 12 farms was studied. Four were in Ayrshire, four in Lanarkshire, one in Kirkcudbrightshire and three in Wigtownshire.

The quality of land as measured by rental value of the farms varied from about 13/- per acre to about 40/-. Of the fields used primarily for milking cows the estimated rent varied from 13/4 an acre to 40/- and averaged 26/- an acre.

All twelve farms were dairy farms, with herds ranging in size from 26 cows to 113 and averaging about 50 cows. The proportion of ground under arable crops varied from 8% to 44%, the middle proportion being about 25%. The proportion of winter milk varied from 27% to an exceptional 63% and averaged about 45%. Only one of the farmers had intentionally based his

farming on high summer milk production with low winter production. Average daily milk yields while at grass covered by these records, averaged 2.1 gals. and ranged from 1.77 to 3.14 gals. a head. The fact that on three farms some dry cows were either grazed on other fields than those for which records were kept or grazed elsewhere, would not greatly affect the average daily yield per cow. Annual yields per cow in herd averaged 850 gals. and varied from 650 gals to 950 gals.

#### The grassland

Table 1 in Appendix II of this report, shows that these 12 farms had a much higher proportion of their grass in temporary leas than the average for their four counties and mowed a greater proportion than the average. Ordinarily, that would indicate a higher intensity of operation.

As already mentioned, some of the grassland on some of these farms was omitted from the survey. Of the fields that were covered by the enquiry, 30% were in their seventh or later year, and 30% had been sown within two years of 1952. Over half the fields had been sown in 1948 or later. The wholly grazed fields were on average somewhat older. (Table 2).

The soil types varied from deep rich loams and heavy clay to thin soils on rock and on peat. A short reference to the soil type on each farm is made in Appendix III.

#### The weather of 1952

Because temperatures were slightly higher than usual in March, April and May, the main grazing season of 1952 commenced about a week earlier than usual, and some three weeks earlier than in 1951. But whereas the 1951 season extended about a month further into the autumn than usual, in the year under review cold wet weather in October and cold snaps in November brought the season to a close somewhat earlier than usual. Abundant rain and the spring warmth gave an exceptional growth in May and June, and the yield of grass during 1952 was generally reckoned to be higher than usual. This was said not to apply to the Kirkcudbrightshire farm.

The unusual season, combined with restrictions on the movement of stock because of foot-and-mouth disease risks, made the stocking during this season somewhat untypical. Even if the weather had been normal, a single year's study could not be expected to yield the sounder information that would be obtained from several years' study of the same fields.

#### The kinds of manures used 1952

Table 3 indicates the manures (other than lime) applied to the grassland of eleven of the farms. (The twelfth farm applied no manure but Nitro-Chalk). The table shows how important were Nitro-Chalk, ground mineral phosphate, potassic superphosphate, and potassic mineral phosphate, and how more usual it was to use potato fertilisers than specific grass fertilisers. At 1953 prices these compound fertilisers cost about 45% more than "straight" fertilisers of the same gross content would have done, a difference largely due to greater solubility of phosphates and partly due to the handier form of the manures.

The average dressings on the grassland of these eleven farms were roughly equivalent to the following:

|                          |         |     |       |
|--------------------------|---------|-----|-------|
| Nitro-Chalk              | 1.7 cwt | per | acre. |
| Ground mineral phosphate | 1.7     | "   | "     |
| Muriate of potash        | 0.5     | "   | "     |

#### The expenditure on manures

Table 4 shows that over a quarter of the fields studied received no manure in 1952. On half the fields the expenditure on manures applied in 1952 was no more than £2 an acre. Over £8 an acre was spent on applications to 10% of the fields.

Because much manuring of a season's grass is done indirectly by

applications in earlier years, expenditure on manures may best be measured in terms of the cost of the manurial ingredients which are considered to have been, in the year, either used up or rendered of little value to later years. The proportions of manures which are considered to have been used up or rendered of little value are set out at page 13 in Appendix I. The same proportions were written off whatever the weight of crop removed and no allowance was made for manurial value received from the feed fed. It is recognized that some allowance might properly have been made for the fact that heavy crops of grass would probably remove more of the manurial residues and applications than lighter crops would do. Table 5 shows the variations in these manure costs per acre, based on the actual past costs on the several farms, and Table 6 shows the similar distribution of manure costs had all the manures used up been bought at the unit prices set out on p.14. As the note on p.14 says, a large part of the differences between Table 5 and Table 6 is due to the omission from Table 6 of nitrogen applied in dung in 1951 and earlier years, while a share of the cost of this is included in the costs of Table 5.

The cost of manures used up at 1953 prices on four fields exceeded £10 an acre. On practically two-thirds of the cow pastures this cost was less than the average cost of typical dressings considered to be in keeping with normally good practice in this province.

The variations in the quantities of the four main fertilizing ingredients which were used up in the year are shown in Table 7. Factors for converting these quantities into terms of actual applications are given on p. 13. It is not possible to consider the balance of the fertilising programme in detail from these tables. This is possible, however, from the details for each field in Appendix III about the individual farms, and in Table 14 which summarises the main facts for each farm. On average the cost of manures applied in 1952, and the net cost chargeable to 1952 for all manuring of the fields (a) using actual past costs and (b) using 1953 standardized prices were as follows:

|                         | Shillings per acre          |  |                       |
|-------------------------|-----------------------------|--|-----------------------|
|                         | Actual applications of 1952 | Share of all past and current manuring |                       |
|                         |                             | (a)<br>At Cost                         | (b)<br>At 1953 prices |
| Fields not mown:        |                             |  |                       |
| mainly grazed by cows   | 39                          | 44                                     | 41                    |
| not " " " "             | 27                          | 38                                     | 33                    |
| all such fields         | 36                          | 43                                     | 39                    |
| Fields mown:            | 109                         | 102                                    | 94                    |
| Fields sown out in 1952 | 76                          | 123                                    | 96                    |

Only four of the farmers applied nitrogen during the summer of 1952.

#### Total net costs of growing the grass

The total of costs chargeable for growing the grass averaged £5.13s. per acre on all fields chiefly grazed by cows, £4.18s. on all fields chiefly grazed by other stock, and £9.11s. on all fields mown. The constituents of these average figures are set out in Table 8. The comparable figure obtained for 8,300 acres of grazing mainly used by cows covered by the Milk Cost Investigation of this department in 1952 was £6. 2s. The chief cause of the difference between this £6. 2s. and the £5.13s. above was the higher charge in the milk cost sample for a share of sow-out costs.

Table 14 indicates how low was the average expenditure on Farm L3. This farm was included in the study because it was trying out the paddock method on one of its fields - a field that did very well.

#### Seeding and seeds mixtures

While it is recognised that the management of a pasture in past years may have had a profound influence upon the botanical composition of the sward, the information collected about seeds mixtures has been summarised in the III Appendix about individual farms and fields. As is to be expected perennial

ryegrass was present in nearly all the seeds mixtures noted. Meadow fescue seemed to be gaining a place. Special strains of seeds were mentioned fairly often and occasionally the mixtures had been recommended by the County Adviser.

Some of the farmers, particularly those with little ploughed land, were reluctant to break pastures. Their reasons were: soil conditions did not favour the re-establishment of swards, a tillage crop or two would usually be less valuable than the grass which would be foregone, and the work of cultivation and crop harvesting would be difficult to fit in.

#### Stocking the pastures

The numbers of stock on these fields other than dairy cows and their followers were very small; for these were dairy farms seeking to make the most profitable use of their own home grass. With this end in view, six of the farms summered young stock on other farms. On another four of the farms some young stock were grazed on fields not covered by the records. Indeed, only two farms kept all their grazing stock on the fields covered by the study. One of these two considered that controlled grazing enabled him to avoid summering expenses elsewhere while still keeping the number of cows in his herd at the optimum level.

Controlled grazing, if practised at all, was operated in early weeks until the main flush of grass had passed and was reinstated when the foggage was ready. On the farms with autumn calving herds where summer manuring was practised, at least one field was left without top dressing so that cows could have a relatively bare pasture for drying off.

Four farms practised topping of pastures, usually in June.

#### The stock carried

In terms of stock units (i.e. the no. of days for which the equivalent of a cow was maintained) the stock carried per acre during the season on fields not mown varied from under 50 to over 400. The average was about 160. The highest number was on a very small field that was heavily manured and strip grazed before being ploughed up for reseeding in autumn, 1952 and the lowest on a poor rocky field used principally for young and dry stock. Table 10 shows that 250 stock units per acre was exceeded on about one twelfth of the cow fields. About half of these cow fields carried the equivalent of a cow for between 100 and 170 days per acre. These figures are influenced by the length of the grazing season. Making allowance for the length of the season on each farm it may be said that about one third of these fields carried the equivalent of a cow or more for the season.

It should not be inferred from Table 14 that, because the number of cow days per acre on these fields was 146 during a season of 187 days (omitting Farm W1 for this purpose), 128 acres of these fields would carry 100 cows with their followers for the season. This is not true; for the stock usually on these fields were sometimes on other grass especially foggage. If foggage had not been available, the management and stocking of these fields would clearly have been different, except on Farm W2.

#### Milk produced

On about a quarter of the cow fields cows produced over 500 gallons per acre, and on about a quarter the production was under 240 gallons. The average was about 376 gallons (Table 11) and the highest over 800. The net gallons produced averaged 302 gallons. On one field it reached nearly 600 gallons.

#### Starch equivalent produced

After making allowance for the estimated feeding value of hay, silage or dried grass harvested from the pasture, and after making deductions for foods fed to the cattle during the grazing season, and making the assumptions set out on p.12 about the food required by the stock to live, eat and move and produce the milk yielded, the average combined output of starch equivalent from the grass has been estimated at just under 18 cwts from fields chiefly

used by cows, about  $11\frac{1}{2}$  cwts from fields chiefly used by young stock, and 24 cwts from fields mown. (Table 14). The estimated yield varied widely, about a quarter of all the fields producing less S.E. than a cow in full milk would need in 100 days, 2 fields producing more than such a cow would need in 300 days, and about 60% of the fields producing more than the estimated average output from U.K. grassland which has been stated to be 17 cwts. (Table 12).

It is recognised that some allowance should properly have been made for average liveweight increases or decreases in the cows and for the rather lower than average requirements for maintenance by the small Ayrshire cows on Farms W2 and W3, or for the lower than average requirements to cover the effort of grazing, when cows are on lush pasture, or for the higher pre-sustainable requirements of cows walking long distances on hard roads. These all could properly have been allowed for, but were not. So ought the fact that most fields are not exactly the whole acres which have been recorded. Nevertheless it is suggested that the averaged figures are reasonable estimates. They necessarily reflect the effects of varied efficiency in cows and management.

The number of Standard Cows per acre quoted in the particulars about each farm is a convenient way of expressing the net production of starch equivalent from the grass of these farms. This is a conventional, rather than practical, concept; for the actual food demands of a herd which gave 2.4 gallons a day on average would vary from day to day according to the calving pattern etc. and would be unlikely to be met each day of the grazing season by the grass itself. None of these farms left all their cows to satisfy all their needs for food from the grass.

#### Seasonal variation in production

It is not convenient to estimate the production month by month from fields that were mown, for dates of mowing were not always recorded. Table 13, however, shows the figures for production in four-weekly periods from the cow fields. It is to be noted that in the first period and the last two periods some farms had no stock on these pastures. This was due, sometimes, to the cows being on foggage and sometimes to the grazing season having ended. These average figures obscure the marked peak in May or June which is characteristic of most of British grassland. At the time of greatest abundance of grass, too, since the grass tends to grow faster than the stock can use it, the present method fails to indicate the true peak of growth as distinct from the peak of utilisation. In wet weather too the soiling of grass by the cows' feet may make the grass distasteful, and so reduce the amount of grass the cows will eat, and may consequently reduce the apparent production during that period of grazing. Cold wet weather may further reduce the amount eaten.

Table 13 indicates the actual number of cows carried per acre in each 28-day period. It will be seen that while the area required for a cow herself was never less than one acre, it only required  $\frac{1}{13}$ th more than an acre on average for the 8 weeks to the end of June per cow. Equating young and other stock to their equivalents in cows the area per cow equivalent is seen to be virtually just one acre for the 12 weeks from April 26th to the end of July. On average some concentrated feeds were used in all periods; the extent can be seen by comparing the column for Gallons with that for Net Gallons and the column for Stock Units with that for Net Stock Units.

Figure 2 shows for Farm W2 the weekly production of starch equivalent from the whole of the grassland on the farm. It has been possible to produce this figure for this farm because all the grass was grazed. The high, well maintained, output is remarkable. For practically 16 weeks the grass fields as a whole were able to maintain a standard cow (giving 2.4 gallons a day) to the acre. In fact, however, as the broken line on Figure 2 implies, this farm's grass could not provide for the whole food requirements of one of its deep milking cows per acre. There were actually 1.19 acres of grass of some sort to each cow throughout the season. This covered the cow's share of the needs of the bulls and the young stock. While no supplementary food was fed between May 28th and August 27th some supplementary food was obviously necessary at the beginning and towards the end of the season. Further details about this farm are in Appendix III.

### The cost of starch equivalent in grass

From the average estimated output and the average costs it is computed that the cost of growing a cwt of S.E. in this grass was about 6/6 on the fields used chiefly by cows, 8/6 on the fields used chiefly by young stock etc. and 8/- on the fields mown; an overall average of about 7/4d. In computing these costs per cwt S.E. the whole of the year's costs has been divided by the estimated S.E. produced. No credit or set off has been made for any winter grazing.

The costs of increases in the quantity of utilisable grass which might follow the application of more manures or the additional use of the electric fence, for example, may be compared with the cost of other home grown foods or of purchased foods which would otherwise be needed to maintain milk production during the grazing season, or which would be replaced, during the winter, by the extra hay, silage or dried grass which could be produced from the additional grass. The same comparison may be made for additional grass which would follow the growing of an additional field of grass. It is this later comparison which is made in the following paragraph.

If losses of S.E. in hay making are put at 30% and inclusive costs of harvesting hay at 10/- a cwt of S.E., the cost of S.E. from mown fields made into hay is about 21/6 a cwt. Similarly, if there are 25% losses of S.E. in silage making and if the inclusive cost of making silage is 17/- a cwt of S.E., the cost of S.E. from mown fields made into silage is about 28/- a cwt. And if there are 7% losses in artificial drying, and the inclusive cost of harvesting and drying is 30/- a cwt of S.E., the cost of S.E. from mown fields dried is about 39/- a cwt. Hay and silage would be appreciably cheaper sources of S.E. than home-grown cow foods of similar protein content, which are estimated to cost about 31/- a cwt of S.E. at 1953 prices. Grass drying, at £18 a ton for the drying process, brings the cost per cwt. of S.E. above that of S.E. in home-grown foods in general, but still well below the present cost of S.E. in compound dairy cakes.

It follows that even when the costs of harvesting and conserving are allowed for, grass is a relatively inexpensive food. If equipment for conserving is already owned and labour and power are free from other calls, preservation will cost much less than the rates quoted, and it will clearly often be profitable to produce and preserve grass surplus to the grazing requirements of the stock.

These foregoing comparisons relate to conserved grass. If additional grass is able to lead to the saving of other homegrown food or of purchased foods the appropriate comparison is between the cost of S.E. in grazed grass (say 7/4 a cwt) and the costs of S.E. in these other foods; and in making this comparison allowance must be made for the fact that the efficiency of S.E. in these foods would be about one-sixth higher than that of S.E. in the grazed grass, because the latter requires the effort of grazing.

### Did manuring pay?

Since one year's management of a field can have a big effect on subsequent years, the results of a given course of action can only be fully considered after several years' results are known. Moreover, since fields within farms differ in soil type, state of fertility, age of lea, and so on, comparisons of expenditure and return on the several fields cannot be expected to yield a clear estimate of the direction and extent of the effect of a particular treatment. And similarly as between fields on different farms. For these reasons no close relationship emerges, nor could be expected to emerge, between output per acre on those cow fields of the several farms and not standardized expenditure on manures. Indeed, among fields not mown these wide differences mask the obvious relationship between production and cost of manuring, though fields on which grass was harvested do show a stronger relationship of this sort. Similarly they obscure any evidence of relationship between nitrogenous, phosphatic and potassic manures respectively used up and production. This implies that soil conditions and the reserves of potash, phosphates and nitrogen in the soil, or the nitrogen fixed during the season, influenced production more, on average, than the manures applied in the current and recent years. Obviously this does not suggest that there would not have been any increase in production from these fields if more

manures had been applied, or that the production would not have been lower had they not been manured as they had been. Experimental methods would have been required to trace the effects of such treatments.

#### The return from high total expenditure

High average total expenditure (of all sorts) per acre over the cows' fields on a farm was not closely related to high average output from those fields. A close relation would be expected even less than one between manuring and output.

#### Controlled grazing

The entries in Table 14 on the line named 'Acres per cow at peak' gives a rough indication of the density of stocking at the time of the flush of grass on each field. Farm A2 took few steps to control the amount of grass to which the cows had access. Farm L3 did indeed split one 23-acre field into 8-acre paddocks which were grazed rotationally and from which a high output was obtained, but all other fields on this farm were grazed extensively. Farm W2 grazed extensively but to a definite pattern. All the rest had at least some enclosures, whether permanent or temporary, which were small enough to represent only a very few days of grazing at a time for the herd. Those which practised strip grazing as a normal procedure, Farms W1, W3, A3, and K1, did so for a variety of reasons: to secure the best use of the grass and enable some cuts to be taken for winter feed was an objective common to all these. Some thought that strip grazing had reduced the incidence of bloat. The decision of Farm K1 to graze extensively in 1953 (except for foggage) was connected with an unhappy experience of ineffective fencing and difficult terrain. The other three farmers were convinced that this control provided opportunities for increasing the output from their grassland, partly through reduction of waste, and partly through facilitating sectional manuring etc. with a view either to producing cuts for harvesting or to producing special grazing for particular groups of cows. The latter might even be for cows requiring a bare pasture. Some of the farms needed more than one controller and batteries. One has, since 1952, connected his paddock fence to the mains through a transformer.

On fields strip grazed, from about a half to one hour's labour was spent per acre during the season on moving the fence daily.

If an electric fence costs £36 to buy and maintain for 6 years and the grass it saves is made into hay worth £8 a ton, the fence will have paid for itself if it has saved 5% of the grass on 12 acres each year. The saving is usually considered to be more than 5%. However, a saving of 5% will normally be well worth while; and if the area over which a unit is used is greater than 12 acres the saving is so much the greater. Similarly it will be worth while to buy and use a fence if it saves enough grass to enable the farm to keep at home each year a stirk which would otherwise have to be summered elsewhere at hired grazing. If the fence prevents even one bloat casualty it will have saved its whole cost; and if it removes the fear of bloat or the constant need to watch for bloat it is worth while. It might, however, be that the workers would be unable to fit in the work of moving the fence. If so, paddocks for rotational grazing, as at Farms L1, L4 and L2 may well be made with the fence. (One of these, Farm L4, had decided to return to extensive methods because his fence did not deter his cows and because he could not conveniently arrange to make and use silage from any grass 'saved'). The value of the electric fence is clear for enclosing foggage on unfenced fields.

#### Field to field variations

Even when full allowance is made for weaknesses in the methods adopted in this study, it is clear from the distribution tables and the fuller details of individual fields which are set out in Appendix III that results vary very widely; and that any attempt to use results from a very few individual fields to measure the success of a given method of



management is almost bound to lead to inconclusive results. Nevertheless detailed study of individual farms or circumstances over several years could well lead to valuable comparisons of alternative methods.

