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1943 to 1953

By
C. H. BLAGBURN

MISCELLANEOUS STUDIES No. 11
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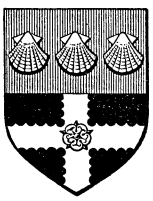

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TABLES

CHANGES IN THE ECONOMY OF FIFTY ONE FARMS IN THE SOUTH OF ENGLAND FROM 1943 to 1953.

For the past 20 years, the Agricultural Economics Department of Reading University has been collecting economic data from approximately 200 farms in the Southern Province of the Provincial Agricultural Economics Service. While the composition of the sample of farms surveyed inevitably changes somewhat from year to year, continuous records covering the ten-year period 1943/4 to 1952/3 have been obtained for a group of 51 farms. The object of this report is to examine what changes in the economy of production on this group of farms during that period are disclosed by these records and, so far as possible, to trace the main factors responsible for these changes. The procedure adopted is to compare the average performance of the group of farms during the first two years of the decade (1943/4 and 1944/5) with that in the last two years (1951/2 and 1952/3).

The data available are of two kinds—physical and financial. The **physical data** include the following:—

(i) Acreages of crops grown.
(ii) Numbers of livestock kept.
(iii) Average yields per acre of crops.
(iv) Quantities of milk produced, where dairy cows are kept.
(v) Total quantities of feedingstuffs purchased.
(vi) Number of workers employed.

The **financial data** comprise records of income and expenditure, in total and under main headings, and valuations of farming stock. Clearly, if these financial data are to be used as a basis for assessing changes in the real economy of production in the two periods, they must be corrected to allow for the considerable changes in prices and costs which have occurred. In general, prices and costs were rising throughout the ten-year period. Accordingly, figures of expenditure and income in each main category in years previous to 1952/3 have been corrected to the levels prevailing in the latest year.

Description of Sample

The sample comprises 51 farms of which 3 are in Berkshire, 20 in Buckinghamshire, 8 in Hampshire, 5 in Northamptonshire and 15 in Oxfordshire. The total acreage covered is approximately 11,400 acres.

The farms range in size from 52 to 674 acres, the average for the whole group being 223 acres: 11 farms are of less than 100 acres, 15 between 100 and 200 acres and 25 over 200 acres.

A wide variety of farming types is included in the sample. One farm derives its income mainly from sale crops, 26 from milk, 9 from livestock products other than milk, while 15 are mixed.

The farms considered have been deliberately confined to those where

no major changes in acreage have occurred, and those which have remained throughout under the same management. Changes in tenure have also been few; in the earlier years 36 farms were wholly or mainly rented, 15 owned or mainly owned by the occupiers; by 1952/3 the numbers of rented and owner-occupied farms were 33 and 18 respectively.

Pattern of Production

Appreciable changes in the pattern of production have occurred during the ten years.

TABLE 1

Main Crops as Percentages of Total Area

	1943/5	*1951/3*
Cereals	35·2	28·2
Roots, etc.	6·6	4·7
Bare Fallow	1·5	1·3
Hay and Silage	20·9	26·9
Grazing	35·8	38·9

Table I, showing the use made of the total farm acreage, indicates that cereal crops have declined by about 20% (from 35·2% to 28·2% of total area) and crops of roots, kale, etc., by 30% (from 6·6% to 4·7% of total area), while the grass acreage has correspondingly increased. The percentage of the farm area used for growing forage crops of all kinds (grass, roots, kale and feed grain) increased from 74·5% in 1943/5 to 84·5% in 1951/3. Cow numbers (see Table 2) have remained stationary, while numbers of other cattle have increased by about a third. Numbers of sheep rose by 60%. The additional grass acreage thus appears to have been primarily used for increased beef and mutton production rather than for milk. Poultry numbers more than doubled. Pig numbers remained relatively insignificant on this group of farms, but there was nevertheless an increase of about 20%.

TABLE 2

Average Numbers of Livestock per 100 *Acres.*

	1943/5	*1951/3*
Horses	2·0	0·6
Cows	11·7	12·0
Other Cattle	18·5	25·0
Sheep	16·5	26·5
Pigs	3·7	4·5
Poultry	90	210

Gross Output, Expenditure and Profit

Table 3 shows the average gross annual output, the average total expenditure, and the average profit, all per 100 acres, for the group of farms in the two opening and the two closing years. Both the actual and the corrected figures are given.

TABLE 3

Average Gross Output, Total Expenditure and Profit per 100 *Acres.*

Period	*Gross Output*		*Total Expenditure*		*Profit*	
	Actual	*Corrected*	*Actual*	*Corrected*	*Actual*	*Corrected*
	£	£	£	£	£	£
1943/5	1,658	2,670	1,358	2,610	300	60
1951/3	3,014	3,066	2,736	2,772	278	294

Output in this Table includes the value of produce consumed in the farm household and takes into account any increase or decrease in stocks during the year. Expenditure includes an allowance, at statutory wage rates, for unpaid manual work done on the farm by the farmer and members of his family, but no charge is included for the farmer's managerial work or for interest on capital.

It will be seen that, at constant prices, there was an increase in gross output, by value, of £396 per 100 acres or 15% during the period. Total expenditure, at constant prices, rose meanwhile by only £162 per 100 acres or 6%. Thus, while actual profit was slightly lower in the later period, after correcting for price changes average profit per 100 acres increased from £60 to £294. This represents a real increase in economic efficiency. Total expenditure per £100 of gross output was £90·2 in the later period compared with £97·8 in the earlier years—an improvement in economic efficiency of about 8%. It is interesting to note that, if 1952/3 price and cost levels had prevailed in the earlier period, this group of farms would have only just succeeded in covering its costs, leaving a very small margin of profit. The fact that in practice profits were maintained at around £3 an acre was the result of the moderate increase in efficiency indicated.

Output

The composition of gross output from the group of farms in the two periods is shown in Table 4.

TABLE 4

Composition of Gross Output per 100 *Acres at Constant Prices.*

	1943/5 £	*1951/3* £	% *rise or fall*
Cattle	309	438	+ 41
Sheep	109	172	+ 58
Pigs	105	164	+ 56
Poultry and Eggs ...	143	482	+237
Milk	1,174	1,140	− 3
TOTAL LIVESTOCK PRODUCTS	1,840	2,396	+ 30
Crops	720	519	− 28
Miscellaneous	110	151	+ 37
TOTAL OUTPUT	2,670	3,066	+ 15

As would be expected from the crop acreages and livestock numbers already mentioned, there has been a change in the pattern of sales from this group of farms in the direction of considerably more livestock products and less sale crops. Poultry and egg production, particularly, increased by more than 200%.

