FARMERS' BULLETIN NO. 18

INTERPRETATION OF FARM ACCOUNTS

Issued by

FARM ECONOMICS BRANCH
SCHOOL OF AGRICULTURE
CAMBRIDGE UNIVERSITY

FEBRUARY, 1955

Post Free
2s.

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Foreword

With ending of food rationing and of fixed prices for agricultural produce, the farmer is now faced with new problems in deciding on a policy for his farm. It is no longer enough to secure a reasonably high output—production must be of the kind and type that the consumer requires. Of even more importance, output must be secured with an economic use of resources. For this reason, there has recently been a growing demand for economic, as distinct from technical, advice.

Economic analysis may suggest to the farmer the keeping of elaborate records, but, as shown here, much can be done with no more than the ordinary accounts that must be prepared for taxation purposes.

The Farm Economics Branch at Cambridge has been a pioneer in this field and, as long ago as 1932, Dr. R. McG. Carslaw published a bulletin on the subject. In the last few years, however, the scope for economic analysis has grown and techniques have greatly improved. The co-operation of the advisory services has been secured and most district officers are now in a position to give advice on the analysis of accounts and the practical lessons to be drawn from them. The amount of time that an advisory officer can give to any individual farm is, however, limited and a farmer can do much of this work himself. As an alternative, he can ask his accountant to carry out an analysis of the kind shown here.

It is therefore for the benefit of farmers and accountants that this bulletin has been prepared by Mr. D. B. Wallace of this department. There are other and more elaborate tests that may sometimes be necessary, but the methods described here should suffice in most cases. If a farmer resides in the Eastern Counties, he can obtain more detailed information about farming results in the area from the annual "Report on Farming" published by this department.

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Introduction

At the present time, agriculture in Britain faces a period of economic uncertainty, when compared with the years 1939–1954. The advent of food surpluses in the world, coinciding with the improved financial position of this country, has meant that the British farmer must face more competition than has been the case in recent years. The White Paper on the 1954 Price Review recognised this point when it stressed that in future "Still further expansion must depend on the continued success of the industry in reducing costs and improving quality, particularly of livestock products, and so reducing the cost to the Exchequer of carrying out the guarantees under the Agriculture Act."

This change in emphasis means that farmers will have to pay as much attention to the economic organisation of the farm as to the technical processes of growing crops and rearing livestock. Management in this sense concerns itself firstly with seeking the most profitable combination of the factors of production, land, labour and capital, and then with supervising that combination. In other words, management to be effective implies *control*, and control means having the requisite information with which to tell whether the farm is being run properly or not.

In industry, many examples of such controls can be cited—from the power-station engineer reading the dials on the control-board to the chemist carrying out batch analyses on vats of chemicals. But in business further methods of control have been evolved which rely not only on technical data, but also on figures and balance sheets. Systems have been set up, such as " budget control " in which the expected costs of running a plant are set out for periods in the future. These are later compared with the actual costs incurred and major discrepancies have to be accounted for. Again, there are many types of cost-accounting by which the industrialist seeks not only to learn the price he must charge for his product, but also to keep control of the production process itself.

It is clearly impractical to suggest to a working farmer that he should follow any such system, or indeed that it would be necessary. But there are a number of simple tests that can give him a broad picture of his farm organisation and direct his attention to those parts of it which would repay further investigation. The only figures required are the farmer's normal accounts, together with a little extra information which every farmer should be able to produce. From this data certain *key-factors* are calculated, such as Farm Income and Net Output, which act as " gauges " of the farm organisation. When it comes to acting upon these results, the farmer may in some cases find it necessary to keep some additional records if he is to get worthwhile results, but even so the extra work is small in relation to the benefits that can accrue.

It is sometimes contended that the labour of calculating even these simple key-factors is unnecessary and that experience and visual inspection can detect whether anything is wrong in the farm organisation. The experience of this department in advisory work shows that this is often not so. Even on a farm where there is an obvious cause for low returns such as poor crop

yields, it may still be worth while to calculate the key-factors, to find whether there are other contributory causes that can be rectified at the same time. Where the cause is not obvious to the eye—such as poor livestock output in relation to feed consumed—then such key factors are essential, for no amount of " show-points " will indicate whether the livestock are being produced economically. The farm used as an example in the next chapter is intended to illustrate this point. In this case technical efficiency judged by crop or livestock yields, was above average, but profits were well below, and it would have been difficult to discern the cause merely from visual inspection of the farm.

The foregoing should not however be taken to mean that this analysis is sufficient in itself. To correct faults in organisation the results must be interpreted with common sense, and remedies advised in the light of the circumstances of the individual farm.

In the next section a complete example is worked through to show what such an analysis entails in practice and this is followed by a general discussion on the interpretation of results. The standards used in the example and included on the loose-leaf supplement at the end, refer only to the Eastern Counties. Farmers in other areas should approach the local District Advisory Officer of the National Agricultural Advisory Service for standards appropriate to their farm.