#### Details about the individual farms

Details about the individual farms and fields are set out in Appendix III.

#### SUMMARY

In this small-scale enquiry, hampered by the foot-and-mouth disease outbreaks, expenditure and output were studied on the grassland of 12 dairy farms in 1952. Of the farms 4 were in Ayrshire, 4 in Lanarkshire, 1 in Kirkcudbrightshire and 3 in Wigtownshire.

#### Fields used chiefly by cows and not mown

On average the grazing season lasted from about 28th April to 25th October, with a total of 184 days on average. It varied between the farms from 168 to 238 days. (In this summary the figures for variations are for averages of all fields on the particular farm).

On 47 fields which were chiefly used for cow grazing the average number of acres needed to carry a cow for a season of 184 days was 1.26 (approx.  $1\frac{1}{4}$ ). More correctly the number of cow-days per acre during the season averaged 146 (for a season of 184 days). From farm to farm the average varied from 110 (for a season of 168 days) to 204 (for a season of 238 days).

During the season the total milk yielded by cows at pasture on those cow fields averaged 376 gals. per acre, varying from 181 to 644.

Counting in young stock and sheep and equating these to dry cows, the number of stock (in terms of dry cow days) per acre was 164 and varied from 122 to 223.

When deductions are made for the cattle which could have been maintained on the hay and other bulk foods fed to the grazing stock during the grazing season, the number of stock (in terms of dry cow days) carried was 150 per acre on average; it varied from 120 to 179.

Making similar deductions for the milk which could have been produced from the concentrated foods fed to the stock during the season, the number of gallons produced from the grass itself was, on average, 302 per acre; it varied from 122 to 515.

It is estimated that the feeding value derived by the stock from the grass itself was equivalent on average to 17.8 cwts starch equivalent, varying from 11.5 cwts to 24.7 cwts.

Net costs of manures used up on these fields averaged 44/- per acre and varied from 20/- to 108/-; and total costs of producing the grass, erecting electric fences and so on (but not the costs of the electric fence equipment) averaged £5.13s. per acre, and varied from £4.19s. to £12.16s.

#### Fields mown and grazed

Similar figures for 26 fields mown and grazed were also arrived at for 9 of the farms.

On these fields the cows were carried for only part of the season. During this part of the season the average number of stock carried was equivalent to 94 cow days per acre for that part season; it varied from farm to farm from 19 days to 163 days.

While grazing these fields the cows gave 130 gallons of milk per acre on average, varying from 44 gals. to 289 gals.

If deductions are made for concentrated and bulky foods fed and when the feeding value of the hay, silage or dried grass produced is added in, the total feeding value derived from the grazing and from the harvested grass is estimated to have been equivalent on average to 23.9 cwts S.E., varying from 16.0 cwts to 33.5 cwts.

Net costs of manures used up on these fields averaged £5.2s. per acre and varied from £1.19s. to £10.13s. Total costs (excluding depreciation of electric fences and excluding costs of harvesting and making hay, silage or dried grass) averaged £9.11s. per acre, and varied from £4.13s to £18.15s.

Fields grazed chiefly by young stock etc. and not mown

On 12 fields grazed principally by other stock than cows and not mown - usually fields of lower quality than those used for cows - costs and output were in general lower. On average, the estimated feeding value derived by the stock is put at 11.4 cwts S.E; manures used up cost £1.7s per acre and total costs were £5.

All these fields

Excluding the cost of harvesting the grass that was mown and excluding the quite small depreciation of electric fences, the cost of producing the grass on the whole of the fields covered (other than rough grazing) can be put at 7/4 per cwt. S.E. This is roughly a quarter of the average cost of other homegrown cow foods of similar protein content, which is estimated to be about 31/- per cwt S.E. at 1953 prices. Even when costs of harvesting and conserving are allowed for, grass is a relatively inexpensive food.

The chart on page 27 indicates the relationship of production to total costs on these farms.

All the seven farmers who used electric fences were satisfied that the fences had enabled them to use the grass concerned more efficiently than they could have done without the fences. There were, however, no trials of ordinary grazing and restricted grazing on identically treated land. It has been impossible therefore, to make direct comparisons of costs and returns from the use of the fences. For similar reasons it has not been possible to compare the efficiency of rotational grazing with that of ordinary grazing. Two of these seven farmers decided in 1953 that the advantages of the fence (except on foggage) were not sufficient to outweigh its disadvantages; but the other five were still satisfied with its use.

It is suggested that a study of individual farms over several years might well lead to valuable comparisons of alternative methods.

Details of the definitions and methods used in this enquiry, and of the findings made are set out in the appendices.

APPENDIX I  
DEFINITIONS AND NOTES

It may be convenient here to define the terms used in this report.

- (1) Age of pastures For convenience age is expressed as the number of years between sowing and Spring 1952.
- (2) The numbers of cows carried are measured in terms of the number of cows multiplied by the number of 24-hour periods they were carried. These are called Cow Days. The day time from morning milking to afternoon milking is treated as a half for this purpose and so is the night time, from afternoon milking to morning milking.
- (3) The numbers of other stock carried multiplied by the number of days are converted to Stock Units on the following scale which makes allowance for normal growth. The stock unit is equivalent in food requirements to a cow day for a dry Ayrshire cow.

|                     |             |
|---------------------|-------------|
| 2-year-old beast    | 1.1         |
| 1 " " "             | 0.8         |
| Calf                | 0.5         |
| Bull                | 1.0         |
| Horse               | 1.0 to 1.5  |
| Sheep over 6 months | 0.2 to 0.4  |
| " under 6 "         | 0.1 to 0.15 |

- (4) In the tables about individual fields the proportion of other stock than cows is indicated by the Young Stock etc. %. This is arrived at by dividing stock units minus cow days by stock units, and multiplying by 100.
- (5) The feeding value derived from the turnips, hay, straw etc. fed during the grazing season is based on standard tables and is converted to the number of cows it could have maintained for a day on the assumption that the dry Ayrshire cow needs 6.25 lbs S.E. per day for maintenance and the production of the calf she is carrying. The result of subtracting this number from the stock units is the Net Stock Units.
- (6) Similarly the feeding value derived from the concentrated foods fed is converted to the number of gallons of milk which could have been produced from feeding these in addition to a ration sufficient for maintenance and the production of the calf the cow is carrying. These are then subtracted from the gallons produced to yield the Net Gallons produced.
- (7) Apportionment between fields When cows were grazing two or more fields during the 24 hours and it has been desired to have the results from the several fields separately, the fields have each been credited with a share, based on acreage, of the stock carried and of the milk produced, and they have been similarly debited with a share of the feeds fed. As between day fields and night fields the day grazing and the night grazing have been assumed to be of equal value and to have contributed equally to milk production, unless the recorder had a special note of the one being inferior to the other.
- (8) The feeding value obtained from the grazing is measured in terms of lbs. or cwts of Starch equivalent from grazing. (In some studies of grazing this has been called the Intake of Starch Equivalent from Grazing.) This is arrived at by multiplying net stock units by 8.25 and net gallons by 2.5. The assumptions are that the dry Ayrshire cow requires each day 6.0 lbs of S.E. to maintain her body; 0.25 lbs to enable her to produce her calf within her, and 2.0 lbs to cover the effort of grazing, making 8.25 lbs in all. (Some allowance should properly be made for the food value which has been converted into liveweight increase. The adjustment, which has not

been made, would be at the rate of 2.75 lbs S.E. for each change of 1 lb. in liveweight.)

- (9) The feeding value of the hay, silage or dried grass harvested is estimated from standard tables. The value in terms of starch equivalent is called the Starch equivalent harvested. Since yields also were estimated there may be a fairly wide margin of error here.
- (10) Starch equivalent produced is the sum of starch equivalent from grazing and starch equivalent harvested.
- (11) Starch equivalent produced can be converted to the number of days for which a cow yielding average quantities of milk could have derived all the food energy she needed (but not necessarily her protein requirements) from the grazing or hay or silage or dried grass produced. To do this the number of cwts of S.E. should be multiplied by 7.85 (nearly 8.0). This gives the number of days a cow yielding 2.4 gallons could nominally have been fed on the grazing or hay, silage or dried grass produced. 2.4 gallons per day for 26 weeks is 437 gallons and is a little higher than the average yield during the summer 26 weeks of 1951/2 on 154 farms covered by the Milk Cost Investigation of the College. Such a cow is called a Standard Cow in this report.
- (12) The figures in Appendix III for Acres per Standard Cow for individual farms refer only to the fields which were used mainly by cows and which did not give more than half their production as harvested grass.
- (13) The Net Cost of Manures used up is obtained as follows:

Cost of manures and lime applied for 1952,  
plus residues of earlier applications,  
less residues of both the above carried forward to later crops.

The following table shows the proportions of dressings which are written off in the year.

| Applications of the year mentioned below |               |               |                 |               |           |           |           |
|--|---------------|---------------|-----------------|---------------|-----------|-----------|-----------|
|  | Current Year  | Last year     | Yr. before last | 3 yrs ago     | 4 yrs ago | 5 yrs ago | 6 yrs ago |
| N  | 1             | -             | -               | -             | -         | -         | -         |
| P <sub>2</sub> O <sub>5</sub>            | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{8}$   | $\frac{1}{8}$ |           |           |           |
| K <sub>2</sub> O                         | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{4}$   | -             |           |           |           |
| CaO                                      | 1/7th         | 1/7th         | 1/7th           | 1/7th         | 1/7th     | 1/7th     | 1/7th     |
| Compounds                                | 2/3rds        | 1/6th         | 1/6th           |               |           |           |           |
| Dung                                     | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{8}$   | $\frac{1}{8}$ |           |           |           |

For a comment on the relevance of these proportions see page 5.

It follows then that:

1 cwt. of N used up corresponds to  $6\frac{1}{2}$  cwt. Nitro-Chalk this year  
or 5 " sulphate of ammonia.

1 " " P<sub>2</sub>O<sub>5</sub> " " " to 7 cwt. grd. min. phosphate this year,  
or 14 " grd. min. phosphate last year,  
or 27 " grd. min. phosphate 2 yrs ago,  
or 27 " grd. min. phosphate 3 yrs ago.

1 " " K<sub>2</sub>O " " " to 3 cwt. 60% muriate of potash this year,  
or 7 " 60% muriate of potash last year,  
or 7 " 60% muriate of potash 2 yrs ago.

1 " " CaO " " " to 14 cwt. grd. limestone this year,  
or 14 " grd. limestone in any one  
of the previous 6 years.

(14) The quantities of manures used up are determined as follows.

For each manurial ingredient calculate the no. of cwts. of it in the manures applied and in the residues from earlier applications. Reduce each of these by the proportions carried forward to subsequent crops. The net quantities are the quantities presumed to have been used up in 1952.

(15) Standardized net cost of manures is determined by multiplying each of the quantities of manurial ingredients used up by the average price of that ingredient in 1953. These prices are based on 1953 delivered prices of the quantities and kinds of manures used in 1952 on eleven of the farms as a whole, reduced by the current subsidies on nitrogenous and phosphatic manures and compounds. Dung has been included at 20/- a ton.

In terms of prices per unit these standardized prices are:

|                               | <u>Unit price</u> |
|-------------------------------|-------------------|
| N                             | 20/-              |
| P <sub>2</sub> O <sub>5</sub> | 5/8               |
| K <sub>2</sub> O              | 9/2               |
| CaO                           | 8d.               |

The standardized net cost of the manures differs substantially on some farms and fields from the net cost of (13) above. The main reasons are:

- (a) The past cost of dung is written off in the proportions of  $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}$ ; but in the second calculation each ingredient in the dung has been written off as if it were in an artificial fertiliser. In particular the expensive nitrogen is then charged wholly against the first year.
- (b) Differences in price per unit because of
  - (i) differing solubility,
  - (ii) differing handiness as between 'straight' fertilisers and complete granular fertilisers,
  - (iii) differing length of haul etc., and
  - (iv) changes in prices and subsidies, particularly in 1953.

(16) Cost of the grass

Costs of the grass are computed in the way followed for milk costing and described in this department's reports on milk costing. This involves estimating the following:

- (i) The rent chargeable against the particular field.
- (ii) The share of costs incurred in sowing out the field. Normally this is one-seventh of the cost of seeds and labour when sown down for 6 or 7 years, one quarter when sown down for 3 years, and so on. This is equivalent to counting the turf, which is to be ploughed in, as an extra crop to share the cost of seeding.
- (iii) The total cost of manures applied to the field in 1952 or earlier years which would normally be considered to contribute to the growing of the year's grass, less the share of that cost which is chargeable to other years.
- (iv) The manual labour, horse labour and tractor power used in 1952 on the fields, including attention to electric fences, topping, weeding, etc., (each item being charged at an appropriate rate).

(v) A share of general or overhead expenses, charged at the following agreed rates:

|                                |      |
|--------------------------------|------|
| Per £ of labour charged        | 8/-  |
| " hour of horse labour charged | 1/9  |
| " " " tractor work charged     | 7/-  |
| " acre of land                 | 17/6 |

No charges are included against the grass for work on silage or hay crops taken or of the capital cost of electric or other fences; but otherwise the expenditure was to cover all the costs of producing the year's grass.

(17) Cost per cwt S.E.

The cost of the grass is divided by the starch equivalent produced, in cwts. If winter grazing in fact yields any food value the cost per cwt is overstated because this food value has been ignored. The error is not very great. (See also definition 21.)

(18) Density of Stocking

As an indication of the density of stocking of the grazing, a figure is given under the title Acres per cow at peak. This represents the average area per cow to which the herd had access at any one time in each field, the measure being taken at the time when the field was at its highest production. The areas presented at other times during the season were normally much greater. Strip grazing may present as little as 35 sq. yds (i.e. .007 acres) per cow when the fence is moved twice a day or separate day and night fields are used, each with a fence moved daily.

(19) Length of Grazing Season

The season is reckoned from the day when cows first went out to grass and were expected to derive some of their nutriment from the grass, up to the date on which the cows either ceased to go out to grass or, if still out, derived little, if any, nutriment from the grass. In the tables about individual farms and fields these dates are entered in shortened form: thus 26/10 means 26th October and so on. These dates have been omitted for most fields mown.

(20) In Appendix III the interval between the end of each period of grazing and the beginning of the next is indicated by each entry on the line Rests(days). Normally no entries have been made on this line for fields mown.

(21) Winter grazing

Since the amount of fodder given to stock wintered outside may represent a very large proportion of their needs, no attempt has been made to measure the value they derived from the grass. On some farms the winter stock clearly derived a good deal of feeding value from the grass: on others the fodder given to the stock appeared to have provided far more food value than the stock should have needed. The numbers of stock carried during the winter on individual fields are indicated in Appendix III.

(22) Rounding of numbers

In the distribution tables in this report a group described as £0.5 to £1.0 includes all values above £0.4995 and up to £0.9995; a group described as .1 to .2 cwts includes all values above .095 up to 0.195. The percentage tables do not necessarily add to 100, each figure being accurate in itself; and similarly with the table of costs.

(23) Averages

Most of the averages quoted are weighted averages.

(24) Field to field variations

While care was taken in the recording and calculations, some error may have been involved when sharing stock and milk between fields used in the same week. In so far as the farmers concerned or their representatives have been consulted about the figures the results can be taken as reasonable. They must not be taken as completely accurate.

## APPENDIX II

TABLE 1

## Grassland on the 12 Farms

|   | These<br>Farms<br>% | Their<br>Four<br>Counties<br>(1951) % |
|---|---------------------|---------------------------------------|
| Temporary grass mown  | 35                  | 14                                    |
| not mown  | 39                  | 26                                    |
| Permanent grass mown  | 2                   | 6                                     |
| not mown  | 25                  | 54                                    |
| No. of acres mown for silage<br>times no. of cuts, per 100 acres<br>grass | 16                  |                                       |

TABLE 2

Ages in 1952 of the pastures covered by the enquiry  
No. of fields of the following ages (%)

|                      | Years since seeding |    |    |    |   |    |   |   |                   |
|----------------------|---------------------|----|----|----|---|----|---|---|-------------------|
|                      | Less<br>than<br>1   | 1  | 2  | 3  | 4 | 5  | 6 | 7 | More<br>than<br>7 |
| Not mown:            |                     |    |    |    |   |    |   |   |                   |
| Used mainly for cows | 4                   | 4  | 12 | 15 | 6 | 12 | 6 | 2 | 40                |
| Not " " " "          |                     | 13 | 13 | 13 | 7 | 7  |   | 7 | 40                |
| Mown:                |                     |    |    |    |   |    |   |   |                   |
| All these            | 3                   | 33 | 17 | 17 | 7 | 13 | 3 |   | 7                 |
|                      | 3                   | 14 | 14 | 15 | 6 | 11 | 4 | 2 | 30                |

Note: Less than 1 means sown in 1952  
 1 means sown in 1951  
 3 " " " 1949  
 and so on.