The basis for this increase in livestock production was partly provided by a rise of about 50% in purchases of animal feedingstuffs, partly by the increased acreage of grass and partly by the retention of a somewhat higher proportion of home-grown grain on the farms—sales of crops decreased by 28% as against a 20% drop in acreage, and the feed corn area actually rose from 13% of total acreage in 1943/4 to 19% in 1952/3. Because of the higher purchases of food, net output, i.e. the sum remaining after deducting from gross output the cost of bought food and seeds, as indicated by Table 5, increased by considerably less than gross output, i.e. by only 8%. This figure may be regarded as a better indication than gross output of the real increase in production over the period.

TABLE 5

Net Output per 100 *Acres at Constant Prices.*

	1943/5		*1951/3*		% *rise or fall*
	£	£	£	£	
Gross Output		2,670		3,066	+15
Less: Food Purchases ...	486		736		+51
Seed Purchases ...	141		119		−18
		627		855	
Net Output		2,043		2,211	+ 8

Expenditure

Total expenditure (see Table 3) increased by only £162 per 100 acres or 6%. This increase is more than accounted for by the rise in food purchases, which has already been allowed for in the above comparison of net output at the beginning and end of the period. The main items of expenditure incurred in achieving net output are set out in Table 6.

TABLE 6

Main Items of Expenditure per 100 *Acres at Constant Prices.*

	1943/5	*1951/3*	% *rise or fall*
	£	£	
Rent	167	167	—
Fertilizers	180	142	−21
Labour	974	869	−11
Power and Machinery Costs	503	506	+ 0·6
Other Expenses	159	233	+46
TOTAL	£1,983	£1,917	− 3·5

Total expenditure (other than food and seeds) at constant prices fell by £66 per 100 acres (3·5%), a rise in miscellaneous expenditure being

more than offset by reductions in labour and, surprisingly, in fertilizer costs. Expenditure per £100 of net output at 1952/3 prices dropped from £97·2 to £86·7—a reduction of about 11%—a somewhat better performance than is indicated by gross output and expenditure figures.

Production Factors

The level of production of farms is determined by two main factors—(a) the intensity of the system of production in operation and (b) the yield-factor, e.g. crop yields per acre, milk yields per cow and so on. Overall measurements of these two factors can be derived from two indices—(a) a System Index which can be arrived at by calculating the "standard income" for the farm or farms in question, on the basis of normal output per unit for each of the productive enterprises on the farm, and then comparing this figure with the average standard income for a substantial sample of farms, and (b) a Yield Index obtained by comparing the actual income for the farm or farms with the standard income. The overall figures for the 51 farms at the beginning and end of the period are shown in Table 7. The normal output figures used in calculating standard incomes are those prevailing in 1952/3 and in converting these standard income figures for the 51 farms into System Indices, the base (=100) is the average standard income for a group of approximately 200 farms in the same region for which economic data were obtained under the annual Farm Management Survey.

TABLE 7

Intensity and Yield Factors determining Gross Output on 51 Farms.

	1943/5	*1951/3*
	£	£
Average Standard Income per 100 Acres ...	3,003	3,194
Average System Index	91	97
Average Yield Index	90	97

It will be seen that the increase in gross output of 15% on these farms was obtained to an almost equal extent by intensification of the farming system and by improvement in yields. Standard income (which, of course, is unaffected by actual yields obtained) rose by £191 per 100 acres, which is almost exactly half of the actual increase of £396 per 100 acres in gross output (see Table 3), the other half of the increase being the result of better yields.

Intensity of Farming Systems

The increase of 7% in intensity is entirely the result of the additional livestock kept. If all livestock are converted to "livestock units" on the basis of the conversion factors given in the Appendix, the average number of livestock units per 100 acres of the total farm area increased from 29 to 36—a rise of 24%. This increase, however, was partly the result of a replacement of sale crops by forage crops; per 100 acres of total forage

area, the average number of livestock units increased from 38 to 42·5—a rise of only 11%. Moreover, as has already been shown, purchases of feedingstuffs have increased substantially, and although the expansion in livestock represents a real increase in farming intensity in relation to the actual area of land available, it does not represent any appreciable improvement in the efficiency of use of that land for livestock feeding purposes. If every ton of concentrated food bought is assumed to represent the product of an acre of land (on the basis of the approximate average yield per acre of cereal crops) the additional "acreage" so purchased represented 14% of the total farm area in 1943/5 and 22% in 1951/3. The average acreage of feed of all kinds utilised per livestock unit in the 1951/3 period was 2·9 acres compared with 3 acres in 1943/5, an improvement of only 3%. In view of the big increase in feedingstuffs prices in relation to prices of livestock products since 1949, it is surprising that the improvement in use of the forage area has not been greater.

The position is, of course, a little complicated both by the changes in the proportions of different types of stock and by the improvement referred to below in average production per head of stock during the period. Further light on this factor of economic use of feed acreage can be obtained from several other "yardsticks":—

Bulky Forage per Unit of Grazing Stock. The acreage of grass and fodder roots on the farm meets the main part of the food requirements of cattle, sheep and horses; pigs and poultry derive most of their needs from bought concentrates and home-grown grain The average area of bulky forage per unit of grazing stock was 2·22 acres in 1943/5 and 2·18 acres in 1951/3—a saving of only 2%.

Utilised Starch-Equivalent per Acre of Forage. If the total theoretical nutrient requirements, in terms of starch-equivalent, of the stock on a farm is calculated and a deduction made for the starch-equivalent value of foods purchased, the remaining figure can be regarded as a rough measurement of the food value, in terms of starch-equivalent, obtained from the fodder acreage of the farm itself. Applying this method of calculation to this group of farms it is found that the average utilised starch-equivalent per acre of forage rose from 10·9 cwt. in 1943/5 to 11·3 cwt. in 1951/3—an increase of 5½%.

All the above tests tend to confirm the conclusion that while the intensity of output on these farms was increased during the period by something of the order of 7% by expanding livestock, this was done largely through higher food purchases and little had been done up to 1952/3 to improve the use of grass and other forage crops, in spite of the incentive which was provided by the high prices of feedingstuffs.

Yields.

Except in the case of dairy cows, records of yields per head of livestock in physical terms are difficult or impossible to obtain on most

farms and reliable crop yield figures are generally equally scanty. (A method of obtaining a rough indication of the trend of forage yields has already been given). It is, however, possible to construct separate Yield Indices for sale crops and livestock respectively on the basis of standard and actual gross income figures and these are shown in Table 8.

TABLE 8

Yield Indices for Sale Crops and Livestock Products.