CHAPTER I

Demonstration

To illustrate the use of efficiency measures in practice, an example is given.

Description.

The farm[1] consists of 140 acres of boulder clay land, organised for mixed arable cropping and livestock. The crops are those usually found on such farms: wheat, barley, oats, beans and sugar beet, together with some mangolds, one-year leys and permanent grass. In the year under consideration the cropping was as follows:—

CROP	ACRES	CROP	ACRES
Wheat	30	Sugar Beet	7
Barley	30	Mangolds	3
Oats	10	One-year Ley	15
Beans	20	Permanent grass	25

Total 140 acres.

The yields were about average or slightly more, being 26 cwt. per acre for wheat and 24 cwt. for barley. The sugar beet reached 12 tons per acre and hay yielded 2 tons per acre in two cuts.

The livestock consisted of beef cattle, pigs and poultry. About a dozen cattle were bought annually as yearlings and fattened off at $2\frac{1}{2}$ years old. There were also two house cows whose calves were reared. Fifty pigs were purchased each year as young stores and fattened to bacon weight. The poultry flock consisted of 300 laying pullets in a henyard fashioned from a disused bullock-court. They were replaced each year by pullets reared from day-old chicks.

The labour staff consisted of a stockman, two day-men, a girl and some casual labour hired for threshing. There were two reasonably modern tractors, but no combine or baler. Some combining and sugar beet lifting was carried out by a contractor.

Analysis.

At the end of the year, the farmer received his financial statement from his accountant and found that his trading profit was less than £600. The farm had at least shown a profit but in view of the good crop yields he was puzzled that the result was not better. He therefore decided to call on his District Advisory Officer for help. When the latter had visited the farm he confirmed that there was no immediately obvious cause in the form of bad husbandry or poor livestock to account for the disappointing results. The farmer and the adviser then settled down to analyse the farm organisation by calculating the five key-factors. The trading account prepared by the accountant is shown on page 22 and the first step was to cast this into a standard form, using the methods described in Appendix I. The result of this work was as follows:—

[1]For obvious reasons, the farm account used is fictitious. The author would have no difficulty, however, in producing farm records closely resembling the one shown here.

Modified Trading Account

COSTS:	£	RETURNS:	£
Wages	1400	Cereals	1130
Machinery	680	Sugar Beet	550
Livestock	900	Other crops	300
Foods	950	Cattle	1000
Seeds	150	Pigs	1100
Fertilisers	250	Poultry	1100
Rent	140	Miscellaneous	150
Miscellaneous	300		
Gross Charges	4770		
FARM INCOME	560		
	5330	GROSS INCOME	5330

To allow comparison with other similar farms, each of these figures were divided by 140—the acreage of the farm. The results were set out as shown below, together with standards produced by the District Officer for " ordinary " and " good " (well managed) farms of similar type in the area.

Modified Trading Account—per Acre

COSTS:	THIS FARM	OTHER FARMS AVERAGE STANDARD	OTHER FARMS GOOD STANDARD	RETURNS:	THIS FARM	OTHER FARMS AVERAGE STANDARD	OTHER FARMS GOOD STANDARD
	£	£	£		£	£	£
Wages	10.0	9.3	9.5	Cereals	8.1	9.6	10.2
Machinery	4.9	6.3	5.4	Sugar Beet	3.9	4.4	5.9
				Other Crops	2.1	1.7	1.8
Wages and Machinery	14.9	15.6	14.9	Cattle	7.1	13.1	14.8
Livestock	6.4	2.1	2.5	Pigs	7.9	7.4	6.5
Foods	6.8	5.9	5.2	Poultry	7.9		
Seeds	1.1	1.3	1.1	Miscellaneous	1.1	2.6	2.5
Fertilisers	1.8	2.3	2.5				
Rent	1.0	1.8	1.8				
Miscellaneous	2.1	2.1	2.1				
Gross charges	34.1	31.1	30.1				
FARM INCOME	4.0	7.7	11.6				
	38.1	38.8	41.7	Gross Income	38.1	38.8	41.7

It will be seen that this farmer was making a profit of only £4 per acre compared with an average of £7.7 per acre on other similar farms and £11.6 per acre on the best managed farms. He then studied the receipts and expenses in detail. On the expenses side of the account, no glaring extravagance was apparent. Wages and machinery costs (per acre) appeared normal, so also did seeds, rent and miscellaneous expenses. He was spending a little less than average on

fertilisers, but the manuring programme was a matter that he could discuss with the advisory officer later. He was spending a little more then average on the purchase of livestock and foods but this was balanced by higher livestock receipts. On the receipts side of the account, the total Gross Income (£38 per acre) was about average but somewhat less than was obtained on the best farms.