TABLE 3

## Manures applied to the grass in 1952 (Eleven farms)

|                            | cwts |
|----------------------------|------|
| Sulphate of ammonia        | 186  |
| Nitro-Chalk                | 809  |
| Superphosphate             | 16   |
| Ground mineral phosphate   | 520  |
| Basic slag                 | 97   |
| Muriate of potash          | 144  |
| Potassic superphosphate    | 382  |
| Potassic mineral phosphate | 645  |
| Grass fertilizer           | 160  |
| Intensive grass fertilizer | 151  |
| Maincrop potato "          | 431  |
| Early " "                  | 151  |
| Turnip "                   | 106  |
| Dung                       | 9040 |



TABLE 4

## Cost of manures applied to 1952 grass

Numbers of fields (%) on which manures applied cost the following amounts per acre

| Cost in £ per acre | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|--------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|                    | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0                  | 36                    | 17                        | 12                    |                           | 67             | 26         |
| 0.5 - 1.0          | 2                     |                           |                       |                           |                | 1          |
| 1.0 - 1.5          | 9                     | 8                         | 4                     |                           |                | 7          |
| 1.5 - 2.0          | 6                     | 42                        | 24                    |                           |                | 15         |
| 2.0 - 2.5          | 6                     | 17                        |                       |                           |                | 5          |
| 2.5 - 3.0          | 6                     |                           | 4                     |                           |                | 4          |
| 3.0 - 3.5          | 6                     | 8                         |                       | 20                        |                | 5          |
| 3.5 - 4.0          | 2                     | 8                         | 4                     | 40                        |                | 5          |
| 4.0 - 5.0          | 9                     |                           | 8                     |                           |                | 7          |
| 5.0 - 6.0          | 9                     |                           | 4                     | 40                        |                | 8          |
| 6.0 - 7.0          |                       |                           | 8                     |                           |                | 2          |
| 7.0 - 8.0          | 4                     |                           | 4                     |                           |                | 3          |
| 8.0 - 9.0          | 2                     |                           |                       |                           |                | 1          |
| 9.0 - 10.0         |                       |                           | 4                     |                           |                | 1          |
| 10.0 - 11.0        | 2                     |                           |                       |                           |                | 1          |
| 11.0 - 12.0        |                       |                           |                       |                           | 33             | 1          |
| 12.0 - 13.0        |                       |                           | 4                     |                           |                | 1          |
| 13.0 - 14.0        |                       |                           | 12                    |                           |                | 3          |
| 14.0 - 15.0        |                       |                           | 4                     |                           |                | 1          |
| 16.0 - 17.0        |                       |                           | 4                     |                           |                | 1          |
| No. of fields      | 47                    | 12                        | 25                    | 5                         | 3              | 92         |

TABLE 5

## Cost of manures at actual net cost

Numbers of fields (%) on which manures used up cost the following amounts per acre

| Costs of manures £'s. per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|-------------------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|                               | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| .0 - 0.5                      | 15                    | 8                         | 8                     |                           |                | 11         |
| 0.5 - 1.0                     | 9                     |                           |                       |                           |                | 4          |
| 1.0 - 1.5                     | 11                    | 17                        | 4                     |                           |                | 9          |
| 1.5 - 2.0                     | 9                     | 17                        | 8                     |                           |                | 9          |
| 2.0 - 2.5                     | 15                    | 17                        | 8                     |                           |                | 12         |
| 2.5 - 3.0                     | 4                     | 25                        | 4                     |                           |                | 7          |
| 3.0 - 4.0                     | 9                     |                           | 12                    | 20                        | 67             | 11         |
| 4.0 - 5.0                     | 17                    | 17                        | 4                     | 20                        | 33             | 14         |
| 5.0 - 6.0                     | 4                     |                           | 16                    |                           |                | 7          |
| 6.0 - 7.0                     | 4                     |                           |                       | 40                        |                | 4          |
| 7.0 - 8.0                     | 2                     |                           | 8                     | 20                        |                | 4          |
| 8.0 - 9.0                     |                       |                           | 16                    |                           |                | 3          |
| 9.0 - 10.0                    |                       |                           | 8                     |                           |                | 2          |
| 10 & above                    | 2                     |                           | 8                     |                           |                | 3          |
| No. of fields                 | 47                    | 12                        | 25                    | 5                         | 3              | 92         |

TABLE 6

Cost of manures used up, at standardized 1953 net prices

Number of fields (%) on which manures used up cost the following amounts  
at standardized 1953 net prices

| Costs of manures<br>£'s. per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|----------------------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|                                  | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0 - 0.5                          | 17                    | 8                         | 8                     |                           |                | 12         |
| 0.5 - 1.0                        | 6                     | 25                        |                       |                           |                | 7          |
| 1.0 - 1.5                        | 23                    |                           | 4                     |                           |                | 13         |
| 1.5 - 2.0                        | 4                     | 25                        | 16                    |                           |                | 10         |
| 2.0 - 2.5                        | 15                    | 17                        |                       |                           |                | 10         |
| 2.5 - 3.0                        |                       | 17                        | 8                     |                           | 33             | 5          |
| 3.0 - 4.0                        | 11                    |                           | 8                     | 60                        | 33             | 12         |
| 4.0 - 5.0                        | 9                     |                           | 8                     |                           |                | 6          |
| 5.0 - 6.0                        | 9                     | 8                         | 16                    | 20                        |                | 11         |
| 6.0 - 7.0                        | 4                     |                           | 8                     | 20                        |                | 5          |
| 7.0 - 8.0                        |                       |                           | 8                     |                           |                | 2          |
| 8.0 - 9.0                        |                       |                           | 4                     |                           | 33             | 2          |
| 10 & above                       | 2                     |                           | 12                    |                           |                | 4          |

TABLE 7

Quantities per acre of manures used up in the year

Numbers of fields (%) on which the following quantities were used up

(a) NITROGEN

| cwts per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|--------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|              | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0 - 0.1      | 40                    | 75                        | 20                    |                           | 67             | 36         |
| 0.1 - 0.2    | 22                    | 17                        |                       | 20                        |                | 18         |
| 0.2 - 0.3    | 11                    |                           | 8                     |                           |                | 9          |
| 0.3 - 0.4    | 13                    | 8                         | 28                    | 60                        |                | 18         |
| 0.4 - 0.5    | 6                     |                           | 4                     |                           |                | 2          |
| 0.5 - 0.6    | 2                     |                           | 4                     |                           |                | 2          |
| 0.6 - 0.7    |                       |                           | 4                     |                           |                | 1          |
| 0.7 - 0.8    |                       |                           | 4                     |                           |                | 1          |
| 0.8 - 0.9    |                       |                           | 4                     |                           |                | 1          |
| 0.9 - 1.0    | 2                     |                           | 12                    |                           | 33             | 4          |
| 1.0 - 1.1    |                       |                           | 4                     | 20                        |                | 3          |
| 1.1 - 1.2    |                       |                           | 4                     |                           |                | 1          |
| 1.2 - 1.3    |                       |                           | 4                     |                           |                | 1          |
| 1.3 - 1.4    | 2                     |                           |                       |                           |                | 1          |
| 1.4 - 1.5    |                       |                           | 4                     |                           |                | 1          |
| 1.5 - 1.6    |                       |                           | 4                     |                           |                | 1          |
| 1.6 - 1.7    |                       |                           | 4                     |                           |                | 1          |
| 1.7 - 1.8    |                       |                           | 4                     |                           |                | 1          |

TABLE 7 (Contd.)  
(b) PHOSPHATES (As P<sub>2</sub>O<sub>5</sub>)

| cwts per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|--------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|              | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0 - 0.1      | 32                    | 17                        | 24                    |                           |                | 25         |
| 0.1 - 0.2    | 4                     | 17                        | 16                    |                           |                | 9          |
| 0.2 - 0.3    | 13                    | 8                         | 4                     |                           |                | 9          |
| 0.3 - 0.4    | 11                    |                           |                       | 20                        |                | 7          |
| 0.4 - 0.5    | 9                     | 8                         |                       |                           |                | 5          |
| 0.5 - 0.6    | 4                     | 17                        |                       | 20                        |                | 5          |
| 0.6 - 0.7    | 4                     | 8                         | 12                    |                           | 33             | 8          |
| 0.7 - 0.8    | 6                     |                           | 12                    | 40                        |                | 9          |
| 0.8 - 0.9    | 9                     |                           | 8                     |                           | 67             | 9          |
| 0.9 - 1.0    | 2                     | 8                         | 4                     | 20                        |                | 4          |
| 1.0 - 1.1    | 2                     |                           | 8                     |                           |                | 3          |
| 1.1 - 1.2    | 2                     | 17                        |                       |                           |                | 3          |
| 1.2 - 1.3    | 2                     |                           | 4                     |                           |                | 2          |
| 1.3 - 1.4    |                       |                           | 4                     |                           |                | 1          |
| 1.5 - 1.6    |                       |                           | 4                     |                           |                | 1          |

(c) POTASH (As K<sub>2</sub>O)

| cwts per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|--------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|              | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0 - 0.1      | 42                    | 40                        | 24                    |                           |                | 34         |
| 0.1 - 0.2    | 11                    | 55                        | 20                    | 20                        |                | 16         |
| 0.2 - 0.3    | 6                     | 16                        | 4                     | 20                        |                | 8          |
| 0.3 - 0.4    | 6                     |                           | 8                     | 20                        |                | 7          |
| 0.4 - 0.5    | 2                     |                           |                       | 20                        |                | 2          |
| 0.5 - 0.6    | 17                    |                           | 12                    |                           |                | 12         |
| 0.6 - 0.7    | 6                     |                           |                       |                           | 67             | 5          |
| 0.7 - 0.8    | 2                     |                           | 4                     |                           |                | 2          |
| 0.8 - 0.9    | 2                     | 8                         |                       |                           |                | 2          |
| 0.9 - 1.0    | 2                     |                           | 8                     | 20                        | 33             | 5          |
| 1.0 - 1.1    | 2                     |                           | 4                     |                           |                | 2          |
| 1.3 - 1.4    |                       |                           | 12                    |                           |                | 3          |
| 1.4 - 1.5    |                       |                           | 4                     |                           |                | 1          |

(d) LIME (As CaO)

| cwts per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|--------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|              | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 0 - 0.5      | 36                    | 50                        | 48                    | 20                        | 33             | 40         |
| 0.5 - 1.0    |                       | 8                         |                       |                           |                | 1          |
| 1.0 - 1.5    | 4                     |                           | 4                     |                           |                | 3          |
| 1.5 - 2.0    |                       | 8                         | 4                     |                           |                | 2          |
| 2.0 - 2.5    | 13                    | 8                         | 8                     |                           | 35             | 11         |
| 2.5 - 3.0    | 13                    | 8                         | 12                    | 60                        |                | 14         |
| 3.0 - 4.0    | 13                    | 8                         | 12                    |                           | 33             | 12         |
| 4.0 - 5.0    | 11                    |                           | 4                     | 20                        |                | 8          |
| 5.0 - 6.0    | 11                    |                           | 4                     |                           |                | 7          |
| 6.0 - 7.0    |                       | 8                         |                       |                           |                | 1          |
| 7.0 and over |                       |                           | 4                     |                           |                | 1          |

TABLE 8

Average costs of growing the grass in 1952: shillings per acre

|                                       | Fields not mown             |            |                                    |           | Fields mown |            |
|---------------------------------------|-----------------------------|------------|------------------------------------|-----------|-------------|------------|
|                                       | Grazed<br>mainly by<br>cows |            | Grazed<br>mainly by<br>other stock |           |             |            |
| Rent                                  | 26                          |            | 19                                 |           | 24          |            |
| Share of sow-out                      | 10                          |            | 6                                  |           | 17          |            |
| Overheads on acreage basis            | <u>19</u>                   | 55         | <u>19</u>                          | 44        | <u>19</u>   | 60         |
| Manures applied before 1952           |                             |            |                                    |           |             |            |
| Dung                                  | 30                          |            | 40                                 |           | 71          |            |
| Lime                                  | 32                          |            | 25                                 |           | 32          |            |
| Slag & ground mineral phosphate       | 6                           |            | 11                                 |           | 32          |            |
| Other phosphatic manures              | 18                          |            | 33                                 |           | 16          |            |
| Potassic manures                      | 3                           |            | -                                  |           | 1           |            |
| Compounds                             | <u>26</u>                   |            | <u>11</u>                          |           | <u>41</u>   |            |
|                                       | <u>115</u>                  |            | <u>120</u>                         |           | <u>194</u>  |            |
| less deductions to other years        | <u>96</u>                   | 19         | <u>99</u>                          | 22        | <u>160</u>  | 34         |
| Manures applied for 1952              |                             |            |                                    |           |             |            |
| Dung                                  | -                           |            | -                                  |           | 20          |            |
| Lime                                  | 2                           |            | -                                  |           | 11          |            |
| Slag & ground mineral phosphate       | 3                           |            | 9                                  |           | 15          |            |
| Other phosphates                      | 9                           |            | 4                                  |           | 8           |            |
| Potassic manures                      | 2                           |            | 1                                  |           | 2           |            |
| Compounds                             | 12                          |            | 10                                 |           | 20          |            |
| Nitrogen                              | <u>11</u>                   |            | <u>4</u>                           |           | <u>33</u>   |            |
|                                       | <u>39</u>                   |            | <u>27</u>                          |           | <u>109</u>  |            |
| less deductions to succeeding years   | <u>13</u>                   | 26         | <u>10</u>                          | 17        | <u>40</u>   | 69         |
| Total net charges for manures         |                             | (44)       |                                    | (38)      |             | (102)      |
| Manual labour                         | 4                           |            | 3                                  |           | 7           |            |
| Horse "                               | -                           |            | neg.                               |           | -           |            |
| Tractor "                             | 3                           |            | 4                                  |           | 7           |            |
| Share of dunging costs in earlier yrs | 2                           |            | 2                                  |           | 2           |            |
| Overheads on labour basis             | 1                           |            | 1                                  |           | 2           |            |
| " " tractor hour basis                | <u>4</u>                    | <u>15</u>  | <u>5</u>                           | <u>15</u> | <u>11</u>   | <u>29</u>  |
| Net total cost                        |                             | <u>113</u> |                                    | <u>98</u> |             | <u>191</u> |
| Total area covered (acres)            |                             | 619        |                                    | 186       |             | 396        |

TABLE 9

Net costs per acre (excluding labour etc. on mown crops)  
Number of fields (%) on which these costs were as follows

| Costs of grass<br>£'s per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|-------------------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|                               | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 2.0 - 2.5                     | 2                     | 8                         |                       |                           |                | 2          |
| 2.5 - 3.0                     | 17                    |                           |                       |                           |                | 10         |
| 3.0 - 3.5                     |                       |                           | 8                     |                           |                | 2          |
| 3.5 - 4.0                     | 4                     |                           |                       |                           |                | 2          |
| 4.0 - 5.0                     | 11                    | 42                        |                       |                           |                | 15         |
| 5.0 - 6.0                     | 22                    | 17                        | 4                     |                           |                | 15         |
| 6.0 - 7.0                     | 7                     | 8                         | 8                     |                           |                | 6          |
| 7.0 - 8.0                     | 11                    | 8                         | 8                     |                           |                | 10         |
| 8.0 - 9.0                     | 9                     | 17                        | 4                     | 40                        |                | 9          |
| 9.0 - 10.0                    | 7                     |                           | 12                    |                           |                | 6          |
| 10.0 - 11.0                   | 2                     |                           | 4                     | 20                        | 33             | 6          |
| 11.0 - 12.0                   | 2                     |                           | 8                     |                           | 33             | 4          |
| 12.0 - 13.0                   | 2                     |                           | 4                     |                           |                | 4          |
| 13.0 - 15.0                   |                       |                           | 12                    |                           | 33             | 4          |
| 15.0 - 17.0                   |                       |                           | 4                     |                           |                | 1          |
| 17.0 - 20.0                   |                       |                           | 12                    |                           |                | 3          |
| 20.0 - 21.0                   | 2                     |                           |                       |                           |                | 1          |

TABLE 10

Stock carried during the season

Numbers of fields (%) on which the following numbers of stock units per acre were grazed

| Stock units per acre | Fields not mown       |                           | Fields mown           |                           | Sow out fields |
|----------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|
|                      | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |
| 0 - 50               | 2                     | 8                         | 36                    | 60                        | 33             |
| 50 - 100             | 6                     | 33                        | 24                    | 20                        |                |
| 100 - 150            | 36                    | 33                        | 16                    | 20                        | 33             |
| 150 - 200            | 23                    | 17                        | 20                    |                           | 33             |
| 200 - 250            | 23                    |                           |                       |                           |                |
| 250 - 300            | 4                     | 8                         | 4                     |                           |                |
| 300 - 350            | 2                     |                           |                       |                           |                |
| 350 and over         | 2                     |                           |                       |                           |                |

TABLE 11

Gallons produced during the season

Numbers of fields (%) on which cows gave the following numbers of gallons of milk per acre

| Gallons per acre | Fields not mown       |                           | Fields mown           |                           | Sow out fields |
|------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|
|                  | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |
| 0 - 100          | 6                     | 92                        | 32                    | 80                        | 33             |
| 100 - 150        | 2                     | 8                         | 20                    |                           | 33             |
| 150 - 200        | 13                    |                           | 20                    |                           |                |
| 200 - 250        | 9                     |                           | 8                     | 20                        |                |
| 250 - 300        | 11                    |                           | 4                     |                           |                |
| 300 - 350        | 13                    |                           |                       |                           | 33             |
| 350 - 400        | 6                     |                           | 4                     |                           |                |
| 400 - 450        | 11                    |                           | 8                     |                           |                |
| 450 - 500        | 4                     |                           |                       |                           |                |
| 500 - 550        | 4                     |                           | 4                     |                           |                |
| 550 - 600        | 6                     |                           |                       |                           |                |
| 600 - 650        | 4                     |                           |                       |                           |                |
| 650 - 700        | 4                     |                           |                       |                           |                |
| 700 - 750        | 4                     |                           |                       |                           |                |
| 800 - 850        | 2                     |                           |                       |                           |                |

TABLE 12

Net yield of feeding material in terms of lbs starch equivalent per acre in the season

Numbers of fields (%) on which the estimated yields were as follows

| Starch equivalent lbs per ac. | Fields not mown       |                           | Fields mown           |                           | Sow out fields | All fields |
|-------------------------------|-----------------------|---------------------------|-----------------------|---------------------------|----------------|------------|
|                               | Grazed mainly by cows | Not grazed mainly by cows | Grazed mainly by cows | Not grazed mainly by cows |                |            |
| 300 - 600                     | 2                     | 8                         |                       |                           |                | 2          |
| 600 - 900                     | 4                     | 17                        |                       |                           | 33             | 5          |
| 900 - 1200                    | 9                     | 8                         |                       |                           |                | 5          |
| 1200 - 1500                   | 13                    | 17                        | 4                     |                           |                | 10         |
| 1500 - 1800                   | 15                    | 34                        | 8                     |                           |                | 14         |
| 1800 - 2100                   | 21                    | 17                        | 16                    | 20                        |                | 14         |
| 2100 - 2400                   | 4                     |                           | 16                    | 40                        | 33             | 13         |
| 2400 - 2700                   | 9                     |                           | 8                     |                           |                | 7          |
| 2700 - 3000                   | 11                    |                           | 12                    | 20                        | 33             | 11         |
| 3000 - 3300                   | 9                     |                           | 20                    |                           |                | 11         |
| 3300 - 3600                   |                       |                           | 8                     |                           |                | 2          |
| 3600 - 3900                   | 2                     |                           |                       | 20                        |                | 2          |
| 3900 - 4200                   |                       |                           | 4                     |                           |                | 1          |
| 4200 - 4500                   |                       |                           | 4                     |                           |                | 1          |
| 4800 - 5100                   | 2                     |                           |                       |                           |                | 1          |

TABLE 13

Stock carried and production per acre month by month  
(Fields chiefly grazed by cows)

|                         | Cow days | Stock units | Gallons | Net stock units | Net gallons | Net S.E. cwts |
|-------------------------|----------|-------------|---------|-----------------|-------------|---------------|
| Period to 3rd May       | 9        | 11          | 29      | 6               | 15          | .8            |
| 4th May to 31st May     | 26       | 27          | 78      | 27              | 71          | 3.6           |
| 1st June to 28th June   | 26       | 29          | 75      | 28              | 72          | 3.6           |
| 29th June to 26th July  | 23       | 28          | 59      | 27              | 55          | 3.2           |
| 27th July to 23rd Aug.  | 20       | 23          | 48      | 22              | 42          | 2.6           |
| 24th Aug. to 20th Sept. | 18       | 20          | 40      | 19              | 30          | 2.1           |
| 21st Sept. to 18th Oct. | 15       | 16          | 29      | 14              | 13          | 1.3           |
| 19th Oct. onwards       | 10       | 10          | 18      | 5               | 4           | .5            |
| Total                   | 146      | 164         | 376     | 150             | 302         | 17.8          |

TABLE 14 (a)