	1943/5	*1951/3*
Sale Crops	88	106
Livestock Products ...	83	89

The improvement in sale crop yields (about 20%) was of about the same order of magnitude as that for cereals in general in Great Britain during this period and was, proportionately, considerably greater than in livestock. An important factor, as regards the livestock index, is the average milk yield per cow (milk represents around 40% of gross output over the whole group of farms). This increased from 581 gallons per cow at the beginning of the period to 628 gallons at the end—a figure still substantially below the general average for all dairy farms in the Province included in the Farm Management Survey.

The combined effect of slightly higher livestock productivity and slightly improved utilisation of forage acreage is reflected in output per acre of food used for livestock in general and in output of milk per acre occupied by cows (see Table 9).

TABLE 9

Output of Livestock Products per Acre.

	1943/5	*1951/3*	% *rise or fall*
Gross Output of Livestock Products per feed acre ...	£20·8	£22·4	+ 7·7
Milk Yield per acre	193 galls.	214 galls.	+11

Details of Expenditure

(a) *Rent.* Although the actual average rent increased from £134 per 100 acres in 1943/4 to £167 in 1952/3, i.e. by 23%, it has been assumed, as part of the process of conversion to constant prices, that rents remained unchanged. In view of the small increase in net output per acre, however, the cost of rent per £100 net output fell from £8·4 to £7·5.

(b) *Fertilizers.* Actual expenditure on fertilizers increased by two-thirds between 1943/4 and 1952/3, but as prices more than doubled this represents a decline in average quantities applied, which is contrary to general experience. Fertilizer costs per £100 net output fell from £9·4 to £6·4.

(c) *Labour.* While actual labour costs increased from £514 per 100 acres in 1943/4 to £857 in 1952/3 farm wage rates increased in the same

period by over 90%. Thus real labour costs per acre actually fell by 11% on this group of farms, and in view of the concurrent increase in net output, labour costs per £100 net output fell by about 17%—from £47·7 to £39·3.

Labour costs per unit of output, however, are not necessarily a good guide to the efficiency of labour use, since they are affected by other changes in productive efficiency. The work unit system is a more reliable guide. Under this system the actual quantity of labour available on the farm is compared with its total theoretical labour requirement, arrived at on the basis of normal requirements for the acreages of different crops and the numbers of different types of livestock on the farm. Labour efficiency on this group of farms by the work unit system is shown in Table 10 for the beginning and end of the ten-year period.

TABLE 10

Labour Efficiency.

	1943/5	*1951/3*	% *rise or fall*
Total labour requirements in work-units* per 100 acres	620	636	+ 2·5
Total labour available in work units†	735	654	−11
Labour efficiency index ...	85	98	+15

The total labour requirement of these farms has increased by about 2½%, while the amount of labour available has fallen by about 11%. This represents an increase of about 15% in efficiency of labour use, which is slightly less than is indicated by the improvement in labour cost per unit of output.

(d) *Power and Machinery Costs.* The annual costs of power and machinery—including fuel and electricity, repairs, depreciation and contract work—increased from £259 to £543 per 100 acres, i.e. by 110% between 1943/4 and 1952/3. This, however, is approximately equivalent to the increase in prices during the period, so that real costs went up by only a trivial percentage. Costs per £100 net output fell from £24·6 to £22·9, i.e. by 7%.

As in the case of labour, however, machinery costs per unit of output are affected by changes in general productive efficiency and are therefore not an entirely reliable guide to the level of economy of use of machinery; the overall yield increase which has occurred on this group of farms, for instance, would tend, other things being equal, to reduce the unit cost of machinery. A rough-and-ready assessment of machinery costs in relation to the theoretical work-load on the farm can be made on the basis of "tractor work units," the total number of tractor work units for any farm being the theoretical number of hours of tractor work normally required for the various crops grown and livestock kept on the farm. For

* One work unit equals a normal working day of 8 hours.

† Average work unit output per man per year=230.

the purpose of making this calculation a table of normal tractor hours worked per acre of different crops and per head of different kinds of livestock is used (see Appendix). By dividing the total power and machinery costs by the number of tractor work units, a cost per tractor work unit is arrived at which roughly reflects the economy of machinery use. Thus, where fuel or repair costs are high or depreciation is heavy as a result of "over-mechanization" the cost per tractor work unit will tend to be high. The method has some obvious defects; machinery costs on a particular farm will not be directly proportionate to the tractor work-load; some machinery, e.g. barn machinery, does not involve the use of tractors; and the figure will be affected by the extent to which horses are used. But the method will generally show up marked inefficiencies.

Table 11 shows the theoretical tractor work units and the total power and machinery costs per 100 acres, and the machinery cost per 100 tractor work units for the 51 farms in 1943/5 and 1951/3:—

TABLE 11

Machinery Costs in relation to Work-load.

	1943/5	*1951/3*	% *rise or fall*
Tractor Work Units per 100 acres	1,107	1,072	−3
Power and Machinery Costs per 100 acres	£503	£506	+0·5
Costs per 100 Tractor Work Units	£45·3	£47·3	+4·5

The total theoretical tractor requirement tended to fall a little over the period, mainly through the reduction in arable crop area, while total power and machinery costs remained almost stationary. As a result costs per tractor work unit increased by 4 to 5%. This increase, however, is hardly significant and could easily be accounted for by reduced use of horses, whose numbers fell by over 50%.

Differences in Profit Trends on Individual Farms

Average figures for the whole group of farms inevitably conceal wide changes in economy from farm to farm. While, as has been shown, average actual profits for the whole sample remained practically unchanged, the position so far as individual farms are concerned was very different; some farms showed substantial increases and others substantial falls in profit. Farming profits notoriously fluctuate widely from year to year as a result of weather conditions, the incidence of disease and so on. To some extent such year-to-year variations have been smoothed out in this investigation by basing comparisons on two-year averages; but even on this basis substantial fortuitous changes will remain. It seems reasonable, however, to regard any rise or fall of more than £3 an acre in two-year average profits on a single farm as an indication of a real improvement or deterioration in its economic status. The numbers of farms whose profits have varied over the ten-year period by more or less than £3 an

acre and of those whose profit change has exceeded £5 an acre are shown below:—

	No. of farms
Profits down by more than £5 an acre ...	5
Profits down by £3 to £5 an acre	6
Profit variation less than £3 an acre	27
Profits up by £3 to £5 an acre	7
Profits up by more than £5 an acre	6

It will be seen that 24 farms—almost half—showed substantial profit variations and that 11 farms out of 51 showed profit changes, on a two-year average basis, of over £5 an acre. Examination of the results for these 24 farms can be expected to shed considerable light on the factors responsible for these changes. In Tables 13 and 14 are set out the principal financial data and economic efficiency measurements both for the whole group of 51 farms and for each of the four groups whose profits have shown marked changes.