In some cases, an examination of the accounts in this way may show up some glaring overspending or shortfall in receipts. But this was not so in the present case, for the standard of technical management was reasonably high. It was apparent therefore that some more detailed analysis was necessary. Essentially, if farm income (or profit) is low, output must be too low or expenditure must be too high for the type of production undertaken. Each will now be considered in turn.

OUTPUT

Net Output per Acre.

The farmer felt that his output at least should have been satisfactory because of his high crop yields. Nevertheless, they calculated the Net Output per acre as the first part of the analysis to satisfy themselves upon this point. Net Output is the Gross Income less purchases of livestock feedingstuffs and seeds.[1]

	£	£
Gross Income		5330
Less purchases of—		
Livestock ..	.. 900	
Feedingstuffs	.. 950	
Seeds ..	.. 150	
	——	2000
NET OUTPUT		3330

The Net Output was thus £3330 or £24 per acre. Reference to the District Officer's standards showed that similar farms averaged £30. This surprised the farmer in view of his yields, and he set out to discover the reason.

Output is the result of the system of farming practised and the yields achieved. A farmer may follow a system that, potentially, will lead to a rather low output at ordinary yields, but because of a high level of fertility or technical ability, he may in fact achieve a high output through good yields. Crops such as hay or cereals, and livestock such as beef cattle have a relatively low potentiality, known as *intensity*, while root crops such as potatoes or sugar beet, and livestock such as pigs, are of a high intensity, because at normal yields they give a high *gross* return per acre.

As already mentioned both the yields of crops and of livestock, in so far as these latter could be measured, were satisfactory, and the intensity of cropping and stocking were about the average for similar farms. It was thus neither the yields nor the system that was at fault in this particular case.

It must be remembered that Net Output is calculated by subtracting three items of cost from Gross Income. If any of those items are too high in relation to the total production of the farm, they will have the effect of reducing the Net Output. It is most unlikely that the level of seed costs will ever be so high as to affect seriously the level of Net Output, but both the other items,

[1]Some farmers breed their own livestock and grow their own feedingstuffs and seeds—others buy them. By deducting purchases of these items, all farms are placed on an equal footing.

livestock and feedingstuffs, may very well do so, the more especially as they are directly connected. If this is the case, then calculation of the key-factor relating to livestock will show a poor result. This calculation is demonstrated in due course.

INPUTS

Labour and Machinery costs are nearly always the biggest items of expenditure on farms. Therefore the efficiency of labour use was examined.

Net Output per £100 Labour and Machinery.

To a large extent labour and machinery are substitutes. Thus if a farmer spends large amounts on machinery, he should require less labour—and vice versa. These two items generally account for more than half the cost of running a farm and it is well worth the effort to check the expenditure under this heading with some care.

The vital factor is output per £100 of labour and machinery and this was calculated as follows:

1. Cost of labour. To the total wage bill was added an allowance (in this case £300) for manual work carried out by the farmer.

2. Cost of machinery. This was already given in the Modified Trading Account and included repairs and upkeep of machinery, fuel and tackle hire.

	£
Wages	1400
Farmer's own labour ..	300
Total Labour ..	1700
Machinery costs ..	680
Total Labour and Machinery	2380

Output per £100 labour and machinery.

$$\frac{\text{Net Output}}{\text{Total Labour and Machinery}} \times 100 = \frac{£3330}{£2380} \times 100 = £140$$

A reasonable standard would have been £180. The return was thus too low and would seem to indicate that either output was too low, or alternatively that too much was being spent on labour and machinery. The farmer had already seen that output per acre was somewhat low. Were labour and machinery expenses also too high ? There is no very satisfactory objective measure of machinery expenses, but labour requirements can be measured with some precision.

As a first step they calculated output per £100 labour.

$$\frac{\text{Net Output}}{\text{Total Labour}} \times 100 = \frac{£3330}{£1700} \times 100 = £196$$

A reasonable standard would have been £290. This seemed to indicate that the labour force was excessive and this was tested by means of " work units."

Work Units.

Work units measure the physical amount of labour required to grow crops or tend livestock. A list of these is given in the appendix but the results for this farm were as follows:—

	ACRES	W.U. PER ACRE	TOTAL W.U.
Wheat (cut by binder)	30	4	120
Oats „	10	4	40
Barley (cut by contractor) ..	30	2	60
Beans	20	5	100
Sugar Beet	7	20	140
Mangolds	3	20	60
Hay	15	$2\frac{1}{2}$	38
Pasture	25	$\frac{1}{4}$	6
Total for Crops	140		564
	NUMBER	W.U PER HEAD	
House Cows	2	18	36
Cattle	17	3	51
Calves	2	$4\frac{1}{2}$	9
Pigs fattened	50	$\frac{3}{4}$	38
Laying Hens	300	$\frac{1}{4}$	75
Pullets reared	300	$\frac{1}{10}$	30
Total for livestock			239