Some details of farms and averages for fields not mown; chiefly grazed by cows

| FARM                                      | W.2  | W.1  | W.3  | A.3   | A.1  | A.4  | L.2  | A.2  | L.4  | L.3  | K.1   | L.1      | All  |
|---|------|------|------|-------|------|------|------|------|------|------|-------|----------|------|
| <u>1951/52</u>                            |      |      |      |       |      |      |      |      |      |      |       |          |      |
| Milk yield per cow year (gals)            | 880  | n.a. | 809  | 800   | 950  | 864  | 860  | 800  | 850  | n.a. | 650   | 745      |      |
| " sales per farm acre "                   | 384  | 171  | 243  | 190   | 198  | 237  | 174  | 172  | 222  | 118  | 84    | 201      |      |
| % of winter milk                          | 27   | 45   | 46   | 63    | 48   | 50   | 43   | 43   | 48   | 45   | 40    | 53       |      |
| Length of grazing season (days)           | 238  | 210  | 191  | 195   | 184  | 180  | 180  | 176  | 171  | 187  | 184   | 168      | 189  |
| <u>Cows' fields not mown: 1952 season</u> |      |      |      |       |      |      |      |      |      |      |       |          |      |
| Acres recorded                            | 102  | None | 61   | 12    | 64   | 51   | 20   | 52   | 49   | 132  | 45    | 31(adj)  | 619  |
| Milk per cow per day (gals.)              | 3.16 |      | 2.17 | 1.39  | 2.98 | 2.00 | 2.52 | 2.35 | 2.30 | 2.61 | 1.94  | 1.65     | 2.58 |
| Young stock etc. (%)                      | 9    |      | 11   | 13    | 4    | 29   | 17   | 12   | 25   | neg. | 17    | 10       | 11   |
| Cow days per acre                         | 204  |      | 160  | 171   | 181  | 116  | 152  | 122  | 112  | 126  | 121   | 110      | 146  |
| Stock units per acre                      | 223  |      | 181  | 197   | 189  | 163  | 183  | 139  | 148  | 126  | 146   | 122      | 164  |
| Gallons per acre                          | 644  |      | 348  | 238   | 538  | 232  | 383  | 286  | 253  | 328  | 283   | 181      | 376  |
| Net stock units per acre                  | 179  |      | 161  | 177   | 174  | 158  | 172  | 131  | 139  | 121  | 121   | 120      | 150  |
| Net gallons per acre                      | 515  |      | 308  | 219   | 384  | 220  | 322  | 279  | 208  | 246  | 222   | 122      | 302  |
| S.E. harvested per acre (cwts)            | -    |      | -    | -     | -    | -    | -    | -    | -    | .1   | -     | -        | neg. |
| S.E. produced per acre (cwts)             | 24.7 |      | 20.2 | 17.9  | 21.4 | 16.6 | 19.8 | 16.0 | 14.9 | 14.4 | 13.8  | 11.5     | 17.8 |
| Cost per acre (shillings)                 | 110  |      | 105  | 256   | 156  | 99   | 200  | 109  | 144  | 58   | 151   | 99       | 113  |
| Manures applied per acre (shlgs)          | 9    |      | 4    | 155   | 96   | 45   | 102  | 39   | 83   | 5    | 72    | 15       | 39   |
| Net cost of manures per acre (sh.)        | 31   |      | 20   | 152   | 73   | 42   | 108  | 35   | 77   | 17   | 75    | 39       | 44   |
| Standardized do. per acre (shlgs)         | 26   |      | 13   | 143   | 54   | 30   | 100  | 23   | 86   | 20   | 95    | 32       | 40   |
| Manures used up per acre (cwts):          |      |      |      |       |      |      |      |      |      |      |       |          |      |
| N   | -    |      | .04  | .88   | .23  | .11  | .41  | .13  | .30  | .05  | .30   | .09      | .14  |
| P <sub>2</sub> O <sub>5</sub>             | .21  |      | .03  | .94   | .44  | .33  | .75  | .22  | .84  | .08  | 1.07  | .13      | .34  |
| K <sub>2</sub> O                          | .29  |      | -    | .60   | .23  | .21  | .57  | .11  | .59  | .07  | .52   | .21      | .24  |
| CaO                                       | 1.93 |      | 2.41 | .36   | 2.37 | -    | 2.36 | -    | 1.69 | 2.80 | 3.36  | 2.68     | 2.00 |
| Acres per cow at peak                     | .42  |      | .01  | Strip | .17  | .31  | .23  | .70  | .24  | .45  | Strip | .23(adj) | -    |
| Cost per cwt S.E. (shillings)             | 4.4  |      | 5.2  | 14.3  | 7.3  | 6.0  | 10.1 | 6.8  | 10.3 | 4.0  | 10.9  | 8.6      | 6.4  |

TABLE 14 (b)

Averages for fields grazed mainly by young stock, etc. and not mown

| <u>FARM</u>                          | <u>W.2</u> | <u>W.1</u> | <u>W.3</u> | <u>A.3</u> | <u>A.1</u> | <u>A.4</u> | <u>L.2</u> | <u>A.2</u> | <u>L.4</u> | <u>L.3</u> | <u>K.1</u> | <u>L.1</u> | <u>All</u> |
|--------------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Acres recorded                       | none       | none       | 54         | none       | 37         | 12         | 9          | none       | none       | none       | 74         | none       | 186        |
| Milk Yield per cow per day (gals.)   |            |            | 2.42       |            | 0          | 1.53       | 0          |            |            |            | 0.5        |            | 0.43       |
| Young stock etc. (%)                 |            |            | 98         |            | 77         | 66         | 53         |            |            |            | 89         |            | 87         |
| Stock units per acre                 |            |            | 208        |            | 181        | 120        | 183        |            |            |            | 103        |            | 154        |
| Gallons per acre                     |            |            | 8          |            | 0          | 62         | 0          |            |            |            | 6          |            | 9          |
| Net stock units per acre             |            |            | 195        |            | 177        | 120        | 183        |            |            |            | 103        |            | 149        |
| Net gallons per acre                 |            |            | 8          |            | 0          | 62         | 0          |            |            |            | 2          |            | 7          |
| S.E. harvested per acre (cwts)       |            |            | 0          |            | 1.4        | 0          | 0          |            |            |            | 0          |            | neg.       |
| S.E. produced per acre (cwts)        |            |            | 14.4       |            | 14.5       | 10.2       | 13.5       |            |            |            | 7.6        |            | 11.4       |
| Cost per acre (shillings)            |            |            | 103        |            | 130        | 109        | 150        |            |            |            | 70         |            | 98         |
| Manures applied per acre (shlgs)     |            |            | 12         |            | 40         | 60         | 75         |            |            |            | 20         |            | 27         |
| Net cost of manures per acre (shlgs) |            |            | 33         |            | 61         | 49         | 95         |            |            |            | 23         |            | 38         |
| Standardized do. per acre (shlgs)    |            |            | 21         |            | 43         | 39         | 107        |            |            |            | 27         |            | 33         |
| Manures used up per acre (cwts):     |            |            |            |            |            |            |            |            |            |            |            |            |            |
| N                                    |            |            | .02        |            | .16        | .18        | .30        |            |            |            | 0          |            | .06        |
| P <sub>2</sub> O <sub>5</sub>        |            |            | .18        |            | .49        | .27        | .91        |            |            |            | .66        |            | .47        |
| K <sub>2</sub> O                     |            |            | .25        |            | .11        | .29        | .67        |            |            |            | .10        |            | .19        |
| CaO                                  |            |            | .63        |            | 2.37       | 0          | 6.22       |            |            |            | 1.02       |            | 1.36       |
| Acres per cow or her equiv. at peak  |            |            | .40        |            | .31        | .44        | .64        |            |            |            | 2.9        |            |            |
| Cost per cwt S.E. (shillings)        |            |            | 7.1        |            | 9.0        | 10.7       | 11.1       |            |            |            | 9.2        |            | 8.6        |





Figure 1. RELATION OF COST PER ACRE TO PRODUCTION PER ACRE

Key  
 ••• fields grazed chiefly by cows  
 ⊙ " " " " young stock etc.  
 × " mown and grazed.

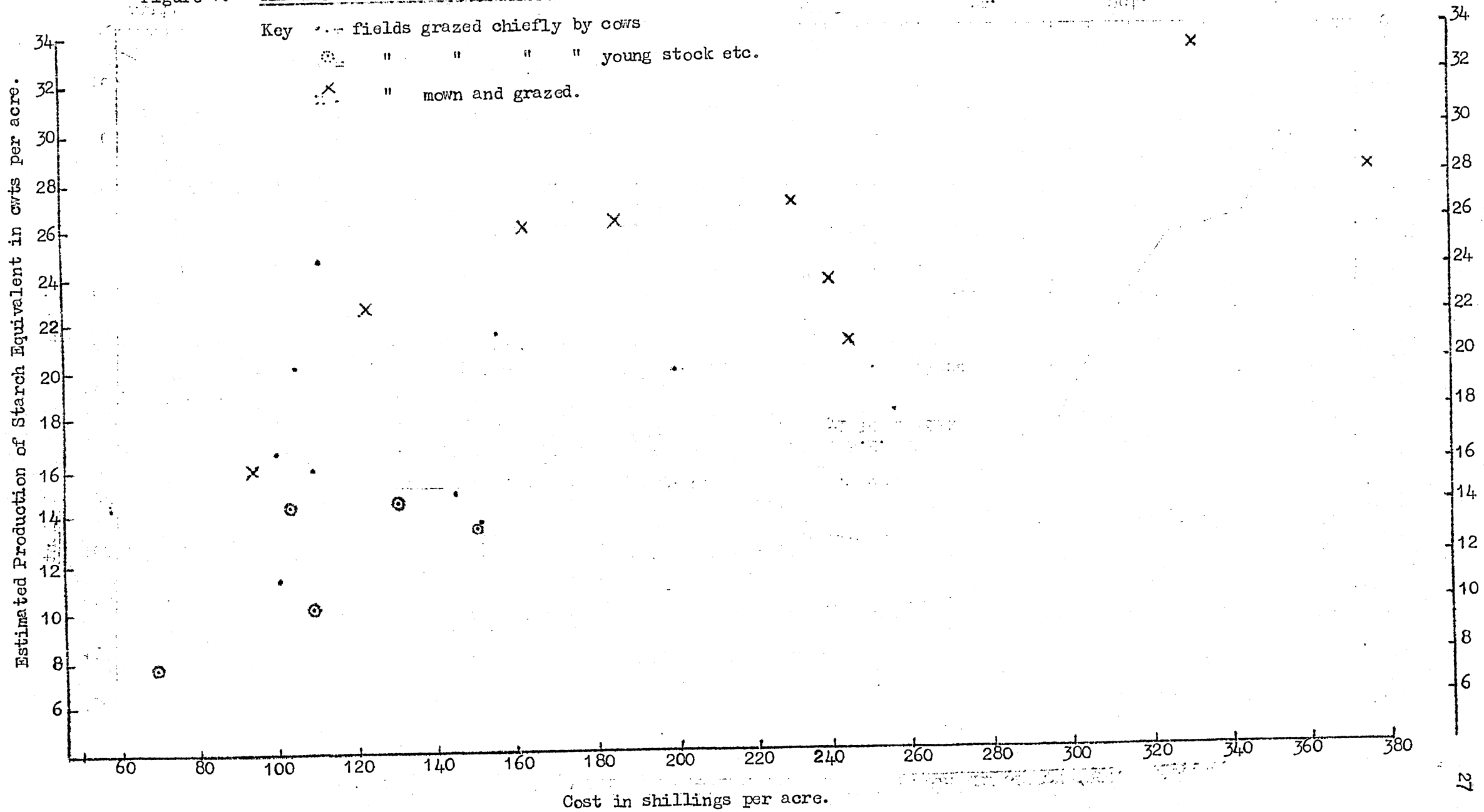
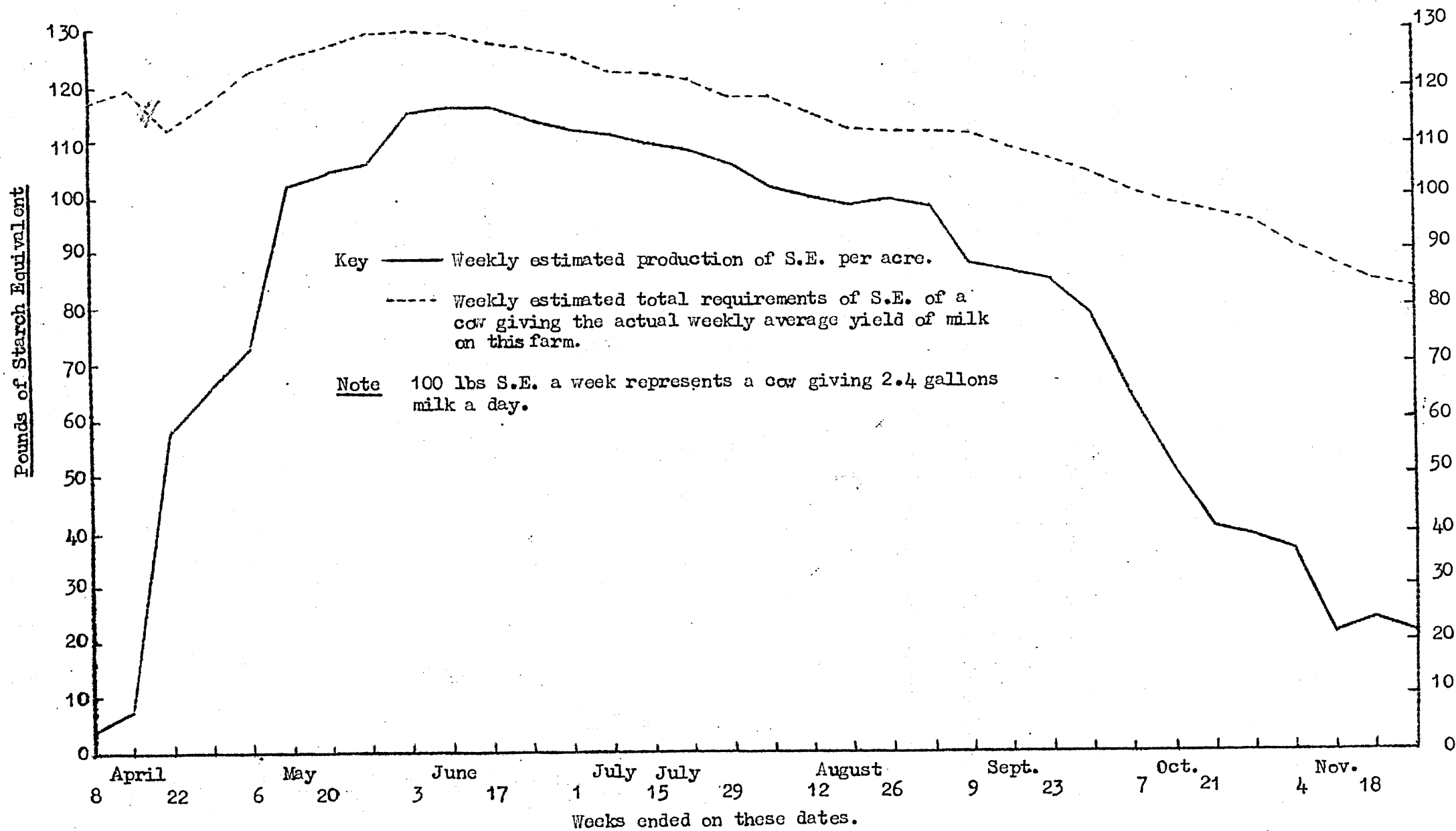


Figure 2. ESTIMATED WEEKLY PRODUCTION OF STARCH EQUIVALENT THROUGH THE SEASON 1952. FARM W2.



APPENDIX IIIParticulars about the individual farms and fields.

Some particulars about the individual farms have been set out in Table

14 of Appendix II. In this Appendix further details are given about

the farms and the individual fields. Farm acreage figures are approximate.

| <u>Farm</u> | <u>Pages</u> |
|-------------|--------------|
| A1          | 30-32        |
| A2          | 33-34        |
| A3          | 35-37        |
| A4          | 38-39        |
| L1          | 40-41        |
| L2          | 42-43        |
| L3          | 44-45        |
| L4          | 46-47        |
| K1          | 48-49        |
| W1          | 50-52        |
| W2          | 53-55        |
| W3          | 56-58        |

FARM A1

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 950 gallons |
| % OF WINTER MILK                          | 48%         |
| GRAZING SEASON                            | 184 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.09 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 384 gallons |

|  |   |
|--|---|
| Height                                 | 100'  |
| Soil                                   | Deep free loam to strong loam.                              |
| Contours                               | Gentle  |
| General aspect                         | Easterly: sheltered   |
| Area                                   | 400 acres   |
| Rent of grassland                      | 30/-  |
| No. of cows                            | 85: chiefly autumn calving                                  |
| Other grazing stock                    | Followers: a few bullocks: a few sheep                      |
| Fields not studied                     | Grass not grazed by cows, and rough grazing                 |
| Stock elsewhere                        | None  |
| % land under crops                     | 36  |
| Cropping purpose                       | Stock feed: sale  |
| Silage cutting acres<br>per 100 acres  | 8, including arable silage                                  |
| No. of years' cropping<br>between leas | 3, usually  |
| Length of leas                         | 4, 2 to 6   |
| Seeds mixtures                         | Vary widely: though the following is typical of<br>several: |

lbs. per acre

|                              |           |
|------------------------------|-----------|
| Italian ryegrass             | 4         |
| Perennial " (Ayrshire & S23) | 16        |
| Cocksfoot                    | 6         |
| Timothy (S51)                | 4         |
| Rough stalked meadow grass   | 1         |
| Broad red clover             | 1½        |
| Late flowering red clover    | 1½        |
| White clover, S100           | 1         |
|                              | <u>35</u> |

|          |  |
|----------|--|
| Manuring | Liberal  |
|          | Grazed fields: 1 cwt potassic supers<br>1 cwt NitroChalk |
|          | Mown fields: twice the above: dung sometimes             |

|                                       |      |
|---------------------------------------|------|
| Surface cultivations                  | None |
| General system of<br>grazing for cows |      |

The normal practice is to have the herd on a different field at night from the one it occupied in the day, and to change one of these fields every 3 days or so; thus the cows have a fresh pasture for either the day or the night every 3 days or so.

|       |   |
|-------|---|
| Fence | Existing fields are fairly small in relation to the number of cows. |
|-------|---|

|         |  |
|---------|--|
| General | Rotational grazing following balanced manuring, with good management and suitable feeding of the cows enables the herd to give a high summer yield and to lie in well prepared for high winter yields. |
|---------|--|

For further particulars about this farm, which is the College Farm of the West of Scotland Agricultural College at Auchincruive, Ayr, see "Guide to Auchincruive 1953" obtainable from the Secretary, West of Scotland Agricultural College, 6 Blythswood Square, Glasgow, C.2.