Farms with Increased Profits

Seven farms increased their average profits by more than £5 an acre and six by amounts between £3 and £5 an acre in this period. These farms are referred to as groups A and B in Tables 13 and 14. There is no evidence that these farms were markedly different from the general average in economic efficiency at the beginning of the ten-year period, 6 out of the 13 were earning less and 7 more than the average profit per acre at that time. It will be seen from Tables 13 and 14 that the main factor responsible for increased profit in both groups was a substantial expansion in output with little change in the rate of expenditure. Both groups commenced the period at about the average rate of gross and net output per acre, i.e. at 1952/3 prices, around £27 an acre gross and £21 an acre net output. By 1951/3 average gross output had increased in group B, however, to nearly £36 an acre (i.e. by 35%) and in group A to nearly £48 an acre (i.e. by 75%). These figures compare with the average gross output increase for the whole sample of £4 an acre or about 15%. Within the groups there are, of course, individual exceptions to this general trend, in each group one farm showed a relatively small increase in output. But in general higher output was the governing factor.

Comparison of System and Yield Indices for these groups at the two dates shows that whereas in Group B the increase in output was due entirely to the intensification of the farming system, in Group A intensification was accompanied by a 15% improvement in yields. In Group B the System Index rose from 88 to 112, the Yield Index remaining almost unchanged, while in Group A the System Index rose from 89 to 130 and the Yield Index from 98 to 113. It is difficult to avoid the conclusion that it was the combination of improved technique with greater intensity that accounted for the greater profit increase in Group A.

The increase in intensity of systems was general. The following list of System Indices for each farm in the two groups at each of the two periods shows that the Index increased in all cases but one.

		System Index	
		1943/5	*1951/3*
Group A			
Farm	1	114	102
,,	2	85	170
,,	3	113	144
,,	4	93	127
,,	5	65	105
,,	6	61	108
Group B			
Farm	7	78	86
,,	8	81	172
,,	9	73	108
,,	10	69	90
,,	11	113	121
,,	12	82	94
,,	13	98	113

Intensification in both groups was mainly by an increase in livestock numbers. Thus livestock units per 100 acres increased from 29·3 to 42·8 in Group B and from 27·3 to 40·1 in Group A.

In Group A, however, the livestock expansion was largely through the development of supplementary livestock enterprises such as poultry and pigs, especially the former. The average number of poultry per 100 acres increased from 30 or 40 in the earlier period to around 600 in the later period and the average number of breeding sows from 1 or 2 to about 13 per 100 acres. Of the increase in gross output per acre of approximately £20 on this group of farms, over £15 consisted of eggs and poultry and about £2 of pig sales. Milk sales remained more or less stationary and crop sales fell somewhat. There is only one farm in this group of six—a 170-acre grassland dairy farm—where the increase in output was largely the result of a considerable expansion in the size of the dairy herd and one where additional sale crops in the form of potatoes, sugar beet and grass seeds played a part in addition to poultry.

The opportunity for expansion of livestock enterprises was mainly provided by the more abundant supplies of purchased feedingstuffs in recent years and this group of farms has taken full advantage of this, food purchases at constant prices having increased by over 100%. Because of this, the average increase in net output (about £13 an acre) was considerably less than in gross output.

The nature of the increase in livestock output in Group B differs considerably from Group A. Pigs and poultry have been expanded

relatively little. Only on one farm out of seven were poultry or pigs primarily responsible for the increase in production. About two-thirds of the output increase for the group as a whole was due to higher production of milk and most of the remainder to bigger sales of cattle and sheep. The average number of dairy cows per 100 acres increased by 50% and the average output of milk per 100 acres by about 75%. In only one case were cow numbers reduced. Obviously the scope for expanding output without the introduction of subsidiary livestock enterprises is considerably more limited, hence their lower percentage increase in gross production. As in the case of Group A, the expansion in livestock output has been accompanied by a more than 100% rise in food purchases, though, as would be expected in the absence of large pig and poultry units, these are still on a considerably smaller scale in Group B.

The expansion in livestock numbers on these farms was based not only on increased food purchases but also on a considerable improvement in efficiency of use of food and of feed acreage. The average adjusted acreage of feed per livestock unit fell in Group B from 2·9 to 2·5 acres and in Group A from 3·2 to 2·85 acres. There was a substantial improvement in utilised starch equivalent per acre of home-grown feed. As is shown in Table 12, food requirements in terms of starch-equivalent per 100 acres increased substantially in each group of farms. About 27% of this additional requirement in Group B and about 40% in Group A was provided by higher food purchases. The balance came from home-grown food, and though this was partly supplied by an overall increase of

TABLE 12

Theoretical Starch-Equivalent Requirements and Utilised Starch-Equivalent per Feed Acre for 11 Farms.

	Group B		*Group A*	
	1943/5	*1951/3*	*1943/5*	*1951/3*
Total S.E. Requirements per 100 acres (cwt.)	988	1,518	937	1,567
S.E. equivalent of purchased foods (cwt.)	125	266	231	500
Balance from home-grown food (cwt.)	863	1,252	706	1,067
Home-grown food acreage (acres)	75·5	84·5	72·4	79·0
Utilised S.E. per acre (cwt.) ...	11·2	14·9	9·7	13·5

around 10% in feed acreage, it was largely due to better food output per acre, utilised S.E. per acre increasing from 11·2 to 14·9 cwt. in Group B and from 9·7 to 13·5 cwt. in Group A. These figures compare with the average for all 51 farms of 11·3 cwt. in 1951/3. Increased efficiency in grassland utilisation is probably largely responsible for this improvement. The average acreage of grass and green forage crops per livestock unit in the form of cattle and sheep fell during the period from 2·1 acres to 1·6 acres in Group B and from 2·2 to 1·9 acres in Group A.

Yield increases in general were not a significant factor in the expansion of output in Group B, where as has been shown the overall Yield Index was almost unchanged. Even in this group, however, average milk yield per cow increased by 80 gallons or about 14%, which is about double the increase over the whole sample of farms. A Yield Index for sale crops shows that crop yields also went up by about 10%. In group A, average milk yield rose by 175 gallons or about 25%, and this obviously made a significant contribution to higher output and probably to the higher profits in the group. There appears to have been no appreciable increase in crop yields in this group.