Total work units required 564 + 239 = 803

Work units available—	
Stockman	300
2 day-men @ 250 ..	500
Girl	200
Farmer	250
	1250
Work units required ..	803
Excess of labour ..	447

The farmer then has 447 units of labour more than was apparently necessary. It should thus have been possible to manage the farm on present lines with nearly two men less. The farmer admitted this after some thought but was somewhat reluctant to dismiss any of his staff for once they left his employment, he would find it difficult to replace them if this should ever be necessary. The adviser pointed out however that the output was insufficient to carry four workers and if the farmer would not reduce his staff he must increase the output. In either case output per worker would be increased. The latter course—an increase in output rather than a reduction in staff—is often the more profitable of the two alternatives but may unfortunately require an appreciable amount of capital.

Livestock Output per £100 of Feedingstuffs.

The other vital sector of costs is connected with livestock production. It is often hard to tell at a glance whether or not a livestock enterprise is paying. The last key-factor is therefore directed to measure livestock efficiency. The largest item of cost in livestock production is generally feedingstuffs. Livestock production per unit of foods used is thus of vital importance. The first step was to calculate livestock output. This is found by deducting purchased livestock from the gross income derived from livestock and livestock products such as milk or eggs. In addition, an allowance was made for produce used in the farm house, in this case £40 of milk and £20 of eggs.

GROSS LIVESTOCK INCOME:	£	£
Cattle	1000	
Pigs	1100	
Poultry	1100	
Produce used ..	60	
		3260
Less Purchases of livestock		900
LIVESTOCK OUTPUT		£2360

Next, the value of home-grown and purchased feedingstuffs was totalled. The farmer had little difficulty in estimating the acreages of roots, hay and grazing, but the quantities of home-grown cereals presented another problem. In common with many farmers, he had kept no accurate records of these items, but by dint of much hard thought, together with reference to the stockman for his opinion, they finally arrived at a figure which was accurate enough for the purpose. The quantities were priced at the values in force at the time, as follows:—

FEEDINGSTUFFS:	QUANTITY	VALUE PER UNIT £	TOTAL £
Cereals	37 Tons	23	851
Beans	8 Tons	30	240
Hay	32 Tons	7	224
Mangolds	3 acres	50	150
Grazing: Perm. Grass ..	25 acres	3	75
Purchased Concentrates ..	25 Tons	–	950
		Total Value	2490

The key-factor was then calculated by dividing the Livestock Output by this figure and multiplying by 100.

$$\frac{£2360}{£2490} \times 100 = £95$$

The District Officer pointed out that the average for similar farms was £140, so that this sector clearly required further investigation.

This is a very poor result and means that for every £100 of foods—both purchased and home-grown—the farmer was producing only £95 worth of livestock. Thus even without any allowance for labour or other costs, it is obvious that the livestock were losing money.

As there was no great difficulty in separating the foods fed to the different types of livestock, it was decided to carry the analysis a stage further to see which type of livestock was most at fault.

The farmer kept no special records, but in the course of the researches made to discover the quantity of home-grown cereals and beans used, it had been possible to allocate these foods to the different classes of livestock. The roughages and grazing presented no problem, as they had obviously gone to the cattle.

The Livestock Output from each enterprise together with the cost of feedingstuffs was then calculated.

(*a*) *Cattle.*

The Gross Income from cattle in the revised account was shown as £1000, and adding £40 for milk used in the house, gave a total of £1040. The costs of purchased cattle were then deducted to give the Livestock Output from cattle:—

£1040 less £330 = £710.

The feedingstuffs fed to the cattle were:—

FEEDINGSTUFFS:	QUANTITY	£
Cereals	10 Tons	230
Beans	8 Tons	240
Hay	32 Tons	224
Mangolds	3 Acres	150
Grazing	25 Acres	75
Purchased meal	3 Tons	95
	TOTAL	£1014

Cattle Output per £100 of feedingstuffs was thus:—

$$\frac{£710}{£1014} = £70$$

The District Officer had no need to refer to his standards to show that this was highly unprofitable.

(*b*) *Pigs.*

The farmer turned anxiously to his pigs which he had always considered reasonably good. The output here was £1100 (the Gross Income) less £500 paid for the stores, or £600 net. The feedingstuffs were:—

	QUANTITY	£
Cereals	13 Tons	299
Purchased meal	7 Tons	245
	TOTAL	544

Pig Output per £100 Feedingstuffs was thus:—

$$\frac{£600}{£544} \times 100 = £110$$

This is not quite such a poor result as for the cattle, but it is obvious that the pigs are no more than paying expenses, leaving nothing for profit.

The District Officer thought that £140 would have been a fair standard for this type of pig-keeping. He pointed out that the conversion factor—that is, the pounds of meal per pound of liveweight gain—is the most important efficiency measure in fattening baconers, and that it should be possible to make a rough approximation in the present case.