FARM A.1

| Field                         | Fields not mown: mainly grazed by cows |                |                         |                       |                        |             |                |           | All fields |  |
|-------------------------------|--|----------------|-------------------------|-----------------------|------------------------|-------------|----------------|-----------|------------|--|
|                               | 1                                      | 2              | 3                       | 4                     | 5                      | 6           | 7              | All these |            |  |
| Area (acres)                  | 18                                     | 10             | 18                      | 4                     | 4                      | 5           | 5              | 64        | 151        |  |
| Years old                     | 2                                      | 4              | 1                       | 2                     | 3                      | 3           | Very Old       |           |            |  |
| Length of lea                 | 6                                      | 4              | 6                       | 5                     | 4                      | 4           | Permanent      |           |            |  |
| <u>1952 details per acre</u>  |  |                |                         |                       |                        |             |                |           |            |  |
| Stock units                   | 201                                    | 241            | 213                     | 160                   | 161                    | 117         | 72             | 189       | 147        |  |
| Gallons produced              | 597                                    | 655            | 600                     | 444                   | 445                    | 375         | 191            | 538       | 263        |  |
| Net stock units               | 178                                    | 241            | 187                     | 155                   | 156                    | 117         | 70             | 174       | 137        |  |
| Net gallons                   | 426                                    | 466            | 427                     | 319                   | 319                    | 262         | 144            | 384       | 183        |  |
| S.E. produced (cwts)          | 22.6                                   | 28.2           | 23.3                    | 18.5                  | 18.6                   | 14.5        | 8.3            | 21.4      | 21.6       |  |
| Young stock etc. (%)          | 1                                      | 0              | 8                       | 11                    | 12                     | 0           | 14             | 4         | 33         |  |
| Gallons per cow day           | 2.99                                   | 2.72           | 3.05                    | 3.16                  | 3.14                   | 3.20        | 3.08           | 2.98      | 2.65       |  |
| Cost (shillings)              | 187                                    | 173            | 172                     | 122                   | 114                    | 109         | 58             | 156       | 174        |  |
| Manures applied (sh.)         | 90                                     | 92             | 175                     | 35                    | 35                     | 36          | 0              | 96        | 90         |  |
| Net cost of manures (sh)      | 90                                     | 85             | 92                      | 42                    | 32                     | 47          | 9              | 73        | 84         |  |
| Standardized do. (sh)         | 76                                     | 44             | 70                      | 38                    | 28                     | 42          | 6              | 54        | 61         |  |
| Manures used up (cwts):       |  |                |                         |                       |                        |             |                |           |            |  |
| N                             | .30                                    | .15            | .33                     | .14                   | .14                    | .15         | 0              | .23       | .28        |  |
| P <sub>2</sub> O <sub>5</sub> | .69                                    | .45            | .44                     | .38                   | .30                    | .48         | .20            | .44       | .55        |  |
| K <sub>2</sub> O              | .37                                    | .13            | .30                     | .09                   | .12                    | .09         | 0              | .23       | .23        |  |
| CaO                           | 2.86                                   | 2.86           | 3.17                    | 2.74                  | 0                      | 2.86        | 0              | 2.37      | 2.20       |  |
| Method of use                 |  |                | Rotational Grazing      |                       |                        |             |                |           |            |  |
| Acres per cow at peak         | .24                                    | .13            | .24                     | .12                   | .10                    | .07         | n.a.           | .17       |            |  |
| Grazing season                | 5/5-20/10                              | 7/5-17/10      | 25/4-25/10              | 3/5-20/9              | 3/5-20/9               | 17/5-24/9   | 25/4-30/8      |           |            |  |
| Winter stock per acre         | Little                                 | Little         | Stirks & Sheep(Dec-F.)  | Little                | Little                 | Little      | Cows' exercise |           |            |  |
| Rests(days)                   | 10,3,6,6,<br>10,6,5,14                 | 17,9,26,<br>18 | 16,18,5,5,5<br>15,17,16 | 21,16,13,<br>16,8,7,5 | 21,16,13,16<br>8, 7, 5 | 26,26,39,20 | 27,7           |           |            |  |

| Field                         | Not mown:<br>not mainly grazed by cows     |                     |                |         | Mown:<br>grazed by cows                        |  |         | Mown:<br>not mainly grazed by cows |                   |                            |         |
|-------------------------------|--|---------------------|----------------|---------|--|--|---------|------------------------------------|-------------------|----------------------------|---------|
|                               | 8  | 9                   | 10             | Average | 11   | 12                                       | Average | 13                                 | 14                | 15                         | Average |
| Area (acres)                  | 7.75                                       | 17                  | 12             | 36.75   | 17.5   | 18.5                                     | 36.0    | 4                                  | 5.5               | 4                          | 13.5    |
| Years old                     | 2  | 3-4                 | 3-5            |         | 2  | 1  |         | 1                                  | 1                 | 1                          |         |
| Length of lea                 | 5  | 5                   | 5              |         | 4  | 4  |         | 4                                  | 4                 | 3                          |         |
| <u>1952 details per acre</u>  |  |                     |                |         |  |  |         |                                    |                   |                            |         |
| Stock units                   | 238  | 152                 | 185            | 181     | 50   | 40                                       | 45      | 60                                 | 125               | 178                        | 113     |
| Gallons produced              | 0  | 0                   | 0              |         | 75   | 114                                      | 95      | 68                                 | 26                | 222                        | 96      |
| Net stock units               | 232  | 152                 | 179            | 177     | 35   | 38                                       | 37      | 60                                 | 125               | 152                        | 105     |
| Net gallons                   | 0  | 0                   | 0              | 0       | 39   | 69                                       | 54      | 47                                 | 15                | 134                        | 60      |
| S.E. harvested (cwts)         | 0  | 3.1                 | 0              | 1.4     | 32.4   | 15.2                                     | 23.6    | 14.7                               | 15.6              | 16.7                       | 14.5    |
| S.E. produced (cwts)          | 17.1                                       | 14.3                | 13.2           | 14.5    | 35.9   | 19.5                                     | 27.5    | 20.1                               | 25.2              | 32.9                       | 24.2    |
| Young stock etc. (%)          | 73   | 95                  | 60             | 77      | 47   | 0  | 26      | 60                                 | 93                | 57                         | 71      |
| Gallons per cow day           | 0  | 0                   | 0              | 0       | 2.79   | 2.84                                     | 2.81    | 2.85                               | 2.80              | 2.91                       | 2.88    |
| Cost (shillings)              | 164  | 117                 | 126            | 130     | 341  | 147                                      | 241     | 259                                | 176               | 173                        | 199     |
| Manures applied               | 37   | 43                  | 36             | 40      | 251  | 34                                       | 140     | 73                                 | 73                | 60                         | 69      |
| Net cost of manures (sh.)     | 84   | 53                  | 57             | 61      | 187  | 56                                       | 119     | 141                                | 88                | 77                         | 100     |
| Standardized do. (sh.)        | 47   | 45                  | 38             | 43      | 145  | 38                                       | 90      | 78                                 | 67                | 66                         | 70      |
| Manures used up (cwts):       |  |                     |                |         |  |  |         |                                    |                   |                            |         |
| N                             | .15  | .18                 | .15            | .16     | .99  | 0  | .48     | .30                                | .30               | .29                        | .30     |
| P <sub>2</sub> O <sub>5</sub> | .61  | .51                 | .43            | .49     | .75  | .77                                      | .76     | .74                                | .73               | .50                        | .66     |
| K <sub>2</sub> O              | .07  | .13                 | .10            | .11     | .56  | .14                                      | .34     | .37                                | .16               | .28                        | .26     |
| CaO                           | 3.36                                       | 2.23                | 1.90           | 2.37    | .0   | 2.86                                     | 1.47    | 2.86                               | 2.86              | 2.85                       | 2.85    |
| Method of use                 | Ordinary Grazing<br>of young and dry stock |                     |                |         | I Silage<br>II Silage<br>(Hay pt)<br>III Ordy. | I Hay<br>II Silage<br>(pt.)<br>III Ordy. |         | I Hay<br>II Ordy.                  | I Hay<br>II Ordy. | I Hay<br>II Ordy.          |         |
| Grazing season                | 24/5<br>-25/10                             | 4ac.hay<br>4/5-4/10 | 16/5-<br>25/10 |         | 15/10  | 7/10                                     |         | 31/8                               | 25/10             | 18/10                      |         |
| Winter stock per acre         | None                                       | Little              | None           |         | None   | None                                     |         | None                               | Little            | A few sheep<br>to 16 April |         |
| Acres per cow at peak         | .20  | .53                 | .25            | .31     | -  | -  | -       | -                                  | -                 | -                          | -       |
| Rest(days)                    | None                                       | None                | 20,14          |         | n.a.   | n.a.                                     |         | n.a.                               | n.a.              | n.a.                       |         |

FARM A2

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 800 gallons |
| % WINTER MILK                             | 43%         |
| GRAZING SEASON                            | 176 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.40 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 279 gallons |

|  |  |
|--|--|
| Height                                 | 250'   |
| Soil                                   | Heavy loam   |
| Contours                               | Rolling  |
| General aspect                         | Southerly  |
| Area                                   | 160 acres  |
| Rent of grass land                     | 40/-   |
| No. of cows                            | 44: spring and autumn calving  |
| Other grazing stock                    | Followers: hoggs wintered.   |
| Fields not studied                     | Fields not grazed by cows  |
| Stock grazed elsewhere                 | None   |
| % of land under crop                   | 22%  |
| Cropping purposes                      | Stock feed: including good mashlum   |
| Silage cutting acres<br>per 100 acres  | 14   |
| No. of years' cropping<br>between leas | 2: lea mashlum, oats   |
| Length of leas                         | Indefinite: ploughed before much deterioration   |
| Sow-out crop                           | Oats   |
| Seeds mixtures                         | For 1 to 2 years hay followed by 4 to 5 years<br>grazing.  |
| Manuring                               | Ground limestone as required at sow-out.<br>Young grass: dung in autumn and no other manure,<br>or 1 cwt supers and 2 cwt grass<br>manure.<br>Grass to be mown: 2 cwts early potato manure,<br>3-4 cwts Nitro-Chalk; further<br>3 cwts Nitro-Chalk for a second cut.<br>Timothy: dung  |
| Surface cultivations                   | Harrow after dunging: harrow timothy twice more:<br>Top all grass at about 4" before end of June.  |
| General grazing system<br>for cows     | Extensive grazing: day and night on same field.  |
| Electric fence                         | The prospective additional trouble of erecting<br>and maintaining the electric fence and especially<br>of arranging suitable watering was judged unprofit-<br>able because the existing stock could not use any<br>more grass.   |
| General comments                       | The farmer recognizes that the production from and<br>intensity of cultivation of his grass might be much<br>higher; but he knows that in the year under review<br>the needs of his stock were amply met. As the<br>numbers of young stock - and perhaps of feeding<br>beasts - increase, then he will apply greater<br>quantities of manures. |





FARM A3

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 800 gallons |
| % WINTER MILK                             | 63%         |
| GRAZING SEASON                            | 195 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.10 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 219 gallons |

|  |  |
|--|--|
| Height                                 | 450' - 600'  |
| Soil                                   | Rich open alluvium: heavy loams.   |
| Contours                               | Flat at two levels: rough banks between the two (levels.   |
| Area                                   | 120 acres  |
| Rent of grass land                     | 32/8   |
| No. of cows                            | 30 (varied). The high proportion of winter milk in 1951/52 followed reorganization to increase the value of the output from the farm. A continuation of this relation of summer yield to winter yield could not be expected. |
| Other grazing stock                    | Followers  |
| Fields not studied                     | Fields not grazed by cows  |
| Stock grazed elsewhere                 | None   |
| % of land under crop                   | 16   |
| Cropping purposes                      | Stock feed   |
| Silage cutting acres<br>per 100 acres  | 53   |
| No. of years' cropping<br>between leas | 0 to 2: grass is considered the most profitable (crop.   |
| Length of leas                         | 4  |
| Sow out crop                           | Oats or direct without cover   |
| Seeds mixtures                         | Seeds mixtures prior to 1953 have been fairly complex, as the following table indicates; but the intention now is to sow mixtures of one grass with S100 clover.   |

|                            | <u>Field 6</u>                                     | <u>Field 7</u>                               | <u>Field 5</u>   |
|----------------------------|--|--|------------------|
|                            | Grass dry-<br>ing & 4yrs<br><u>Special grazing</u> | 1yr.hay<br>3 years<br><u>Special grazing</u> | Local<br>Mixture |
| Italian ryegrass:          |  |  |                  |
| Ayrshire                   | 8  | 6  | 6                |
| Hybrid                     |  | 6  |                  |
| Irish                      | 3  |  |                  |
| Perennial ryegrass:        |  |  |                  |
| Ayrshire                   | 9  | 9  | 8                |
| Evergreen                  |  | 3  |                  |
| S23                        |  | 3  |                  |
| Danish                     | 7  |  |                  |
| N.Z. short rotn.           |  | 4  |                  |
| Irish                      |  | 8  |                  |
| Kent indigenous            |  | 5  | 5                |
| Timothy: S51               |  | 4  |                  |
| Scotch                     |  | 3  | 6                |
| American                   |  | 3  |                  |
| Cocksfoot: S37             | 8  | 3  | 10               |
| S143                       |  | 4  |                  |
| Danish                     |  | 4  |                  |
| Unnamed                    |  |  | 5                |
| Early Fescue               | 8  | 4  |                  |
| Rough Stalked Meadow grass |  |  | 1                |
| Red Clover:                |  |  |                  |
| English broadleaved        | 1  |  | 2                |
| Dorset Marl Certified      |  | 1  |                  |
| Late flowering             |  |  | 1                |
| L.F. Montgomery            |  |  | 1                |
| Alteswede L.F.             | 1  | 1  |                  |
| Alsike Clover              |  |  | 1 $\frac{1}{2}$  |
| White Clover: N.Z          | 2  | 1  | 1 $\frac{1}{2}$  |
| S 100                      |  | 1  |                  |
| Kentish wild               |  |  | 1 $\frac{1}{2}$  |
|                            | <u>39</u>  | <u>41</u>                                    | <u>44</u>        |
|                            |  | <u>32</u>                                    | <u>45</u>        |

## Manuring

Shell lime as required.

Grass to be mown for silage and drying:

Spring: 5 cwts potassic supers,  
3-4 " Nitro-Chalk.

Late summer: 4-6 cwt grass or maincrop potato manures.

Grass not to be mown: lighter spring dressings;  
no late summer dressing.

## Topping

General grazing system for cows

None in 1952

Ration the lush grass by daily movements of the fence, (day and night on separate fields). In the 6 weeks or so between the two periods of intensive grazing, it was desired to dry the cows off and rest them before preparation for calving again; for this purpose the rougher grass on the higher land was adequate and did not warrant the use of the fence. This grass had deteriorated, and would not have responded sufficiently to nitrogenous manuring to warrant conserving.

In 1953 the plan has been to strip graze twice, mow once, and then strip graze again. The mowing removes any flowering stalks that have been left by the grazing animals.

In general the policy is to manure heavily and to ration the grazing in the first half of the season to allow the maximum amount to be mown for conservation.

## Fence.

3 sets of controller and battery are needed for the somewhat scattered fields. Each movement takes about 15 minutes' work.

## Special Observations.

The table gives details of the several fields. It may be observed that the very high yield of the  $1\frac{1}{2}$  acre field was authentic and the result of heavy manuring prior to ploughing out.

The field (No.7) of Italian ryegrass sown in 1952 gave a yield of 25 cwts of S.E. in 2 cuts, followed by strip grazing. The grazing yield was rather disappointing and corresponds with the experience on Farm L.2.

On the 3 fields which were grazed and mown, the cost per cwt of S.E. was about 50% higher than the estimated average cost on all the cow fields of this enquiry which were not mown, but about a third less than the corresponding costs on this farm for the cow fields not mown.

FARM A.3

| Field                         | Not mown: mainly grazed by cows              |  |                     |         | Mown: mainly grazed by cows                              |   |  |         | Sown out<br>1952  | All<br>fields |
|-------------------------------|--|--|---------------------|---------|--|---|--|---------|---|---------------|
|                               | 1  | 2  | 3                   | Average | 4  | 5   | 6  | Average | 7   |               |
| Area (acres)                  | 5  | 1.5                                      | 5.5                 | 12      | 3  | 9   | 12   | 24      | 9   | 45            |
| Years old                     | 6  | 7  | 5                   |         | 6  | 4   | 3  |         |   |               |
| <u>1952 details per acre</u>  |  |  |                     |         |  |   |  |         |   |               |
| Stock units                   | 123  | 419                                      | 204                 | 197     | 261  | 175   | 69   | 133     | 37  | 131           |
| Gallons produced              | 171  | 777                                      | 152                 | 238     | 579  | 423   | 160  | 311     | 84  | 246           |
| Net stock units               | 95   | 382                                      | 196                 | 177     | 213  | 175   | 67   | 126     | 37  | 121           |
| Net gallons                   | 161  | 689                                      | 143                 | 219     | 525  | 333   | 136  | 259     | 49  | 206           |
| S.E. harvested (cwts)         | 0  | 0  | 0                   | 0       | 3.1  | 5.6   | 31.9   | 18.4    | 20.7  | 14.0          |
| S.E. produced (cwts)          | 10.6   | 43.5                                     | 17.6                | 17.9    | 30.5   | 25.9  | 39.9   | 33.5    | 24.6  | 27.5          |
| Young stock etc. (%)          | 26   | 7  | 18                  | 13      | 0  | 1   | 10   | 3       | 10  | 8             |
| Gallons per cow day           | 1.56   | 1.99                                     | 0.91                | 1.39    | 2.22   | 2.43  | 2.58   | 2.41    | 2.50  | 2.05          |
| Cost (shillings)              | 213  | 412                                      | 251                 | 256     | 271  | 295   | 374  | 331     | 287   | 302           |
| Manures applied (shlgs)       | 141  | 218                                      | 150                 | 155     | 186  | 270   | 334  | 292     | 238   | 244           |
| Net cost of manures (sh.)     | 129  | 224                                      | 153                 | 152     | 161  | 187   | 246  | 213     | 182   | 206           |
| Standardized do. (sh.)        | 125  | 228                                      | 137                 | 143     | 167  | 252   | 268  | 249     | 174   | 191           |
| Manures used up (cwts):       |  |  |                     |         |  |   |  |         |   |               |
| N                             | 0.69   | 1.47                                     | .90                 | .88     | 1.00   | 1.39  | 1.76   | 1.53    | .91   | 1.23          |
| P <sub>2</sub> O <sub>5</sub> | 1.01   | 1.11                                     | .82                 | .94     | 1.00   | 1.23  | .94  | 1.05    | .89   | .99           |
| K <sub>2</sub> O              | .60  | .89                                      | .52                 | .60     | .67  | 1.30  | 1.42   | 1.28    | 1.04  | 1.05          |
| CaO                           | 0  | 2.87                                     | 0                   | .36     | 2.38   | 5.44  | 0  | 2.34    | 3.18  | 1.98          |
| Method of use                 | I Strip<br>II Strip<br>III Ordy.<br>IV Ordy. | I Night<br>II Strip<br>III Re-<br>seeded | I Strip<br>II Ordy. |         | I Strip<br>II Strip<br>III Strip<br>IV Silage<br>V Strip | I Cut<br>II Pt.Cut<br>twice<br>again<br>Rest<br>strip | I Cut<br>II 8ac.<br>cut thrice<br>4 ac.<br>strip |         | I Cut weeds<br>II Twice<br>cut<br>III Strip<br>IV Strip |               |
| Grazing season                | 28/4-4/10                                    | 12/5-                                    | 13/5-8/11           |         |  |   |  |         | 12/9-8/11   |               |
| Winter stock per acre         | 9 hoggs pt.<br>winter                        |  | 8 hoggs<br>pt. time |         |  |   |  |         |   |               |
| Rests (days)                  | 28,20,78                                     | 27                                       | 8,7,21,<br>21,22,32 |         | 14,6,49,45   | 14,21   | 53,28,<br>14                                     |         | between cuts<br>& 35                                    |               |

FARM A4

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 864 gallons |
| % WINTER MILK                             | 50%         |
| GRAZING SEASON                            | 180 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.38 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 220 gallons |

|   |  |
|---|--|
| Height                                  | 600'   |
| Soil                                    | Medium loam: heavy loam: peat.   |
| Contours                                | Gentle   |
| General aspect                          | Southerly  |
| Area                                    | 132 acres  |
| Rent of grassland                       | 26/-   |
| No. of cows                             | 40: Autumn calving   |
| Other grazing stock                     | Young stock  |
| Fields not studied                      | None   |
| Stock grazing elsewhere                 | Some young stock   |
| % land under crop                       | 9  |
| Cropping purposes                       | To prepare for seeding   |
| Silage: cutting acres<br>per 100 acres. | 16   |
| No. of years' cropping<br>between leas  | 1 or 2   |
| Length of leas                          | Indefinite: until they deteriorate.  |
| Sow-out crop                            | Oats   |
| Seeds mixtures                          | The mixtures are general purpose and usually contain a good proportion of cocksfoot, a grass which appears to suit the farm and the system well. Ryegrass is, however, the dominant grass. |
| Manuring                                | Dung after sowing out.<br>Dung on fields for silage.<br>2 to 4 cwts potato manure to most fields.<br>5 cwts additional sulphate of ammonia to meadows.                                     |
| Surface cultivations                    | Harrow twice to level molehills:<br>1953 top all pastures in June.   |
| General grazing system<br>for cows.     | Extensive. Day and night on same field.  |
| Fence                                   | Not used: intended to make paddocks for rotational grazing; but water supply difficulties and shortage of labour prevented this.   |