The increase in average milk yield per cow, combined with the general reduction in feed acreage utilised per livestock unit, is reflected in the increases in milk yield per feed acre from 200 to 265 gallons in Group B and from 213 to 300 gallons in Group A.

While these substantial increases in output were in progress it will be seen from Tables 13 and 14 that in both groups of farms (apart from the considerably higher costs of purchased feedingstuffs which are taken into account in arriving at net output) expenditure rose very little. In Group B an increased net output of £6 an acre was obtained with an addition of less than £1 an acre to costs, while in Group A an additional output of £13 an acre compared with about 30/- an acre extra expenditure. Virtually all of the increase in costs in both groups has been in overheads, i.e. machinery operating costs and miscellaneous expenditure. Labour and fertilizer costs were on the whole slightly reduced.

The most striking fact which emerges from the expenditure figures is that on the whole a substantial increase in the intensity of farming enterprises has been secured with approximately the same total labour staff. The two factors of better use of grass and forage area plus increased availability of purchased feeds have thus played an important part in enabling these farms to increase their efficiency of use of labour. The theoretical labour load, based on the work unit system of calculation, increased on the average during the period by 17% in Group B and by 13% in Group A. (The additional enterprises which have largely accounted for output expansion in the latter group, i.e. poultry and pigs, do not make big demands on labour.) But total manpower has not increased in either group. In consequence, the labour efficiency index rose from 88 to 100 in Group B and from 92 to 110 in Group A, this latter figure being a considerably bigger improvement than was shown by the whole sample.

The use of machinery, so far as can be judged, has increased a little more than pro rata to the labour task involved. If tractor work-unit requirements are taken as a very rough guide to the demands on machinery, then machinery costs per 100 tractor work-units increased in Group B from £38·9 to £43·3 and in Group A from £42·9 to £50·6.

The effects of the substantial changes in organisation on these farms on their economy of production is indicated by the figures of expenditure per £100 of net output. Compared with the average reduction of £10·4

expenditure per £100 net output over the whole sample, expenditure at constant prices fell by £16·2 per £100 net output on Group B farms (i.e. from £88 to £71·8) and by £34·3 per £100 net output in Group A farms (i.e. from £101·1 to £66·8). It is not surprising, therefore, that at constant prices average profit per acre in Group B has risen from £2 12s. to £7 17s., while Group A farms have converted an average loss of 5/- per acre into an average profit of £11 2s.

As stated, one farm in each group showed a substantial rise in profits with little or no increase in output. The financial results of these two farms per 100 acres at constant prices are summarised below:—

		Gross Output	*Purchases of Food*	*Purchases of Seeds*	*Net Output*	*Total Expenses*	*Adjusted Profit*	*Actual Profit*
		£	£	£	£	£	£	£
Farm 1	(1943/5)...	2,792	54	74	2,664	1,685	979	653
	(1951/3)...	2,708	47	60	2,601	1,558	1,043	1,026
Farm 10	(1943/5)...	4,030	1,350	140	2,540	2,846	64	467
	(1951/3)...	4,116	1,123	93	2,900	1,843	1,057	1,050

In the last column are shown the actual profit figures for these two farms unadjusted for price changes.

Farm 1 is a mixed farm deriving a third to a half of its income from sale crops, producing store cattle and sheep and with a small dairy herd. Only minor changes in production have taken place, consisting of some reduction in arable crops and an increase in cattle and sheep, and as will be seen, output per 100 acres has remained virtually unchanged. Little variation has taken place in expenditure. Thus, although *actual* profits have increased by nearly £4 an acre, profits at *constant price levels* have risen by less than £1 an acre. In other words, higher profits in this case were not so much the result of increased efficiency in management as of the fact that price and cost changes in the ten-year period favoured the type of farming practised. As the figures indicate, the farm was practically self-sufficient in feedingstuffs in the earlier years and has remained so. Hence, while it has benefited by higher livestock prices, it has not been substantially affected by the big increase in prices of purchased food. The farming system is also one which makes relatively low demands on labour so that it has also been less affected than most by wage increases.

By contrast, the other farm, Farm 10, was a small dairy farm relying heavily on bought food, i.e. of a type which has been adversely affected by price and cost changes, and its actual profit of about £4. 13s. an acre would have been reduced almost to vanishing point if changes had not been made. Substantial changes have, however, been made. The dairy herd has been reduced from 16 to 10, a small ewe flock has been introduced, poultry have been increased and the one hired man has been dispensed with. These are not the kind of changes usually regarded as likely to increase profits on the small dairy farm; they have actually reduced the intensity of the farming system slightly; on many small farms this would undoubtedly increase losses. But in this case the following factors have operated:—(1) Average milk yield per cow has been increased by 10%—

from 700 to 770 gallons. (2) The grassland is not particularly productive, the output of utilised S.E. per acre being only about 11 cwt. and with only $1\frac{3}{4}$ acres of grass and roots per cow-equivalent, reliance on purchased food was very heavy. Reduced profits would undoubtedly have resulted from the big increase in feedingstuffs prices since 1949 if the herd had been maintained at its existing size without a substantial improvement in forage production on the farm. (3) The reduction of the dairy herd enabled a hired man to be dispensed with and machinery and general overheads have also been reduced. Total costs under these headings have thus fallen while output has remained stationary.

Farms with Reduced Profits

Six farms in the sample showed average profit reductions of £3 to £5 an acre, and five farms showed reductions of over £5 an acre during the ten-year period. The figures for these two groups, referred to respectively as groups C and D, are summarized in Tables 13 and 14.

The farms in group C, showing the less drastic falls in profit, are all primarily dairy farms. Their actual profits in the earlier years averaged £3. 6s. 0d. an acre, the most profitable farm averaging £5. 6s. and the least profitable £1. 4s. per acre. (At 1952/3 prices, however, their average profits would have been about £1 an acre less.) By 1951/3, the average actual loss incurred was about 11/- an acre, ranging from a profit of 19/- on one farm to a loss of 52/- an acre on another.

The main factor in this deterioration was a substantial decline in output. Average gross output per 100 acres fell from £2,899 to £2,415, the main reductions being in sales of milk and crops. This decline in output affected every farm in the group, though by varying amounts, ranging from about £1 to as much as £10 an acre.