At the beginning of the year the farmer had 10 stores on hand, averaging about 80 lb. liveweight. He knew that he had sold 50 at about 210 lb. liveweight. At the end of the year

there were 12 pigs left on the farm, averaging about 130 lb. each. The liveweight increase was calculated as follows:—

		lb.			lb.
Opening Valuation	10 @ 120 lb.	1200	Closing Valuation	13 @ 160 lb.	2080
Purchases ..	55 @ 70 lb.	3850	Sales ..	50 @ 210 lb.	10500
		5050	Deaths ..	2	
Liveweight increase		7530			
	65	12580		65	12580

The total amount of meal was 20 tons or 44800 lb. So that the conversion factor was:—

$$\frac{44800}{7530} = 5.95$$

His pigs have thus consumed nearly 6 lb. of meal per 1 lb. liveweight gain. Under these conditions 4.5 lb. would have been a fair and 4.0 lb. a good standard. Clearly there was a great deal of waste and the advisory officer decided that there were two main causes. The yards in which the pigs were fattened were damp and draughty and the system that the farmer used of *ad lib.* feeding until fat was wasteful. The farmer agreed to provide runs in the yard with wire netting to restrict movement and break up the pig herd into smaller fattening units. He also decided to provide a false ceiling with wire and straw for the sleeping area. Finally, he proposed that once the pigs reached 120 lb. liveweight, they should be rationed daily on a simple basis suggested by the advisory officer.

(*c*) *Poultry.*

By now the farmer had little hopes of his poultry, but he persisted and calculated the livestock output for this enterprise as well.

The Gross Income from poultry was £1100, plus £20 worth of eggs and birds used in the house giving £1120. From this was deducted £70 for day-olds purchased, leaving a Poultry Output of £1050

The total food used was:—

	QUANTITY	£
Cereals	14 Tons	322
Layer's meal	10 Tons	390
Chick meal	5 Tons	220
	TOTAL COST	932

The Poultry Output per £100 of feedingstuffs was thus:—

$$\frac{£1050}{£\ 932} \times 100 = £113$$

The average for similar farms was £150.

It was just worth calculating the meal used by both chicks and layers, as the information was available.

The chicks used 7 tons of food in all or 52 lb. per bird, whereas 35 lb. should have been enough. The layers averaged over £3 per bird for egg sales which was fair for the year. But they required 22 tons of meal or 1.47 cwt. per bird, whereas 1 cwt. should have been enough.

Obviously, the main trouble in all these livestock enterprises was that the farmer was not keeping strict enough control of the meal fed. This applied particularly to the home-grown cereals, which were neither weighed nor rationed properly. He was reasonably strict about the purchased meals, for these had to be paid for directly, but the home-grown cereals did not involve him in cash outlay *at the time of feeding them*, and so tended to be taken for granted.

There were three livestock enterprises on the farm—cattle, pigs and poultry and so far as could be seen from this analysis, none showed a profit. Two, the pigs and poultry, were probably nearly " breaking even," but the third, the cattle, were losing money heavily.

Conclusions.

The farmer's *Net Output per acre* was low and this was not due to crop yields or even his system, but to the inefficient livestock sector. His *Livestock Output per £100 of Feedingstuffs* was low, due to wasteful feeding, and the same enterprises could have been kept with far less food. Conversely, if he could have improved his standard of feeding, he could have expanded production without drawing on further feedingstuffs. Finally, both *Net Output per £100 Labour* and *Net Output per £100 Labour and Machinery* were low, and investigation showed an excess of labour.

Remedies.

The District Officer and the farmer decided that there was no need to alter the technique of growing the crops, which achieved a very fair level of yield, nor was the cropping lacking in intensity. There was obviously wastage in feedingstuffs which better rationing and housing could eliminate, but this would not solve the whole matter. The kernel of the problem was that there were certain resources on this farm, both labour and land, especially grassland, that were not being utilised to their capacity.

So far as land was concerned, more than half the farm was devoted to a cattle enterprise that was losing money. This enterprise was being carried by the cash crops. It is true that leys provide a rest from cash crops and that the manure produced by the cattle doubtless helps to produce better crop yields. But there is no reason why the livestock enterprise should not itself contribute to the farm profit.

So far as labour was concerned the farmer realised he could, perhaps, have dispensed with the services of one or even two men. But even if total production had remained the same with this smaller labour force, the saving in expenses (and therefore increase in profit) would have been £700, which would have raised him just above the average. He felt it might be possible to let one man go, but that production should then be expanded to take up as much of the excess labour as possible—up to the limits of available capital.

Various combinations could be tried, such as ploughing some of the spare grass, selling some of the excess corn, keeping more beasts, establishing a rearing herd, keeping more pigs, breeding from his own sows, keeping a sheep flock, expanding the poultry flock or even the establishment of a dairy herd.