FARM A.4

| Field                         | Not mown: mainly grazed by cows |                  |                  |                  |                  | Not mown:<br>Y.S. grazing<br>5 | Mown  |               | All<br>fields |
|-------------------------------|---------------------------------|------------------|------------------|------------------|------------------|--------------------------------|---|---------------|---------------|
|                               | 1                               | 2                | 3                | 4                | Average          |                                | Cow grazing                                 | Y.S. grazing  |               |
| Area (acres)                  | 8                               | 9.5              | 16               | 17               | 50.5             | 12                             | 16  | 9             | 87.5          |
| Years old                     | 6                               | 8                | 11               | 8&10             |                  | 10                             | 3&5   | 1             |               |
| Length of lea                 | 8 or more                       | 8 or more        | 8 or more        | 8 or more        | 8 or more        | 8 or more                      | 8 or more                                   | 6             |               |
| <u>1952 details per acre</u>  |                                 |                  |                  |                  |                  |                                |   |               |               |
| Stock units                   | 347                             | 139              | 155              | 100              | 163              | 120                            | 64  | 87            | 131           |
| Gallons produced              | 562                             | 235              | 249              | 59               | 232              | 62                             | 79  | 61            | 163           |
| Net stock units               | 317                             | 139              | 152              | 100              | 158              | 120                            | 59  | 87            | 128           |
| Net gallons                   | 494                             | 235              | 246              | 59               | 220              | 62                             | 55  | 61            | 152           |
| S.E. harvested (cwts)         | 0                               | 0                | 0                | 0                | 0                | 0                              | 15.6  | 12.3          | 4.1           |
| S.E. produced (cwts)          | 34.3                            | 15.5             | 16.7             | 8.7              | 16.6             | 10.2                           | 21.3  | 20.1          | 16.9          |
| Young stock etc. (%)          | 21                              | 24               | 30               | 44               | 29               | 66                             | 12  | 54            | 34            |
| Gallons per cow day           | 2.06                            | 2.22             | 2.31             | 0.79             | 2.00             | 1.53                           | 1.39  | 1.51          | 1.86          |
| Cost (shillings)              | 119                             | 91               | 96               | 97               | 99               | 109                            | 261   | 217           | 142           |
| Manures applied (shlgs)       | 60                              | 40               | 42               | 42               | 45               | 60                             | 80  | 144           | 64            |
| Net cost of manures (sh.)     | 53                              | 37               | 41               | 41               | 42               | 49                             | 166   | 130           | 75            |
| Standardized do. (sh.)        | 41                              | 26               | 29               | 28               | 30               | 39                             | 124   | 132           | 59            |
| Manures used up (cwts):       |                                 |                  |                  |                  |                  |                                |   |               |               |
| N                             | .18                             | .10              | .10              | .10              | .11              | .18                            | 1.00  | 1.04          | .38           |
| P <sub>2</sub> O <sub>5</sub> | .33                             | .30              | .35              | .33              | .33              | .27                            | .25   | .34           | .31           |
| K <sub>2</sub> O              | .31                             | .17              | .20              | .20              | .21              | .29                            | .37   | .40           | .27           |
| CaO                           | 0                               | 0                | 0                | 0                | 0                | 0                              | 0   | 0             | 0             |
| Method of use                 | Ordinary grazing                | Ordinary grazing | Ordinary grazing | Ordinary grazing | Ordinary grazing | Ordinary grazing               | I $\frac{1}{2}$ silage<br>$\frac{1}{2}$ hay | I Hay         |               |
|                               |                                 |                  |                  |                  |                  |                                | II Ord. graz.                               | II Ord. graz. |               |
| Winter stock, per acre        | 0.7 hoggs                       | 0.7 hoggs        | 0.7 hoggs        | 1 dry cow        |                  | 0.7 hoggs                      | 0.7 hoggs                                   | 0.7 hoggs     |               |
| Rests (days)                  | 42,7,5,18                       | 14,13,9          | 18               | n.a.             |                  | 14,19,7                        |   |               |               |
| Acres per cow at peak         | .22                             | .26              | .43              | .32              | .31              | .44                            |   |               |               |
| Grazing season                | 30/4-26/10                      | 18/5-13/9        | 27/4-18/10       | 0                |                  | 11/5-9/8                       |   |               |               |

FARM L1

|   |                 |
|---|-----------------|
| MILK PER COW YEAR                         | 745 gallons     |
| % WINTER MILK                             | 53%             |
| GRAZING SEASON                            | 168 days        |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.86 acres/adj. |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 122 gallons     |

|  |  |
|--|--|
| Height                                 | 800'                                     |
| Soil                                   | Peaty land bordering on a moss           |
| Contours                               | Gentle                                   |
| General aspect                         | Little shelter                           |
| Area                                   | 86 acres equivalent to 70 adjusted acres |
| Rent of grassland                      | 30/-                                     |
| No. of cows                            | 27: autumn calving                       |
| Other growing stock                    | Followers                                |
| Fields not studied                     | Fields not grazed by cows                |
| Grazing stock elsewhere                | The young stock                          |
| % of land under crop                   | 8  |
| Cropping purpose                       | Stock feed                               |
| Silage: cutting acres<br>per 100 acres | 7  |
| No. of years' cropping<br>between leas | 1  |
| Length of leas                         | 7 to 10 years                            |
| Sow-out crop                           | The lea oats                             |
| Seeds mixtures                         | The normal seeds mixture has been:-      |

|                            | <u>lbs per acre</u> |
|----------------------------|---------------------|
| Italian ryegrass           | 6                   |
| Perennial "                | 20                  |
| Timothy                    | 5                   |
| Rough stalked meadow grass | 1                   |
| Red clover, broadleaved    | 2                   |
| lateflowering              | 2                   |
| Alsike clover              | 1                   |
| White clover, N.Z.         | <u>1</u>            |
|                            | <u>38</u>           |

Meadow fescue has been added experimentally in 1952 to make a mixture costing 104/- an acre. Broadcasting is with a spinner type fertilizer distributor.

|                                    |  |
|------------------------------------|--|
| Subsequent treatment               | 1st year, silage, aftermath grazed:<br>2nd, 3rd and 4th year, hay, aftermath grazed:<br>thereafter: grazed   |
| Manuring                           | Hay and silage: 12 tons dung.<br>All grass as well as the above, except the<br>rough ground: 3 cwts grain manure<br>1 $\frac{1}{4}$ " Nitro-Chalk  |
| Surface cultivations               | Harrow poached gateways, hand weed.<br>Topping is unusual.   |
| General grazing system<br>for cows | Paddocks are grazed rotationally. Day and<br>night on different paddocks. Foggage, strip<br>grazed, with lieback on paddocks. Normally<br>graze down to 1".  |
| Electric fence                     | In addition to its use as a permanent fence<br>to permit rotational grazing, the electric<br>fence was used for strip grazing foggage.<br>Because of its exposure to all weathers,<br>batteries costing about £5.10/- lasted only<br>about 2 years. For this reason and the<br>inconvenience due to breakdowns, a transformer<br>has been fitted, at a total cost of about £12,<br>to connect the 240 volt public supply to the<br>6 volts required for the fence. |

FARM L.1

| Field                         | Not mown: mainly grazed by cows |             |                    |               |                           |                 |         | Foggage                             | All fields |
|-------------------------------|---------------------------------|-------------|--------------------|---------------|---------------------------|-----------------|---------|-------------------------------------|------------|
|                               | 1                               | 2           | 3                  | 4             | 5                         | 6               | Average |                                     |            |
| Area (acres)                  | 21½                             | 3           | 4                  | 1             | 8                         | 29              | 47½     | 12                                  | 59½        |
| Adjusted area (acres)         | 21½                             | 3           | 4                  | 1             | 8                         | 12.8            | 31.3    | 12                                  | 43.3       |
| Years old                     | 6                               | 5           | 17                 | 10            | 10                        | ?               |         | Mixed                               |            |
| Length of lea                 | 8                               | 9           | (Ploughed<br>1953) | Permanent     | Permanent                 | Permanent       |         |                                     |            |
| <u>1952 details per acre</u>  |                                 |             |                    |               |                           |                 |         |                                     |            |
| Stock Units                   | 140                             | 126         | 156                | 220           | 119                       | 101             | 122     | 81                                  | 111        |
| Gallons produced              | 310                             | 277         | 308                | 494           | 264                       | 18              | 181     | 178                                 | 180        |
| Net stock units               | 137                             | 125         | 143                | 219           | 117                       | 101             | 120     | 63                                  | 104        |
| Net gallons                   | 197                             | 204         | 165                | 358           | 200                       | 8               | 122     | 9                                   | 91         |
| S.E. harvested (cwts)         | 0                               | 0           | 0                  | 0             | 0                         | 0               | 0       | 23.3                                | 6.5        |
| S.E. produced (cwts)          | 14.5                            | 13.8        | 14.2               | 24.1          | 13.1                      | 7.7             | 11.5    | 28.1                                | 16.1       |
| Young stock, etc. (%)         | 0                               | 0           | 0                  | 0             | 0                         | 0               | 0       | 0                                   | 8          |
| Gallons per cow day           | 2.21                            | 2.20        | 1.97               | 2.25          | 2.22                      | 0.25            | 1.65    | 2.20                                | 1.77       |
| Cost (shillings)              | 175                             | 226         | 84                 | 126           | 109                       | 51              | 99      | 375                                 | 181        |
| Manures applied (shlgs)       | 25                              | 54          | 0                  | 54            | 25                        | 0               | 15      | 274                                 | 87         |
| Net cost of manures (sh.)     | 88                              | 131         | 26                 | 62            | 46                        | 5               | 39      | 255                                 | 99         |
| Standardized do. (sh.)        | 97                              | 65          | 24                 | 32            | 47                        | 4               | 32      | 253                                 | 93         |
| Manures used up (cwts):       |                                 |             |                    |               |                           |                 |         |                                     |            |
| N                             | .23                             | .15         | 0                  | 0             | .22                       | 0               | .09     | 1.69                                | .53        |
| P <sub>2</sub> O <sub>5</sub> | .23                             | .50         | .11                | .26           | .11                       | .04             | .13     | .74                                 | .30        |
| K <sub>2</sub> O              | 1.09                            | .78         | .09                | .18           | .09                       | .03             | .21     | 1.38                                | .54        |
| CaO                           | 5.14                            | 0           | 5.00               | 5.00          | 5.14                      | .39             | 2.68    | 0                                   | 1.94       |
| Method of use                 | Rot.Graz.                       | Rot.Graz.   | Rot.Graz.          | Rot.Graz.     | Night past.<br>throughout | Rot.Graz.       |         | Hay, strip;<br>lieback<br>elsewhere |            |
| Acres per cow at peak         | .11                             | .13         | .17                | .04           | .35                       | .6(adj.)        | .23     |                                     |            |
| Grazing season                | 2/6-18/10                       | 24/5-25/10  | 11/5-20/9          | 19/5-4/10     | 16/5-11/10                | 18/5-25/10      |         |                                     |            |
| Rests (days)                  | 20,22,21,38                     | 20,21,21,58 | 21,17,19,18        | 25,27,24,27,7 | None                      | None            |         |                                     |            |
| Winter stock                  | None                            | None        | None               | None          | Y.Stock to<br>mid March   | Cow<br>exercise |         | None                                |            |



FARM L2

|  |             |
|--|-------------|
| MILK PER COW YEAR                      | 860 gallons |
| % WINTER MILK                          | 43%         |
| GRAZING SEASON                         | 180 days    |
| ACRES PER STANDARD COW FOR THAT SEASON | 4.08 acres  |
| NET GALLONS PER ACRE FROM COW FIELDS   | 322 gallons |

|                                     |   |
|-------------------------------------|---|
| Height                              | 300'                                      |
| Soil                                | Heavy clay                                |
| Watering of grazed fields           | All good                                  |
| Contours                            | Level                                     |
| Area                                | 100 acres                                 |
| Rent of grassland                   | 13/4d                                     |
| No. of cows                         | 27, autumn calving                        |
| Other grazing stock                 | Normal followers                          |
| Fields not studied                  | None                                      |
| Grazing stock elsewhere             | Young stock                               |
| % of land under crop                | 24  |
| Cropping purposes                   | Stock feed: some sale potatoes and wheat. |
| Silage: Cutting acres per 100 acres | 36  |
| No. of years' cropping between leas | 3   |
| Length of leas                      | Until they deteriorate or have failed.    |
| Sow out crops                       | Oats                                      |
| Seeds mixtures                      |   |

|                              | <u>lbs. per acre</u> |
|------------------------------|----------------------|
| Italian ryegrass             | 6                    |
| Perennial ryegrass: Ayrshire | 14                   |
| Kentish                      | 4                    |
| N.Z. Mother                  | 2                    |
| Cocksfoot: S143              | 2                    |
| S26                          | 2                    |
| Timothy: Canadian            | 3                    |
| Scotch                       | 3                    |
| Roughstalked meadow grass    | 1                    |
| Chewing's fescue             | 1/2                  |
| Clover: Red                  | 2                    |
| Lateflowering red            | 1                    |
| Alsyke                       | 1                    |
| N.Z. White                   | 1/2                  |
| Kentish wild white           | 1/2                  |
|                              | <u>42 1/2</u>        |

Manuring, usual

The first year is usually mown once for silage: thereafter the sward is grazed for several years.  
 10 tons dung to crop before sow-out.  
 10 cwts potassic mineral phosphate and ground limestone as necessary, to sow-out.  
 5 cwts potato fertilizer in other years.

Topping

If necessary

General grazing system for cows:

Rotational grazing on small fields: day and night on same field.

Mowing surplus grass

Surplus on paddocks is ensiled.

Fence

Electric fence is used as permanent divisions for paddocks.

Special circumstances of 1952:

A very favourable year for grass.

FARM L2.

| Field                         | Not mown: mainly grazed by cows |                 |                   |                        |         | Not Mown<br>Y.S.<br>Grazing | Mown: mainly grazed by cows   |                 |                  |         | Mown:<br>Y.S.<br>Grazing | All<br>fields |
|-------------------------------|---------------------------------|-----------------|-------------------|------------------------|---------|-----------------------------|-------------------------------|-----------------|------------------|---------|--------------------------|---------------|
|                               | 1                               | 2               | 3                 | 4                      | Average | 5                           | 6                             | 7               | 8                | Average | 9                        |               |
| Area (acres)                  | 8                               | 3.5             | 4                 | 4                      | 19.5    | -9                          | 3.5                           | 10              | 8.5              | 22      | 4                        | 54.5          |
| Years old                     | 4                               | 2               | 3                 | 3                      |         | 10                          | 2                             | 1               | 2                |         | 3                        |               |
| Length of lea                 | 7                               | 7               | 7                 | 7                      |         | 10                          | 7                             | 1               | 7                |         | 7                        |               |
| 1952 details per acre         |                                 |                 |                   |                        |         |                             |                               |                 |                  |         |                          |               |
| Stock units                   | 247                             | 170             | 139               | 110                    | 183     | 183                         | 163                           | 31              | 39               | 55      | 92                       | 125           |
| Gallons produced              | 541                             | 202             | 342               | 264                    | 383     | -                           | 153                           | 73              | 89               | 92      | -                        | 174           |
| Net stock units               | 220                             | 170             | 139               | 110                    | 172     | 183                         | 163                           | 29              | 39               | 54      | 92                       | 120           |
| Net gallons                   | 428                             | 187             | 307               | 242                    | 322     | -                           | 139                           | 62              | 74               | 79      | -                        | 147           |
| S.E. harvested (cwts)         | -                               | -               | -                 | -                      | -       | -                           | 14.0                          | 20.9            | 18.4             | 18.8    | 12.3                     | 8.5           |
| S.E. produced (cwts)          | 25.7                            | 16.7            | 17.1              | 13.5                   | 19.8    | 13.5                        | 29.1                          | 24.4            | 22.9             | 24.6    | 19.0                     | 20.6          |
| Young stock etc. (%)          | 10                              | 60 <sup>x</sup> | 4                 | 8                      | 17      | 53                          | 18                            | 0               | 0                | 8       | 100                      | 29            |
| Gallons per cow per day       | 2.43                            | 2.94            | 2.55              | 2.62                   | 2.52    | 0                           | 1.15                          | 2.34            | 2.23             | 1.81    | 0                        | 1.95          |
| Cost (shillings)              | 185                             | 241             | 187               | 205                    | 200     | 150                         | 221                           | 301             | 194              | 247     | 208                      | 211           |
| Manures applied (shlgs.)      | 101                             | 102             | 102               | 102                    | 102     | 75                          | 102                           | 289             | 57               | 170     | 101                      | 125           |
| Net cost manures (do.)        | 113                             | 123             | 97                | 97                     | 108     | 95                          | 72                            | 168             | 116              | 141     | 131                      | 121           |
| Standardized " (do.)          | 94                              | 106             | 102               | 104                    | 100     | 107                         | 106                           | 89              | 102              | 97      | 114                      | 101           |
| Manures used up: (cwts.)      |                                 |                 |                   |                        |         |                             |                               |                 |                  |         |                          |               |
| N                             | .30                             | .48             | .48               | .48                    | .41     | .30                         | .48                           | .32             | .24              | .31     | .30                      | .34           |
| P <sub>2</sub> O <sub>5</sub> | .69                             | .84             | .77               | .77                    | .75     | .91                         | .84                           | .82             | 1.05             | .91     | .97                      | .86           |
| K <sub>2</sub> O              | .65                             | .52             | .52               | .52                    | .57     | .67                         | .52                           | .58             | .94              | .71     | .95                      | .67           |
| CaO                           | 4.37                            | 3.14            | 3.25              | 3.25                   | 2.36    | 6.22                        | 3.14                          | 2.10            | 1.41             | 2.00    | 4.00                     | 3.45          |
| Method of use                 | Ord.                            | Rot.            | Rot.              | Rot.<br>Topped<br>19/7 |         | Dry and<br>Y. Stock         | I Rot.<br>II Sil.<br>III Padd | ISilage<br>II " | I Hay<br>II Ord. |         | I Silage<br>II Y. Stock  |               |
| Acres per cow at peak         | .38                             | .17             | .19               | .19                    | .23     | .64                         | .16                           | .47             | .42              | -       | -                        | -             |
| Approx. grazing season        | 27/4-23/10                      | 27/4-18/10      | 1/6-18/10         | 4/5-18/10              |         | 6/4-18/10                   |                               |                 |                  |         |                          |               |
| Winter stock - None           |                                 |                 |                   |                        |         |                             |                               |                 |                  |         |                          |               |
| Rests (days)                  | 7, 19, 10,<br>7, 9, 19, 7       | 22, 21          | 26, 16,<br>11, 22 | 24, 11,<br>20, 11      |         | None                        | n.a.                          | 19, 13,<br>3    | 20               |         | n.a.                     |               |

x Note: This field is included in this group to be with the rest of the paddocks.