The reduction in income from crop sales was the result of a general tendency to replace tillage with grass. The average percentage of grass increased over the whole group from 65% to 74·7% and this increase was almost entirely at the expense of the wheat acreage. With one exception this reduction in tillage was a feature on all six farms. It was not accompanied, however, by any marked increase in livestock, or by a reduction in food purchases, as might have been expected. The average stock density increased from 32·5 to 34·3 livestock units per actual 100 acres—a rise of only 5 or 6%. But in relation to feed acreage on the farm, stock density fell from 39·6 to 36·5 livestock units per 100 feed acres. The average amount of grass and other bulky forage per cow-equivalent (including pigs and poultry) rose from 2·15 to 2·3 acres. Meantime, food purchases showed an increase—from £372 to £478 per 100 acres. The average adjusted food acreage per livestock unit went up appreciably—from 2·85 to 3·15 acres. The average utilised starch-equivalent per acre of grass and forage declined from 12 cwt. to 10·9 cwt. The decline in efficiency of utilisation of forage was general; on only one farm was there a slight improvement in the acreage used per livestock unit, and whereas in the two earlier

years only two out of six farms were below average efficiency for the whole sample in this respect, in the two later years all but one were below average. Thus the replacement of corn by grass has resulted generally in a less intensive and less economically efficient system of farming on these farms. The reduction in intensity is shown by the drop in the average System Index from 92 to 85.

A factor of somewhat less importance in the decline in output on these farms is a reduced Yield Index due almost entirely to lower milk sales per cow, the average for all six farms having dropped from £115 to about £93 per cow. This was to a small extent the result of a drop in average yield, but the main factor was a relative decline in the average price realised for milk. Thus, while over the whole sample milk prices per gallon increased by 38% in the period (this in itself being less than the national increase) the average price for these six farms increased by only 30%. The cause of this is not clear, but it must presumably reflect a reduction in the proportion of winter milk.

The combined effect of a decline in efficiency of use of food acreage and in production per unit of stock is seen in the drop in value of output per acre of feed from £23·3 to £18 and in milk yield per acre from 227 to 200 gallons.

As some offset to the general reduction in economic efficiency in the system of farming, there was on the whole an improvement in labour and machinery utilisation. Average work units per man increased from 180 to 205—nearly 15%—and machinery costs per 100 tractor work units fell from £53·6 to £46·5. But the improvement was not sufficient to offset the drop in output, and labour and machinery costs per £100 net output increased by £4·2 and £1·8 respectively.

The farms in Group D, with the greatest profit reductions, were on the whole below average in efficiency at the beginning of the period, four out of five having earned less than the average profit in the two years 1943/5.

The group includes a variety of farming types. All but one of the farms were under 100 acres. In the earlier two years two farms were primarily dairy farms, two were mixed farms, combining arable sale crops with cattle, pigs and poultry, while one was a small highly intensive farm combining a large-scale poultry unit with pedigree stock rearing. Apart from this latter farm, which was highly profitable, none made more than a small profit and two actually incurred losses. By 1951/3 one of the dairy farms had developed store cattle and sheep rearing in place of milk production, while one of the mixed farms had considerably increased milk production. All except the highly intensive farm mentioned above were by now losing heavily and even this farm had almost halved its profits.

While over the whole group gross output remained virtually unchanged at between £45 and £46 an acre, crop sales almost disappeared, but poultry and egg production correspondingly increased during the

period. Food purchases rose substantially so that net output was down on the average by over £5 an acre. Apart from food, other costs showed little change. The average loss, at constant prices, rose by about £7 an acre.

The group average figures, however, are in this case of limited value owing to the wide variation in output trends from farm to farm. It is possible to subdivide the group into three farms on which output has been substantially reduced and two on which it has been considerably expanded. Table 15 gives the main data for these two sub-groups.

In the case of the three farms whose output has been reduced (Group D (1)), there has clearly been an all-round decline in efficiency from what was a low level, even in 1943/5. Their farming systems have been changed in the general direction already noted on the six farms in Group C, i.e. an increase in grass acreage at the expense of tillage, not accompanied by any appreciable increase in livestock; meantime, no doubt partly as a result of the reduction in feed corn acreage, food purchases increased substantially. On average, the grass area on these farms increased from 56% to 76% of total acreage, while the cereal acreage fell from 37% to 19%—a change which is reflected in a reduction in crop sales from £761 to £213 per 100 acres. Livestock numbers increased slightly—from 43 to 48 livestock units per 100 acres—but food purchases also rose by about 25% and the efficiency of use of feed acreage deteriorated, from 2·75 acres to 3 acres per livestock unit.

These changes have resulted in a decline in farming intensity over the whole group, as is shown by the reduction in the average System Index from 121 to 109 and, as is shown below, this decline affected each farm in the group.

	System Index	
	1943/5	*1951/3*
Farm 20	101	90
,, 21	140	132
,, 22	121	90

On Farm 20 increased grass acreage has been used as a basis for store cattle and sheep rearing; the dairy herd of about 20 cows which was previously the main source of income and was largely fed on home produce has been reduced to 5 or 6; pigs and poultry have been introduced on a small scale, mainly on the basis of bought food, but these sidelines have not compensated for the loss of income from milk.

On Farm 21, which in the earlier years combined sale corn production with store cattle rearing, plus pigs and poultry as important sidelines, the grass acreage has been increased by a third and the remaining corn acreage switched from wheat to feed grains; cash crop sales have therefore virtually disappeared; concurrently store cattle numbers have been increased by only about 15% and the combined pig and poultry unit somewhat expanded with a switch from pigs to poultry—a change which

has resulted in increased food purchases. Again the moderate increase in livestock has not offset, in income-earning capacity, the drop in sale crop acreage.

Farm 22 is a farm which in the earlier years combined a small dairy herd with a considerable pig unit (both largely dependent on home-grown concentrates) and also sold some wheat, the corn acreage averaging about half the total area. The corn area has now fallen to 30%, pig production has been virtually discontinued and the dairy herd has been almost doubled. In this case the main loss in income is from pigs and the expansion of the dairy herd has not nearly offset this loss.

The reduced output on these three farms has also been to some extent the result of lower yields. The average Yield Index in the earlier years (90) was the same as for the whole sample of 51 farms, but it has fallen by 10 points to 80. On both farms producing milk, average yield per cow declined. This, combined with increased acreage per livestock unit, is reflected in a drop in milk yield per acre from 216 to 176 gallons—a very low level of output.

To some extent the general decline in output was offset by savings in labour, machinery and fertilizer costs, indeed "extensification" may well have been inspired by the desire to limit expenditure as costs increased. If so, the policy was not economically justified. Labour costs were reduced by £2 10s. an acre, machinery by over £3 and fertilizers by 10/-, but the total saving of nearly £6 an acre was more than exceeded by the reduction in net output of £10 an acre. The drop in labour and machinery costs reflects not only the reduced labour and machinery requirements of the less intensive farming systems practised, but also an improvement in efficiency of labour and machinery use, "work units per man" having risen, on the average, from 172 to 213 and machinery costs per 100 tractor work units having fallen from £68 to about £42. In spite of this the general economy of the farms as a whole deteriorated.