Some of these alternatives the farmer ruled out of court immediately owing to lack of buildings, or because of personal preferences. It is rarely of value, especially with livestock, to press a man to start an enterprise for which he has little liking. Even with these reservations, there were three or four possible changes which could have raised his farm profit. The next task for the farmer and his District Officer was to consider the economic and technical implications of each possibility, and to do so they prepared two or three budgets to see which was likely to produce the greatest farm income. The details of these would only be of interest to the farmer concerned, and would easily fill another bulletin. The purpose of this example is merely to demonstrate the need for a logical method of analysis, and to show how it can be used to direct technical advice into the right channels. We shall therefore leave the farmer and his adviser at their budgets. Briefly, the main lines they considered were the reduction of the amount of grain kept on the farm by tighter rationing and selling the surplus, more intensive use of the grassland, probably with some sheep to supplement the cattle, and the keeping of 10 breeding sows to produce about 140 weaners a year. Only the last of these required additional expenditure on buildings, and careful adaptation of the yard in use at present, coupled with outdoor farrowing huts, went a long way to providing for this extra housing.

CHAPTER II

Interpretation

The previous chapter has been concerned with the explanation of analysis by means of an example. It now remains to discuss in general terms some of the lessons that can be drawn from the use of efficiency factors.

The actual calculation of the key-factors is quite simple, especially when a little experience has been gained with them. But these factors are only a means to an end. Their purpose is to disclose weaknesses in a farm's organisation, and it is the *interpretation* of the results that is important and often presents difficult problems.

In practice, a farmer can calculate these efficiency factors from his accounts or ask his accountant to carry out the work for him. If he has difficulty in interpreting the results, he can take them to the district officer of the N.A.A.S.

It is therefore proposed to work through the key-factors in this chapter, indicating some of the likely causes of low performance in each case. Some of this has already been done when describing the example in the previous chapter, but in order to have a coherent pattern some repetition is inevitable.

The analysis starts with the calculation of Farm Income per acre and the comparison of the results with appropriate standards. Even if profits are above average it may still be worthwhile to carry out the whole analysis to see whether any part of the farm is lagging behind the rest in efficiency.

As Farm Income is the result of subtracting Inputs from Output, both these items should be examined in turn.

Net Output per acre.

Net Output is used as the measure of the production of the farm. To pay for the overhead costs of managing a farm and leave an income for the farmer, the output must be reasonably large. A low output may be due to three main causes.

1. It may be due to a lack of intensity in the system practised. Low intensity means that the farmer is concentrating on low value crops or that his farm is carrying too few livestock on the land devoted to this purpose. As a result the farming organisation would have a low output if only average yields are obtained. Potatoes are more intensive in this sense than sugar beet, and these in turn are more intensive than cereal crops.

2. Low output may be due to low yields either of crops or livestock. A farm may have a high intensity, and this may be spoiled by poor yields leading to a low output.

3. Finally, because Net Output is calculated by subtracting certain items of cost from Gross Income, a low figure may be the result of purchases that are excessive in relation to the production derived from them. This is only likely to be important in the case of feedingstuffs. If feeding efficiency is low, this fact will emerge later in the analysis.

Net Output per £100 Labour and Machinery and per £100 Labour.

Low performance may be due again to one or more of three causes.

1. The Net Output may be low because of poor yields, or low livestock efficiency. To take an extreme example, nearly as much labour is required per acre to grow a 15 cwt. wheat crop as one of 30 cwt. but the latter will give nearly twice the return per man hour. Again, if feedingstuffs are wasted, this does not lessen the amount of labour required in managing livestock but it will lower Net Output and consequently the output per man employed.

2. There may be too much labour employed on the farm. This can be checked by means of work units. It must be added, however, that it is not always easy to fit staff size to labour requirements. There are two reasons for this. Firstly labour is a " lumpy " factor. A farmer can have one man or two, but not one and a half. Thus, on a small farm, a farmer may have two men and realise that this is too many. At the same time, if he dispenses with one of these, this is a reduction of 50%—which may be too much. Secondly, the load of work varies with the seasons. Thus if a farmer has difficulty in obtaining casual labour, he may be tempted to carry a large enough staff to deal with the busiest period. This may however be an extravagant way of running a farm and every effort should be made to deal with labour " peaks " by the recruitment of casual labour, by the use of machinery or, if a larger staff must be carried, by providing productive enterprises to keep them employed throughout the year.

3. Occasionally the farmer may be paying high wages but not getting a commensurate output. This means that the labour cost per unit is high. This must not be taken as a condemnation of high wages—far from it. The payment of bonuses or higher wages for good work is an admirable scheme, but the farmer must see that he is obtaining a tangible return for his extra outlay.

Livestock Output per £100 Feedingstuffs.