FARM L3

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | n a         |
| % WINTER MILK                             | 45%         |
| GRAZING SEASON                            | 187 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.60 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 246 gallons |

|  |  |
|--|--|
| Height                                 | 300'   |
| Soil                                   | Sandy loam: majority of these fields are on black oily peat. Some water logging and some flooding.   |
| Area of farm                           | Over 300 acres   |
| Rent of grassland                      | 21/-   |
| No. of cows                            | 120: calving in spring and autumn  |
| Other grazing stock                    | Followers  |
| Fields not studied                     | Fields not grazed by cows in milk.   |
| Stock grazed elsewhere                 | Dry cows and followers   |
| % of land under crop                   | 44   |
| Silage, cutting acres<br>per 100 acres | 7 (arable)   |
| No. of years' cropping<br>between leas | On this grassland, 2.  |
| Length of leas                         | Indefinite: until deterioration is great.  |
| Seeds mixtures:                        | <u>lbs. per acre</u>   |
|  | 8  |
| Ryegrass - Italian                     | 18   |
| Perennial                              | 4  |
| Evergreen                              | 3  |
| Cocksfoot                              | 3  |
| Timothy                                | 1½   |
| Red clover - Broadleaved               | 1½   |
| Lateflowering                          | 1  |
| Wild white clover                      | <u>40</u>  |
| Manuring of this land                  | Arable silage: 4 cwts potato manure.<br>Sow-out oats: no manure.<br>1st year seeds: 1 cwt Nitro-Chalk.<br>Other grass: 0 to 5 cwts Nitro-Chalk.  |
| Surface cultivations                   | Nearly all grass is Parmiter harrowed in spring.   |
| General grazing system<br>for cows     | One field was divided into paddocks.<br>Others are grazed extensively: normally a week or fortnight on one field night and day.  |
| Surplus grass                          | One paddock was ensiled once.<br>The grass management is based on the experience that enough silage can be made from the ample growth prior to August, which is also adequate for the grazing stock. Whether more intensive treatment of the grass would produce growth that could be profitably used cannot be proved from these details of yields. |
| Fencing                                | The paddocks were made with permanent barbed wire fences.  |
| Special considerations                 | In interpreting these results some allowance should be made for the effect of lameness which the cows developed during their long daily walks to the pastures.   |

FARM L3.

| Field                                      | Not mown: mainly grazed by cows  |                 |           |          |          |                        | Mown: mainly grazed by cows. |         |          |         |         |         | All Fields |
|--|--|-----------------|-----------|----------|----------|------------------------|------------------------------|---------|----------|---------|---------|---------|------------|
|  | 1  | 2               | 3         | 4        | 5        | Average <sup>(a)</sup> | 6                            | 7       | 8        | 9       | 10      | Average |            |
| Area (acres)                               | 23   | 15              | 13        | 35       | 31       | 132                    | 10                           | 7.5     | 13.5     | 21      | 10      | 62      | 194        |
| Years old                                  | 12   | 11              | 8         | 14       | 14       |                        | 5                            | 3       | Old      | 2       | 1       |         |            |
| Length of lea                              | Indef.   | Indef.          | Indef.    | Indef.   | Indef.   |                        | Indef.                       | 3       | Indef.   | Indef.  | Indef.  |         |            |
| 1952 details per acre                      |  |                 |           |          |          |                        |                              |         |          |         |         |         |            |
| Stock units                                | 261  | 223             | 128       | 93       | 59       | 126                    | 46                           | 48      | 110      | 59      | 106     | 74      | 109        |
| Gallons produced                           | 660  | 562             | 356       | 249      | 158      | 328                    | 128                          | 123     | 172      | 128     | 227     | 153     | 272        |
| Net stock units                            | 248  | 205             | 128       | 90       | 59       | 121                    | 46                           | 48      | 110      | 53      | 103     | 72      | 105        |
| Net gallons                                | 385  | 393             | 356       | 196      | 158      | 246                    | 123                          | 39      | 132      | 20      | 2       | 61      | 187        |
| S.E. harvested (cwts)                      | .8   | -               | -         | -        | -        | .1                     | 8.8                          | 6.7     | 7.4      | 10.0    | 13.4    | 9.4     | 3.1        |
| S.E. produced (cwts)                       | 27.6   | 23.9            | 17.4      | 11.0     | 7.9      | 14.5                   | 14.9                         | 11.1    | 18.4     | 14.4    | 21.0    | 16.0    | 15.0       |
| Young stock (%)                            | 0  | 0               | 0         | 0        | 0        | neg.                   | 4                            | 0       | 0        | 0       | 0       | neg.    | neg.       |
| Gallons per cow day                        | 2.53   | 2.52            | 2.77      | 2.68     | 2.68     | 2.61                   | 2.92                         | 2.55    | 1.57     | 2.12    | 2.15    | 2.07    | 2.49       |
| Cost (shillings)                           | 93   | 51              | 52        | 47       | 97       | 58                     | 94                           | 110     | 132      | 60      | 94      | 93      | 79         |
| Manures applied (shlgs.)                   | 28   | 0               | 0         | 0        | 0        | 5                      | 31                           | 31      | 78       | 0       | 31      | 31      | 13         |
| Net cost of manures ( " )                  | 44   | 11              | 11        | 7        | 12       | 17                     | 38                           | 49      | 88       | 5       | 38      | 39      | 24         |
| Standardized do. ( " )                     | 48   | 12              | 21        | 6        | 17       | 20                     | 36                           | 53      | 84       | 9       | 37      | 40      | 26         |
| Manures used up (cwts):                    |  |                 |           |          |          |                        |                              |         |          |         |         |         |            |
| N  | .27  | -               | -         | -        | -        | .05                    | .30                          | .30     | .75      | -       | .31     | .30     | .13        |
| P <sub>2</sub> O <sub>5</sub>              | .08  | .27             | .08       | .08      | -        | .08                    | .08                          | .03     | .11      | -       | .08     | .05     | .08        |
| K <sub>2</sub> O                           | .09  | .09             | .09       | .09      | -        | .07                    | .09                          | .06     | .12      | -       | .09     | .06     | .07        |
| CaO  | 4.29   | -               | 4.29      | -        | 4.87     | 2.80                   | -                            | 5.72    | -        | 2.71    | -       | 1.61    | 2.42       |
| Method of use                              | Grazed<br>in 3<br>paddocks,<br>1 of which<br>was cut<br>once for<br>silage | Ord.            | Ord.      | Ord.     | Ord.     |                        | ISilage                      | ISilage | I Silage | I Hay   | I Hay   |         |            |
|  |  |                 |           |          |          |                        | II Ord.                      | II Ord. | II Ord.  | II Ord. | II Ord. |         |            |
| Acres per cow at peak                      | .18  | .44             | .38       | 1.1      | .97      | .45                    |                              |         |          |         |         |         |            |
| Grazing season                             | 5/5-7/11   | 4/5-7/11        | 28/5-26/8 | 5/5-1/11 | 21/5-7/9 |                        |                              |         |          |         |         |         |            |
| Rests (days)                               | 4 - 38   | 14, 5, 7,<br>24 | None      | None     | None     |                        |                              |         |          |         |         |         |            |
| Winter stock per acre:                     |  |                 |           |          |          |                        |                              |         |          |         |         |         |            |
| 0.6 sheep to 28th Feb.<br>over whole farm. |  |                 |           |          |          |                        |                              |         |          |         |         |         |            |

(a) Includes one 15-acre field not listed in detail and includes Field 1, part of which was mown once.

FARM 14

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 850 gallons |
| % WINTER MILK                             | 4.8%        |
| GRAZING SEASON                            | 171 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.46 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 208 gallons |

|  |  |
|--|--|
| Height                                 | 650'   |
| Soil                                   | Loam; sandy loam with rock: peat.  |
| Contours                               | Gentle   |
| Aspect                                 | South easterly   |
| Area                                   | 125 acres  |
| Rent of grassland                      | 28/6   |
| No. of cows                            | 37: chiefly early autumn calving.  |
| Other grazing stock                    | Followers: a few B.L. ewes: some hogs wintered.  |
| Fields not studied                     | Fields not grazed by cows in milk  |
| Stock grazed elsewhere                 | Young stock  |
| % of land under crop                   | 25   |
| Cropping purposes                      | Stock feed   |
| Silage, cutting acres<br>per 100 acres | 5  |
| No. of years' cropping<br>between leas | 3  |
| Length of leas                         | Over 8: ploughed in turn to keep up the area<br>of oats to cover the stock needs.  |
| Sow-out crop                           | Oats   |
| Seeds mixtures                         | Local mixture of repute: now reducing cocksfoot<br>because the practice of taking as many as 5 years<br>hay tends to encourage complete predominance of<br>cocksfoot.  |
| Manuring                               | In past years, lime and potato manures usually.<br>1952 5 cwts potato manure on one field and<br>5 cwts potassic mineral phosphate, with<br>3 cwts Nitro-Chalk on another.<br>In future, ground mineral phosphate.   |
| Surface cultivations                   | None: topping by machine, or hand weeding.   |
| General grazing system<br>for cows.    | Rotational grazing of paddocks until the end of<br>July: then extensive grazing.<br>The individual paddocks were grazed bare -<br>the milk yield usually falling somewhat as they<br>became bare - and were then rested except for a<br>very light stocking of sheep for from 11 to 31<br>days. It was not thought worth while to attempt<br>to ensile any of the foggage or any parts of the<br>pasture fields that were relieved of stock.<br>Silage was taken on grass and arable crops<br>in 1950, 1951 and 1952; but none was made in<br>1953 because of the greater convenience, on this<br>farm, of feeding roots.  |
| Electric fence                         | Used for dividing the one cow field into 5 paddocks<br>in 1951, fanning out from one corner where the<br>water was. The energy was provided by a spare<br>tractor battery and the normal attention required<br>was merely half a day at the beginning of the<br>season and a negligible amount to take the battery<br>for charging. Changing the 'gate' took a matter<br>of seconds only. But this was not a 'normal'<br>year, and one cow developed an immunity from the<br>shock, would put her back under the wire and break<br>it. This happened frequently. Hence although<br>there was apparently an increase in carrying<br>capacity associated with the manuring and fencing,<br>the fence was not used in 1953. |
| General                                | The wintered hogs and the half score Border<br>Leicester ewes and their lambs keep the ragwort<br>down.  |

## Farm L4 (contd.)

It is thought that the wintering of the sheep does not delay the opening of the cow grazing season; for at 650 feet it is unlikely, the farmer thinks, that spring growth will commence before warmth develops.

The farmer considers that the 1952 grazing season was not quite so good as that of 1953, and has tentatively concluded that it will be more profitable for him to avoid applying nitrogen to his grass land.

Fields not mown, mainly grazed by cows

| Field                         | 1                               | 2          | Average | Fodderage         |
|-------------------------------|---------------------------------|------------|---------|-------------------|
| Area (acres)                  | 29                              | 20         | 49      | 33                |
| Years old                     | 5                               | 3 & 8      |         | Various           |
| Length of lea                 | Over 8                          | Over 8     |         |                   |
| 1952 details per acre         |                                 |            |         |                   |
| Stock units                   | 131                             | 173        | 148     | 25                |
| Gallons produced              | 324                             | 159        | 256     | 67                |
| Net stock units               | 131                             | 150        | 139     | 22                |
| Net gallons                   | 284                             | 98         | 208     | 21                |
| S.E. harvested (cwts)         | -                               | -          | -       | 35.4              |
| S.E. produced (cwts)          | 16.0                            | 13.2       | 14.9    | 37.5              |
| Young stock etc. (%)          | 9                               | 42         | 25      | 4                 |
| Gallons per cow day           | 2.72                            | 1.57       | 2.30    | 2.77              |
| Cost (shillings)              | 145                             | 142        | 144     | n.a.              |
| Manures applied (shlgs.)      | 80                              | 92         | 85      | n.a.              |
| Net cost of manures (shlgs.)  | 75                              | 80         | 77      | n.a.              |
| Standardized do.              | 92                              | 77         | 86      | n.a.              |
| Manures used up (cwts)        |                                 |            |         |                   |
| N                             | .30                             | .30        | .30     | n.a.              |
| P <sub>2</sub> O <sub>5</sub> | .83                             | .86        | .84     | n.a.              |
| K <sub>2</sub> O              | .64                             | .50        | .59     | n.a.              |
| CaO                           | 2.86                            | -          | 1.69    | n.a.              |
| Method of use                 | Rotational grazing (5 paddocks) | Ord.       |         | I Hay<br>II Strip |
| Acres per cow at peak         | .17                             | .6         | .24     |                   |
| Grazing season                | 27/4-27/9                       | 17/4-14/10 |         |                   |
| Winter stock per acre         | .6 sheep                        | .6 sheep   |         |                   |
| Rests (days)                  | from 11 to 31                   | None       |         |                   |

FARM K1

|  |             |
|--|-------------|
| MILK PER COW YEAR                      | 650 gallons |
| % WINTER MILK                          | 40%         |
| GRAZING SEASON                         | 184 days    |
| ACRES PER STANDARD COW FOR THAT SEASON | 1.55 acres  |
| NET GALLONS PER ACRE FROM COW FIELDS   | 222 gallons |

|                                     |   |
|-------------------------------------|---|
| Height                              | Between sea level and 100'  |
| Soil                                | Belts of deep clay and thin soil on granite: some salt marshes. Young stock fields were rough, with whins.  |
| Area                                | 400 acres   |
| Rent of grassland                   | 20/-  |
| No. of cows                         | 60: half spring, half autumn calving.   |
| Other grazing stock                 | Young stock: bought lambs fattened, hoggs wintered.   |
| Fields not studied                  | Fields not grazed   |
| Stock grazed elsewhere              | None  |
| % of land under crop                | 29  |
| Cropping purpose                    | Sale grain & hay: stock feed.   |
| Silage                              | None  |
| No. of years' cropping between leas | Better land, 3-4;<br>Poor land, 2.  |
| Length of leas                      | Better land, 2:<br>poor land, as long as possible.  |
| Sow-out crop                        | Oats<br>In 1952 reseeded of old pasture after two years under crop (barley, then roots) necessitated ploughing, and took in all 6.8 man hours, and 6.8 tractor hours per acre, and cost, with seeds at 95/- an acre, and overheads, £9.13/- an acre. Because of the presence of charlock seeding was without a nurse crop.  |
| Manuring                            | Grass, about 5 cwts ground mineral phosphate.<br>1½ cwts muriate of potash, and 1½ cwts sulphate of ammonia. Clover grows well despite high lime requirement. Basic slag is used.<br>Corn crops, 6 cwts grain manure.<br>Roots, heavy dung.   |
| Topping                             | Mown at 2" or so if necessary: this occurred on the sow-out and one other field.  |
| General grazing system for cows     | Electric fence to give two days' supply at a time, (2-3 days' on foggage). Night and day on same field.   |
| Fence                               | Infrequent moving of the fence to save labour and because of awkward shape of fields. He had no reel. The variation in the quality of the soil made it difficult to estimate the area needed for a single day. Cows were continually breaking through and it was difficult to find time for attention to the fence. The farmer attributed the lack of respect for the fence to having failed to train the cows properly; for they had been introduced to the fence in a spell of dry weather on an area so small that when fighting commenced cows were quickly driven through the wire, and learned to ignore it. The only occasion on which the fence was used in 1953 was to feed foggage in 3-acre breaks to prevent waste. |
| Special circumstances of 1952       | It happened that during the wet weather the strips were on the heavy clay belts, and during the dry weather they happened to be on the thin belts.  |

FARM K1.

| Field                                   | Sown out<br>1952                  | Not mown: mainly grazed by cows |                        |         | Not mown: not mainly grazed by cows. |                      |                       |                  | Foggage            | All<br>fields     |
|---|-----------------------------------|---------------------------------|------------------------|---------|--------------------------------------|----------------------|-----------------------|------------------|--------------------|-------------------|
|   | 1                                 | 2                               | 3                      | Average | 4                                    | 5                    | 6                     | Average          |                    |                   |
| Area (acres)                            | 14                                | 16                              | 29                     | 45      | 31                                   | 26 $\frac{1}{2}$     | 16 $\frac{3}{4}$      | 74 $\frac{1}{4}$ | 71                 | 204 $\frac{1}{4}$ |
| Years old                               | 0                                 | Old                             | Pt.3: Pt.old           |         | Old                                  | Old                  | Old                   |                  | 1-2 yrs<br>chiefly |                   |
| Length of leaf                          | 4                                 | Over 8                          | Over 8                 |         | Over 8                               | Over 8               | Over 8                |                  |                    |                   |
| <u>1952 details per acre</u>            |                                   |                                 |                        |         |                                      |                      |                       |                  |                    |                   |
| Stock units                             | 180                               | 147                             | 116                    | 146     | 100                                  | 49                   | 193                   | 103              | 30                 | 88                |
| Gallons produced                        | 320                               | 333                             | 256                    | 283     | -                                    | 16                   | -                     | 6                | 55                 | 105               |
| Net stock units                         | 180                               | 147                             | 106                    | 121     | 100                                  | 49                   | 193                   | 103              | 30                 | 87                |
| Net gallons                             | 265                               | 246                             | 209                    | 222     | -                                    | 4                    | -                     | 2                | 15                 | 73                |
| S.E. harvested (cwts)                   | -                                 | -                               | -                      | -       | -                                    | -                    | -                     | -                | 20.0               | 7.0               |
| S.E. produced (cwts)                    | 19.2                              | 16.3                            | 12.5                   | 13.8    | 7.4                                  | 3.7                  | 14.2                  | 7.6              | 22.5               | 15.0              |
| Young stock etc (%)                     | 11                                | 0                               | 9                      | 17      | 100                                  | 82                   | 81                    | 89               | 0                  | 44                |
| Gallons per cow day                     | 2.01                              | 2.27                            | 2.69                   | 1.94    | -                                    | 1.89                 | -                     | .5               | 1.84               | 2.03              |
| Cost (shillings)                        | 205                               | 164                             | 144                    | 151     | 40                                   | 89                   | 95                    | 70               | n.a.               | n.a.              |
| Manures applied (shlgs.)                | 0                                 | 90                              | 62                     | 72      | 0                                    | 28                   | 45                    | 20               | n.a.               | n.a.              |
| Net cost of manures ( " )               | 98                                | 93                              | 65                     | 75      | 1                                    | 36                   | 42                    | 23               | n.a.               | n.a.              |
| Standardized do. ( " )                  | 56                                | 109                             | 88                     | 95      | 1                                    | 49                   | 40                    | 27               | "                  | "                 |
| Manures used up (cwts)                  |                                   |                                 |                        |         |                                      |                      |                       |                  |                    |                   |
| N                                       | -                                 | .33                             | .29                    | .30     | -                                    | -                    | -                     | -                | "                  | "                 |
| P <sub>2</sub> O <sub>5</sub>           | .69                               | 1.20                            | .99                    | 1.07    | neg.                                 | 1.12                 | 1.11                  | .66              | "                  | "                 |
| K <sub>2</sub> O                        | .65                               | .55                             | .50                    | .52     | "                                    | .16                  | .19                   | .10              | "                  | "                 |
| CaO                                     | 2.14                              | 5.00                            | 2.45                   | 3.36    | -                                    | 2.86                 | -                     | 1.02             | "                  | "                 |
| Method of use                           | I Strip<br>(7 wks.)<br>II Y.Stock | I Strip                         | I Strip                |         | Y.Stock                              | Y.Stock              | Dry and<br>Y. Stock   |                  | I Hay              |                   |
|   |                                   | II Strip                        | II Run<br>through      |         | Ordinary                             | Ord.and<br>run thro' |                       |                  | II Strip           |                   |
|   |                                   | III Ord.                        |                        |         |                                      |                      |                       |                  |                    |                   |
| Acres per cow at peak<br>Grazing season | Strip                             | Strip                           | Strip                  | Strip   | 1.9                                  | 5.3                  | 3.3                   |                  |                    |                   |
|   |                                   | 28/5-1/11                       | 2/5-1/11               |         | 27/4-4/10                            | 4/5-20/9             | 1/5-11/10             |                  |                    |                   |
| Rests (days)                            | 45                                | 62, 14                          | n.a.                   |         | None                                 | None                 | None                  |                  |                    |                   |
| Winter stock per acre                   | -                                 | 1.2 hfrs.<br>to Dec.31          | 8.3 sheep<br>to Dec.31 |         | 8 sheep<br>to April                  | .8 hfrs.<br>to April | 1.2 hfrs.<br>to April |                  |                    |                   |
|   |                                   |                                 |                        |         |                                      | Cows<br>exercise     |                       |                  |                    |                   |