By contrast the other two farms in group D—one of which already had an output more than double the average—both increased their output during the ten-year period. As will be seen from Table 15, gross output went up by over £10 an acre or 18% on these farms. On one of the farms which in the earlier period derived its main income from milk, supplemented by considerable sales of wheat and potatoes, this increase largely consisted of a 75% expansion of milk output, partly offset by reduced crop sales. On the other farm, where the income in the earlier years was derived about equally from poultry and store cattle plus some pigs, both the poultry and pig enterprises were increased by 50%. The degree of intensification is shown by the increase in the combined System Index of the two farms from 178 to 211. This is the kind of development which, in the case of Groups A and B, resulted in a considerable increase in profit per acre. There are, however, important differences:—

(i) Whereas, in Groups A and B, particularly Group A, the increase in intensity was accompanied by an increase in yields, on the two farms

under consideration the yield index fell, on average, from 107 to 100. More specifically, on one farm milk sales per cow fell from £93 to £88, and on the other income from cattle per livestock unit was approximately halved, largely through the big drop in prices for pedigree stock.

(ii) In Groups A and B, efficiency of use of feedingstuffs, and particularly of the acreage under forage crops, improved substantially; the livestock output increase in these groups was about double the extra cost of bought food plus the loss of sale crops. On the two farms in Group D(2), however, there was no such improvement; acreage of food per livestock unit and starch equivalent per acre of forage remained virtually unaltered at around 3 acres per livestock unit and 12 cwt. S.E. per acre; and an increase in total livestock output of nearly £12 an acre was slightly less than the increase in food purchases plus the drop in crop sales, which together amounted to about £13 an acre.

(iii) While in Groups A and B, labour, machinery and miscellaneous costs increased by less than 10% or far less than proportionately to output, on the two farms in Group D(2) these costs went up by 50% compared with an 18% rise in output. The increase was mainly in machinery costs, but the efficiency of use of both labour and machinery declined, the Labour Efficiency Index falling from 100 to 94, while the cost of power and machinery per 100 tractor work units increased from £53·4 to £113·2.

The figures for these two groups of farms thus illustrate the fact that, while intensification of the farming system is a potential method of obtaining a substantial increase in profits, it may have the opposite effect if the level of "yields" is not maintained or if, meantime, the effect on overhead charges is not closely watched.

The conclusions which emerge from a study of the farms in this sample showing substantial rises and falls in profits over the ten-year period may be summarized as follows:—

(a) The farms on which substantial profit increases have occurred have generally considerably intensified their systems of farming.

(b) On farms which have shown the biggest profit increases the process of intensification has generally been accompanied by material improvements in the level of yields.

(c) Intensification, however, has not invariably resulted in higher profits; some of the biggest reductions in profit have occurred on farms where considerable intensification has taken place, but where yields have fallen or overheads have been disproportionately increased.

(d) Intensification, on farms with considerable profit increases, has mainly taken the form of increasing livestock numbers, partly by means of greater purchases of feedingstuffs, partly through more efficient use of forage acreage.

(e) On the whole, farms showing increased profits have attained a considerably higher output without using more labour and with little or no increase in machinery costs.

(f) Farms whose profits have fallen substantially have, in the majority of cases, been those where output has dropped considerably, mainly as a result of "extensification" of the farming system. In these cases profits have often fallen in spite of some saving in labour and machinery costs.

TABLE 13

*Summary of Economic Data.**

Average for Two Years, 1943/5

	Average for 51 Farms	*Farms with Increased Profits*		*Farms with Reduced Profits*	
		Group A†	Group B†	Group C†	Group D†
	£ £	£ £	£ £	£ £	£ £
Gross Output per 100 acres	2,670	2,794	2,646	2,899	4,596
Less: Food Purchases ...	486	580	313	372	1,734
Seed Purchases ...	141	164	145	131	170
Net Output per 100 acres	£2,043	£2,050	£2,188	£2,396	£2,692
Expenses per 100 acres	£	£	£	£	£
Rent and Rates	167	193	168	190	171
Manures	180	271	195	146	227
Labour	974	915	974	1,077	1,254
Power & Machinery Costs	503	502	439	547	756
Other Expenses ...	159	192	150	201	303
Total ...	£1,983	£2,073	£1,926	£2,161	£2,711
Profit (+) or Loss (−) per 100 acres	+£60	−£23	+£262	+£235	−£19
System Index	91	89	88	92	143
Yield Index	90	98	96	92	101
Livestock Units per 100 acres	29	27·3	29·3	32·5	45·2
Livestock Units per 100 feed acres	38	37·7	38·9	39·6	56·0
Adjusted feed acres per L.U.	3·0	3·2	2·9	2·85	2·9
Utilised S.E. per acre of forage (cwt.)	10·9	9·7	11·4	12·0	12·0
Output per adjusted feed acre	£20·8	£21·4	£19·0	£23·3	£29·2
Milk yield per cow (gallons)	581	680	580	645	566
Milk yield per acre (gallons)	193	213	200	227	197
Work units per man ...	195	211	190	180	196
Labour Efficiency Index ...	85	92	88	78	86
Power & Machinery Costs per 100 tractor work units	£45·3	£42·9	£38·9	£53·6	£61·5

* Financial data in this Table are at constant prices.

† Group A includes 6 farms whose profits increased during the period by over £5 an acre;

Group B includes 7 farms whose profits increased during the period by £3-£5 an acre;

Group C includes 6 farms whose profits fell by £3-£5 an acre;

Group D includes 5 farms whose profits fell by over £5 an acre.