Once more there may be three causes for a poor result.

1. Livestock yields may be low. While a dairy cow with a high yield requires more food than a low yielder, it is not *proportionately* more, because the maintenance ration is the same in both cases. Thus the higher the yield, the lower the food cost per gallon. Exactly the same consideration applies to laying hens or breeding sows.

2. More commonly, there may be waste of food. This is often the case with the home-grown feedingstuffs, especially cereals, which are not checked with the same care as are purchased concentrates. It may also be due to disease or unthriftiness in stock, to poor housing conditions, or to the keeping of inferior strains of animals. Again, grassland is often understocked because it is frequently regarded as a residual item on an arable farm, after all possible cropping land has been taken up. Up to now, this may not have been very important, but with returns from arable crops likely to fall, many farmers will have to make greater use of every acre they possess, including their grassland.

3. Expensive foods may be used when cheaper types would suffice. When straight meals are cheap and there is an excess of grinding corn on the market after harvest, it might pay a farmer to buy a quantity of his winter requirements then and store it to be milled and mixed as required. Again, oats may be fed for the first gallon of milk per day, when hay, at two-thirds the price for an equivalent amount of starch, would do equally well, perhaps better.

It must be stressed that this last key-factor is only a very general one, and if there are several livestock enterprises on the farm, further investigation and probably some simple recording will be necessary to find out which enterprises are at fault and why.[1]

[1]Work books for dairy cows, pigs and poultry are published by this department—for details see the back cover.

These points of interpretation can be summarised as follows.

Low Farm Income (i.e. low profits) is due to either:—

A. Low Output
- System not intensive enough i.e., not enough high value crops or too few livestock.
- Yields of crops or livestock too low.

or

B. High Inputs (i.e. high costs)
- Excessive costs of labour and machinery, due to:—
  - (*a*) Too much labour
  - (*b*) Expensive labour
  - (*c*) Too low an Output for the labour employed
  - (*d*) Insufficient mechanisation
  - (*e*) Too much expenditure on machinery without a corresponding saving in labour costs.
- Insufficient livestock production, due to:—
  - (*a*) Low yields from livestock
  - (*b*) Wasteful use of food or grazing
  - (*c*) Unduly expensive feedingstuffs.
- Other expenses too high.

Remedies.

Having discovered the causes of low performance, the next step is to consider possible remedies. In many cases these will be self-evident from the analysis already carried out. For instance, if livestock feeding is at fault, a closer check on the rationing may be all that is called for. Nevertheless, it may be useful to suggest here a possible order of adjustments that can be made.

In the first place if output is low, usually one of the quickest ways to raise the level is to seek technical advice on the growing of the crops, especially in relation to varieties, seed rates and fertiliser application. Once a reasonably high level has been reached, taking into account the quality of the land and the capabilities of the farmer, further increases in yield may be possible only at a disproportionate cost. Another avenue would be to consider whether more intensive cropping, such as extra roots, or less grass and more cash crops, would be possible. In practice, expansion of this sort may not be possible because of shortages of labour or capital, or to the limits of good rotations. Another possibility is for the farmer to consider whether he could not introduce more livestock to convert relatively low value crops into products in greater demand. This applies particularly to pigs or poultry in case of corn crops, beef cattle for arable residues such as sugar beet tops and straw, or sheep for grassland that cannot be easily ploughed. These same enterprises may also be considered when tackling the problem of surplus labour. As pointed out in another report of this department,[1] it is often more profitable to expand production to take up labour that is unused rather than reorganise so as to discharge labour. This very general conclusion must, of course, be interpreted with care in any particular set of circumstances, for further expansion will almost inevitably require extra capital.

Summary.

In a period of increasing financial stringency for agriculture, it behoves every farmer to keep a tight control on his organisation, and one method of doing this is to calculate the five " key-factors " described in this bulletin. These factors will help him to keep a check on the various enterprises and will indicate where remedies should be sought.

To assist farmers to calculate their own key-factors, detailed directions for the preparation of the standard form of trading account are set out in the Appendix. In the event of any doubt as to the actual calculation or interpretation of the key-factors, it is suggested that contact be made with the local District Advisory Officer.

[1]Report No. 41 " Planning a Farm for Higher Productivity."

APPENDIX I

Standard Form of Accounts

To make a fair comparison between a farm's accounts and the appropriate standards, it is obviously essential that both sets of figures should have been calculated on the same basis. Hence the need to revise the annual trading account into the standard form discussed below. The fact that this form differs from the methods used by accountants does *not* indicate that the normal trading accounts are in any way incorrect. But the accountant and the economist are trying to produce figures for two rather different purposes.