FARM W1.

|   |            |
|---|------------|
| MILK PER COW YEAR                         | n.a.       |
| % WINTER MILK                             | 45%        |
| GRAZING SEASON                            | 210 days   |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.13 acres |

## NO COW FIELDS NOT MOWN

|  |   |
|--|---|
| Height                                 | 150'  |
| Soil                                   | Medium loam on heavy clay: some rocky outcrops. |
| Contours                               | Level   |
| Aspect                                 | Southerly                                       |
| Area                                   | 310 acres                                       |
| Rent of grassland                      | 17/6  |
| No. of cows                            | 80: calvings irregular as yet                   |
| Other grazing stock                    | Followers; a few store bullocks and hill ewes   |
| Fields not studied                     | Fields not grazed by cows                       |
| Stock grazed elsewhere                 | None  |
| % of land under crop                   | 33  |
| Cropping purposes                      | Stock feed: sale grain                          |
| Silage cutting acres<br>per 100 acres  | 18  |
| No. of years' cropping<br>between leas | 4   |
| Length of leas                         | 4   |
| Sow-out crop                           | Oats  |
| Seeds mixtures                         |   |

|                                 |                         | <u>lbs per acre</u> |                |
|---------------------------------|-------------------------|---------------------|----------------|
|                                 |                         | <u>1950</u>         | <u>1951</u>    |
|                                 |                         | <u>seeding</u>      | <u>seeding</u> |
| Italian ryegrass: Irish         |                         | 6                   |                |
|                                 | Ayrshire                |                     | 6              |
| Perennial "                     | : S23                   |                     | 3              |
|                                 | Ayrshire                | 9                   | 8              |
|                                 | Irish                   | 9                   | 8              |
| Cocksfoot                       | S26                     | 5                   | 3              |
|                                 | S37                     |                     | 4              |
| Timothy                         | Scotch                  |                     | 5              |
|                                 | Scandinavian            | 5                   |                |
| Meadow fescue                   | Danish                  | 5                   |                |
| Rough stalked meadow grass      |                         | 1                   | 1              |
| Red clover broadleaved: English |                         | 1                   |                |
|                                 | Cotswold                | 1                   |                |
|                                 | -                       |                     | 1              |
| " "                             | lateflowering: Cotswold | 1                   |                |
|                                 | Swedish                 |                     | 1              |
|                                 | Montgomery              |                     | 1              |
|                                 | Dorset marl             |                     | 1              |
| Alsike clover                   |                         |                     | 1              |
| White clover:                   | English wild            | $\frac{1}{2}$       | $\frac{1}{2}$  |
|                                 | N.Z.                    | $\frac{1}{2}$       |                |
|                                 | N.Z.Mother              |                     | $\frac{1}{2}$  |
|                                 |                         | <u>11</u>           | <u>11</u>      |

Although the farmer has not had long experience of this farm he has decided to reduce the amount of cocksfoot in the seeds mixtures and to substitute timothy. The reason is the difficulty he experiences of getting the cocksfoot eaten once it attains a certain degree of maturity. One field sown with a mixture containing a good deal of commercial cocksfoot and now due for ploughing probably owes its relatively poor yield to this fact.

## Manuring

12 tons dung to greencrop before sow-out oats.  
3 tons of ground limestone at sow-out if necessary, (repeated two years later on one field), and, normally, 7 cwts potassic mineral phosphate each year. In/

## Manuring (Contd.)

In addition, 4 cwts early potato fertilizer or 2 to 4 cwts Nitro-Chalk was applied in the year under review. All crops receive some kind of manure.

## Surface cultivations

Roll in spring and sometimes chainharrow. No weeding necessary on these fields all of which were mown.

## General grazing system for cows

Graze in strips: night and day on same field. Lieback on same field. Graze extensively when dung would become over concentrated at the lieback end. Make silage or hay of surplus grass as is convenient. Fields are eaten bare at each grazing.

## Electric fence

In all, the fence required 100 hours of labour. It is used for folding kale as well as grass.

The fencing unit consisted of a 6 volt accumulator and controller, light wire and stakes. The essentials of a straight, taut wire were soon learned in the hard school of the experience of having to mend a broken fence singlehanded.

The farmer is confident that his return in 1951, 1952 and 1953 from controlled grazing has been substantially higher than under ordinary grazing, which he practised in the two years before. As the labour staff and equipment are adequate to deal with silage and hay cuts, the arrangement seems to be both highly productive and convenient. It should, however, be said that 1952 and 1953 were favourable seasons for this farm.

## FARM W1

## FIELDS MOWN AND GRAZED

| Field                         | 1  | 2                  | 3                  | 4                                     | Average |
|-------------------------------|--|--------------------|--------------------|---------------------------------------|---------|
| Area, acres                   | 24   | 30                 | 24                 | 30                                    | 108     |
| Years old                     | 4  | 2                  | 3                  | 1                                     | -       |
| Length of lea                 | 4  | 4                  | 4                  | 4                                     | -       |
| <u>1952 details per acre</u>  |  |                    |                    |                                       |         |
| Stock units                   | 164  | 186                | 191                | 117                                   | 163     |
| Gallons produced              | 206  | 412                | 363                | 174                                   | 289     |
| Net stock units               | 141  | 178                | 191                | 114                                   | 155     |
| Net gallons                   | 140  | 391                | 363                | 150                                   | 262     |
| S.E. harvested (cwts)         | 4.1  | 4.1                | 5.1                | 16.0                                  | 7.6     |
| S.E. produced (cwts)          | 18.9   | 27.6               | 28.7               | 28.6                                  | 26.2    |
| Young stock etc. (%)          | 12   | 0                  | 17                 | 21                                    | 11      |
| Gallons per cow day           | 1.44   | 2.22               | 2.28               | 1.87                                  | 2.00    |
| Cost, (shillings)             | 147  | 232                | 96                 | 259                                   | 190     |
| Manures applied (shlgs.)      | 37   | 129                | 0                  | 260                                   | 116     |
| Net cost of manures (" )      | 63   | 142                | 25                 | 162                                   | 104     |
| Standardized do. (" )         | 55   | 131                | 25                 | 158                                   | 98      |
| Manures used up (cwts):       |  |                    |                    |                                       |         |
| N                             | .30  | .38                | -                  | .24                                   | .24     |
| P <sub>2</sub> O <sub>5</sub> | .61  | 1.54               | 0.61               | 1.38                                  | 1.08    |
| K <sub>2</sub> O              | .17  | .76                | .17                | 1.44                                  | 0.69    |
| CaO                           | -  | 4.30               | -                  | 8.57                                  | 3.57    |
| Method of use                 | I Strip  | I 10 ac. silage    | I 10ac. silage     | I Hay and silage                      |         |
|                               | II 16 ac. silage 8ac.cut & eaten, II all strip to 15/6 | Rest strip to 30/6 | Rest strip to 23/7 | II 10ac. silage 10ac.strip 10ac.ordy. |         |
|                               | III Ordy.  | III Ordy.          |                    | III Ordy.                             |         |
| Grazing season                | 15/4-10/11   | 29/4-10/11         | 20/5-10/11         | - 10/11                               |         |
| Rests (days)                  | 26,41  | 27,22,25,21        | 30,28,8            | Between crops and 26, 19.             |         |
| Winter stock per ac.          | 0.3 hfrs. 72 days                                      | 1.3 sheep 20 days  | None               | 1.7 sheep 30 days.                    |         |

Note: Some addition might properly be made for live-weight increase of dry stock on Field 1.

FARM W2

MILK PER COW YEAR 880 gallons  
 % WINTER MILK 27%  
 GRAZING SEASON 238 days  
 ACRES PER STANDARD COW  
 FOR THAT SEASON 1.27 acres  
 NET GALLONS PER ACRE  
 FROM COW FIELDS 515 gallons

Height 250'  
 Soil Free draining medium loam; well watered  
 Contours One steep field; rest gentle  
 General aspect South-westerly  
 Area 185 acres  
 No. of cows 90; Spring calving  
 Rent of grassland 30/-  
 Other grazing stock Followers: heifers calve at 2 years: all young stock lie out during the winter.  
 Grass fields not studied None  
 Grazing stock elsewhere A few young stock  
 % of land under crop 40  
 Cropping objectives Sale grain: stock feed  
 Oats, straw and turnips for this spring calving herd. No hay is made. (The ton or two needed for calves is bought in).  
 Silage None  
 No. of years' cropping between leas 3  
 Length of leas 4  
 Sow out crop Oats

|                            | <u>lbs. per acre</u> |                 |
|----------------------------|----------------------|-----------------|
|                            | <u>1950</u>          | <u>1951</u>     |
| Italian ryegrass: Danish   | 4                    | 3               |
| Perennial " : Ayrshire     | 10                   |                 |
|                            | 3                    |                 |
|                            | 3                    |                 |
|                            | 3                    |                 |
| Cocksfoot: S 26            | 2                    |                 |
|                            | -                    | 6               |
|                            | 2                    |                 |
|                            | 2                    | 4               |
| Timothy: Scotch            |                      | 5               |
|                            |                      | 4               |
|                            | 4                    |                 |
| Meadow fescue: S 215       |                      | 4               |
|                            |                      | 5               |
| Rough stalked meadow grass | 1                    |                 |
| Red clover: Broadleaved    | 2                    |                 |
|                            |                      | 1 $\frac{1}{2}$ |
|                            | 1                    | 2               |
|                            | 1                    |                 |
| Alsike and White           | 1                    |                 |
| White clover: S 100        | $\frac{1}{2}$        |                 |
|                            | $\frac{1}{2}$        |                 |
|                            | $\frac{1}{2}$        |                 |
|                            | $\frac{1}{2}$        |                 |
|                            | $\frac{1}{2}$        |                 |
| Trefoil                    | -                    | -               |
| Chickory                   | -                    | 1               |
| Sheep's parsley            | -                    | 1               |
|                            | <u>41</u>            | <u>38</u>       |

The change to timothy-meadow fescue from perennial ryegrass and cocksfoot has been decided on because of a tendency to bloat, happily less pronounced than it was formerly.

## Manuring

12 tons of dung ploughed in for the sow-out oat crop, and mineral phosphate and muriate of potash are applied to the lea before ploughing. The

Farm W2 (contd.)  
Manuring (contd.)

only nitrogenous manures brought on to the farm in the past 20 years have been the relatively small amount in compound manures applied to the mangold crops on one field in 1950 and 1951. The lime status, built up early in the 1939-45 war, is kept up by dressings of 20-30 cwts ground limestone in the year before the leas are broken.

**Topping:**

None in 1952; only necessary for weeds; docks dug; no spring cultivations.

**General system of grazing**

At the height of the season the method of grazing of the four main cow fields is to keep one quarter of the herd permanently night and day on one field, if necessary putting the cows on the young stock field or on one of the other 3 cow fields. The remainder of the herd grazes by day alternately on one of a pair and by night continuously on a third field. For the rest of the season there is no set pattern, and no fields are rested more than 3 days.

Growth was so good that the 90 cows could be kept on less than 100 acres and never were allowed to eat a pasture bare: indeed there was normally some 5" of grass left when cows were removed from any field.

It may be that this leaving of a big part of the plants intact enables the plants to continue to produce a heavy yield very steadily throughout the season. The grass rarely 'shoots' and the only topping done is when a patch becomes weedy. There is good clover development. Even in the dry summer of 1949, although the pastures were eaten bare by mid July, the whole herd and its followers was maintained on the farm. Some hand feed was necessary, and the milk yield dropped; but by the end of the season the year's yield was up to normal. Although it would be possible to increase the output from grass on this farm, the system nevertheless appears to be admirably suited to the strain of cows, the soil and the climate.

**Notes:**

The winter-dry herd can be inexpensively wintered on oats, straw and turnips. Concentrates are needed for the milking stock from September until they dry off and before May 28th.

The curve of production from the grass is shown as Figure 2.

FARM W2

| Field                         | Not mown: mainly grazed by cows |            |            |           |           |         | Sow-out 1952 | All  |
|-------------------------------|---------------------------------|------------|------------|-----------|-----------|---------|--------------|------|
|                               | 1                               | 2          | 3          | 4         | 5         | Average | 6            |      |
|                               | x                               |            |            | xx        | xx        |         |              |      |
| Area (acres)                  | 20                              | 22         | 21         | 29        | 10        | 102     | 5            | 107  |
| Years old                     | 4                               | 2          | 1          | 3         | -         | -       | 0            | -    |
| Length of lea                 | 4                               | 4          | 4          | 4         | Permanent |         | 4            | -    |
| <u>1952 Details per acre</u>  |                                 |            |            |           |           |         |              |      |
| Stock units                   | 293                             | 238        | 233        | 167       | 189       | 223     | 121          | 218  |
| Gallons produced              | 823                             | 721        | 647        | 538       | 421       | 644     | 111          | 619  |
| Net stock units               | 208                             | 196        | 192        | 146       | 147       | 179     | 85           | 174  |
| Net gallons                   | 560                             | 592        | 534        | 462       | 368       | 515     | 27           | 492  |
| S.E. produced (cwts)          | 27.8                            | 27.6       | 26.1       | 21.1      | 19.0      | 24.7    | 6.9          | 23.8 |
| Young stock etc. (%)          | 11                              | 1          | 12         | 1         | 31        | 9       | 55           | 10   |
| Gallons per cow day           | 3.16                            | 3.07       | 3.15       | 3.24      | 3.22      | 3.16    | 2.03         | 3.14 |
| Cost (shillings)              | 80                              | 105        | 148        | 105       | 110       | 110     | 239          | 116  |
| Manures applied (shlgs.)      | 0                               | 0          | 0          | 0         | 90        | 9       | 0            | 8    |
| Net cost of manures (" )      | 5                               | 31         | 59         | 23        | 49        | 31      | 90           | 34   |
| Standardized " (" )           | 5                               | 28         | 46         | 9         | 67        | 26      | 65           | 27   |
| Cwts of manures used up:      |                                 |            |            |           |           |         |              |      |
| N                             | -                               | -          | -          | -         | -         | -       | -            | -    |
| P <sub>2</sub> O <sub>5</sub> | -                               | -          | .57        | .06       | .75       | .21     | .84          | .24  |
| K <sub>2</sub> O              | -                               | .45        | .50        | -         | .90       | .29     | .90          | .32  |
| CaO                           | 1.45                            | 2.14       | 2.14       | 2.14      | 1.40      | 1.93    | -            | 1.84 |
| Acres per cow at peak         | .87                             | .33        | .29        | .43       | .59       | .42     | n.a.         |      |
| Grazing season                | 29/3-22/11                      | 20/4-22/11 | 13/4-22/11 | 13/4-2/11 | 29/3-2/11 |         | 6/7 - 22/11  |      |

x This was the field grazed night and day by the one lot of cows.  
 xx These fields together were the night pasture for the bigger group of cows from 21 May.

FARM W3

|   |             |
|---|-------------|
| MILK PER COW YEAR                         | 809 gallons |
| % WINTER MILK                             | 46%         |
| GRAZING SEASON                            | 191 days    |
| ACRES PER STANDARD COW<br>FOR THAT SEASON | 1.19 acres  |
| NET GALLONS PER ACRE<br>FROM COW FIELDS   | 308 gallons |

|  |  |
|--|--|
| Height                                 | 150'   |
| Soil                                   | Medium loam; well watered                                    |
| Contours                               | Some steep   |
| Aspect                                 | Northerly  |
| Area                                   | 220 acres  |
| Rent of grassland                      | 18/3   |
| No. of cows                            | 70: spring & autumn calvings                                 |
| Other grazing stock                    | Followers: almost as important as grazing<br>(stock as cows) |
| Grass fields not studied               | None   |
| Grazing stock elsewhere                | None   |
| % of land under crop                   | 27   |
| Cropping objectives                    | Sale grain: stock feed                                       |
| Silage cutting acres<br>per 100 acres  | 8  |
| No. of years' cropping<br>between leas | 3  |
| Length of leas                         | 4  |
| Sow out crop                           | Oats   |
| Seeds mixtures                         |  |

|                       | lbs. per acre    |                    |                                   |
|-----------------------|------------------|--------------------|-----------------------------------|
|                       | Fields<br>7 & 12 | College<br>Mixture | Most fields<br>before 1949        |
| Italian ryegrass      | 5                |                    | 8                                 |
| Perennial "           | 18               |                    |                                   |
| Ayrshire              |                  |                    | 6                                 |
| Evergreen             |                  |                    | 6                                 |
| Cocksfoot: S 43       | 5                | 4                  |                                   |
| S 37                  |                  |                    |                                   |
| Timothy               | 5                | 6                  |                                   |
| S 48                  |                  |                    | 6                                 |
| American              |                  |                    |                                   |
| Meadow fescue: Danish | 5                | 8                  |                                   |
| S 215                 |                  |                    |                                   |
| American              |                  |                    | 6                                 |
| Rough stalked meadow  | 1                |                    |                                   |
| Danish                |                  |                    | 1                                 |
| Chewing's fescue      |                  |                    | 1                                 |
| Red clover: S 123     |                  | 2                  |                                   |
| English               |                  |                    | 1                                 |
| Late flwr'g.          |                  |                    | 1                                 |
| Canadian              |                  |                    | 1                                 |
| Alsyke & White clover |                  |                    | 1                                 |
| White clover: Kent    | $\frac{3}{4}$    |                    |                                   |
| S 100                 | $\frac{1}{4}$    |                    |                                   |
| S 134                 |                  | 2                  |                                   |
| N.Z.                  |                  |                    | $\frac{1}{2}$                     |
|                       | <u>40</u>        | <u>22</u>          | <u>38<math>\frac{1}{2}</math></u> |

## Manuring

Normally 12 tons of dung is ploughed in for the sow-out, whether or not a cover crop is used. Dressings of 2 cwts per acre of compound grass fertilisers or of 2 cwts each of mineral phosphates and muriate of potash were applied to a very few fields in 1952.

## Surface cultivations

Weeding included spraying to kill docks. Most fields were rolled in April.

General grazing system  
for cows

Strip graze, each strip bare, with lie-back on another field usually. Cows clean up the lie-back portion.

### Surplus grass

Hay, silage and dried grass are made from fields that can be spared.

### The fence

The electric fence was first used in 1948. Because the farm is cut up by public roads, 3 controllers are necessary and there is some interference from passers-by. The wire is of light gauge and the posts are either sheep stobs with porcelain insulators tied with twine or, on the part to be moved, iron types that can be pressed in with the feet. The cows are dehorned. The farmer considers that the fence prevents waste of grass and thus enables him to avoid sending young stock away for summering and to reduce the area of grass to leave more for the production of winter fodder from arable crops. It is also noteworthy that since lush grass has been rationed daily with the electric fence bloat, formerly a heavy scourge, has been happily absent. Swards are dense.

In 1953 the plan has been (a) to use a separate night field if one was available and (b) to give 1 day's ration at a time with lie-back on the same field.