TABLE 14

*Summary of Economic Data.**

Average for Two Years, 1951/3

	Average for 51 Farms	*Farms with Increased Profits*		*Farms with Reduced Profits*	
		Group A†	Group B†	Group C†	Group D†
	£ £	£ £	£ £	£ £	£ £
Gross Output per 100 acres	3,066	4,781	3,751	2,415	4,527
Less: Food Purchases ...	736	1,283	671	478	2,291
Seed Purchases ...	119	150	116	120	104
Net Output per 100 acres	£2,211	£3,348	£2,784	£1,817	£2,132
Expenses per 100 acres	£	£	£	£	£
Rent and Rates ...	167	193	168	190	171
Manures	142	230	179	78	174
Labour	869	926	943	894	1,160
Power & Machinery Costs	506	622	487	447	852
Other Expenses ...	233	266	223	238	478
Total ...	£1,917	£2,237	£2,000	£1,847	£2,835
Profit (+) or Loss (−) per 100 acres	+£294	+£1,111	+£784	−£30	−£703
System Index	97	130	112	85	148
Yield Index	97	113	98	87	91
Livestock Units per 100 acres	36	40·1	42·8	34·3	55·4
Livestock Units per 100 feed acres	42·5	50·8	50·6	36·5	60·2
Adjusted feed acres per L.U.	2·92	2·85	2·5	3·15	2·9
Utilised S.E. per acre of forage (cwt.)	11·3	13·5	14·9	10·9	12·5
Output per adjusted feed acre	£22·4	£33·4	£25·0	£18·0	£25·4
Milk yield per cow (gallons)	628	855	660	634	535
Milk yield per acre (gallons)	214	300	265	200	186
Work units per man ...	225	252	230	205	230
Labour Efficiency Index...	98	110	100	89	100
Power & Machinery Costs per 100 tractor work units	£47·3	£50·6	£43·3	£46·5	£72·8

* Financial data in this Table are at constant prices.

† Group A includes 6 farms whose profits increased during the period by over £5 an acre;

Group B includes 7 farms whose profits increased during the period by £3-£5 an acre;

Group C includes 6 farms whose profits fell by £3-£5 an acre;

Group D includes 5 farms whose profits fell by over £5 an acre.

Table 15

Summary of Economic Data for Two Groups of Farms with Profit Reductions of over £5 an Acre.

	1943/5		*1951/3*	
	Group D(1)	Group D(2)	Group D(1)	Group D(2)
	£ £	£ £	£ £	£ £
Gross Output per 100 acres ...	3,539	6,017	2,813	7,096
Less: Food Purchases ...	1,328	2,370	1,691	3,188
Seed Purchases ...	127	239	80	141
Net Output per 100 acres ...	£2,084	£3,408	£1,042	£3,767
Expenses per 100 acres	£	£	£	£
Rent and Rates	173	168	173	168
Manures	162	327	113	266
Labour	1,222	1,301	958	1,463
Power & Machinery Costs	796	694	461	1,438
Other Expenses	254	379	367	645
Total ...	£2,607	£2,869	£2,072	£3,980
Profit (+) or Loss (−) per 100 acres	−£523	+£539	−£1,030	−£213
System Index	121	178	109	211
Yield Index	90	107	80	100
Livestock Units per 100 acres	43·2	49·0	48·0	66·0
Livestock Units per 100 acres feed	53·1	61·2	55·2	67·3
Adjusted feed acres per L.U.	2·75	3·05	3·0	3·0
Utilised S.E. per acre of forage (cwt.)	12·4	12·0	12·4	11·5
Output per adjusted feed acre	£22·3	£36·0	£17·5	£33·7
Milk yield per cow (gallons)	586	540	493	568
Milk yield per acre (gallons)	216	180	176	192
Work Units per man ...	172	230	213	216
Labour Efficiency Index ...	75	100	92	94
Power & Machinery Costs per 100 tractor work units ...	£68·0	£53·4	£41·9	£113·2

Appendix

Definitions of Terms Used

1. *Gross Output.* Total income from all sources minus purchases of livestock, plus or minus any increase or decrease in valuation between beginning and end of year.

2. *Net Output.* Gross output minus purchases of feedingstuffs and seeds.

3. *System Index.* A measurement of relative intensity of the farming system. The method of calculation is as follows:—

(a) Arrive at a figure of "standard income" for the farm, by attaching to each of the enterprises which directly contribute to income a value per acre of crops or per head of livestock, which represents the annual income to be expected from these enterprises at normal yields.

(b) Divide the standard income by the productive farm acreage, giving a standard income per acre.

(c) Relate this figure of standard income per acre to the prevailing average for farms in the area.

4. *Yield Index.* A measurement of the general level of crop yields and livestock yields compared with normal figures for the locality. The method of calculation is as follows:—

(a) Calculate the actual gross output of the farm.

(b) Divide this figure by the standard income calculated as in paragraph 3 (a) above.

(c) Relate the resulting figure to the average for farms in the area similarly calculated.

5. *Livestock Units.* Taking the average dairy cow as one "livestock unit" the values used in this report for various kinds of livestock in terms of livestock units are as follows:—

	Units per Head
Cows and Bulls	1
Other Cattle: over 2 years old	4/5
1-2 years old	3/5
under 1 year old	2/5
Horses	1
Ewes, including lambs to 6 months old	1/4
Other Sheep (over 6 months)	1/10
Sows (including litters)	1/2
Other pigs (over 8 weeks)	1/4
Poultry: Laying Birds	1/50
Rearing Birds	1/150

6. *Work Unit System.* A system of measurement of efficiency of use of labour, based on relating the actual labour available on the farm to the normal total labour requirements of the various enterprises on the farm. One "work-unit" is the average work performance in an 8-hour day, and the normal work unit requirements per annum for the main farm enterprises, used in this report are as follows:—

Crops	*Work Units per acre per annum*	*Livestock*	*Work Units per head per annum*
Cereals	3	Horses	10
Potatoes	20	Dairy Cows	18
Sugar Beet	18	Beef Cows	10
Feed Roots and Kale:		Bulls	4
Cut and Carted ...	12	Other Cattle:	
Folded	5	Over 2 years ...	2
Bare Fallow	2	1-2 years	3
Hay and Silage ...	3	Under 1 year ...	4
Grazing	½	Sheep	1
		Sows	5
		Other Pigs over 8 weeks	2
		Poultry	¼

By applying these factors to the crop acreages and livestock numbers on the farm a theoretical total labour requirement for the farm can be calculated. This is divided by the average numbers of men on the farm to give a figure of "work units per man"; for this purpose the average numbers of men can best be arrived at by dividing the total wage bill by the annual wage paid to a male adult worker for a 47-hour week. A normal figure for work units per man on the average farm in the area is 230; figures above or below this level represent a high or low efficiency of labour use as the case may be.

7. *Tractor Work Units.* The normal tractor hours per acre of crops or per head of livestock used for calculating power and machinery costs per tractor work unit, as described on page 10, are as follows:—

Crops	*Tractor hours per acre*	*Livestock*	*Tractor hours per head*
Cereals	12	Dairy Cows	8
Potatoes	35	Other Cattle:	
Sugar Beet	35	Over 2 years ...	7
Feed Roots and Kale:		1-2 years	5
Cut and Carted ...	40	Under 1 year ...	3
Folded	15	Ewes	1½
Bare Fallow	10	Other Sheep	1
Hay	7	Sows	2½
Silage	14	Other Pigs	½
Grazing	2½	Poultry per 100 ...	4

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