In the first place, all farmers are treated as tenants for the purpose of analysis. The reason for this is that an owner-occupier is really performing two functions, those of landlord and of farmer, and this analysis is designed to test his efficiency as a *farmer* only. Therefore, if an owner-occupier wishes to calculate these key-factors for his own farm and compare them with the appropriate standards he should exclude from his account all items that are really a landlord's responsibility such as Schedule 'A' Tax, Tithe, and major building repairs. In place of these he should substitute a fair rent.

If there should be any interest charges for overdrafts etc. these should also be omitted from the revised account. The reason for this is that such charges are merely an indication that the farmer has insufficient capital of his own and has had to borrow some. This is not a fault of his farming but only a reflection of his personal circumstances.

Any drawings in kind, such as milk and eggs should be valued and added to the credits, if this has not already been done in the accounts.

Finally, there is the question of valuations. The sales of crops and livestock should be adjusted for any increase or decrease over the year in the respective valuations. Should there be any stocks of fertiliser etc. on hand, then the appropriate items of costs should be adjusted accordingly. If cultivations have also been valued, this presents a more difficult problem. These latter figures are shown mainly to put a value on work, fertiliser, seed etc., already applied to growing crops or crops in preparation. Unless the system of farming changes radically the value of growing crops and cultivations should not vary greatly from one year to another. For this reason they are often omitted from the opening and closing valuations and indeed, the taxation authorities seldom raise any objection. If, however, they are included and the opening and closing valuation of growing crops and cultivations shows a large change, it should be questioned as to whether it does not really represent the fact that one season was much later than the other, i.e., that work was much further behind in one year. If such is the case the simplest course is to omit this item altogether. But when the difference is due to a large change in organisation or method, then some adjustment should be made, by crediting or debiting the crop production as appropriate.

Family labour (apart from the farmer) is normally charged in the accounts under wages, but if not, a charge should be made, based on the standard wage. This is necessary so that a fair comparison can be made between a farmer using quantities of family labour and one who uses none.

The example below shows how the farmer described in the second chapter recast his trading account on the lines suggested above, preparatory to carrying out the simple analysis.

Trading Account for Year ended 4th April, 1954

	£	£
VALUATION AT 5TH APRIL 1953		
Crops		
Cereals etc.	180	
Forage, straw etc.	320	
Livestock		
Cattle	850	
Pigs	150	
Poultry	440	
Horses	100	
Cultivations	~~810~~ Omit	
	——	2850
PURCHASES		
Livestock	900	
Feedingstuffs	950	
Seeds	150	
Fertilisers	250	
	——	2250
Wages, N.I. etc	1400	
Implement repairs	100	Machinery £680
Depreciation	200	
Fuel, T.V.O. etc.	180	
Contract services	200	
Rates	20	Miscellaneous £300
Water rates	10	
Transport	50	
Hardware—Farming and Road Materials	100	
Telephone	15	
Valuer and Accountant ..	20	
Veterinary	20	
Sundries	65	
Tithe	23	Omit and Substitute Rent £1140
Rent	10	
Schedule 'A' Tax	37	
Building repairs allowance ..	50	
Bank Interest	~~37~~ Omit	
	——	2537
		7637
NET PROFIT		523
		£8160

	£	£
SALES		
Crops		
Cereals	1100	
Sugar-beet	550	
Other crops	270	
	——	1920
Livestock		
Cattle	1100	
Pigs	1000	
Poultry/Eggs	1200	
Subsidies	10	
Wayleaves	8	
Personal drawings	132	
	——	3450
VALUATION AT 4TH APRIL 1954		
Crops		
Cereals etc.	210	
Forage, straw etc.	350	
Livestock		
Cattle	750	
Pigs	250	
Poultry	340	
Horses	100	
Cultivations	~~790~~ Omit	
	——	2790
		£8160

Calculation of Gross Income

ITEM	OPENING VALUATION	CLOSING VALUATION	INCREASE OR DECREASE (a)	SALES (b)	GROSS INCOME (a) and (b)
	£	£	£	£	£
Cereals	180	210	+30	1100	1130
Forage, etc.	320	350	+30	270	300
Cattle	850	750	−100	1100	1000
Pigs	150	250	+100	1000	1100
Poultry	440	340	−100	1200	1100
Horses..	100	100	0	0	0

Next, certain items have been struck through and marked " omit." The reason for this procedure has been explained overleaf. In addition, certain items have been collected together under more general headings, such as " machinery " or " miscellaneous," to reduce the number of entries and concentrate attention on those of the greatest importance.

The modified account, on which the analysis was carried out is shown below.

Modified Trading Account

COSTS	£	RETURNS	£
Wages	1400	Cereals	1130
Machinery	680	Sugar beet	550
Livestock	900	Other crops	300
Foods	950	Cattle	1000
Seed	150	Pigs	1100
Fertilisers	250	Poultry	1100
Rent	140	Miscellaneous	150
Miscellaneous	300		
GROSS CHARGES	4770		
Farm Income	560		
	£5330	GROSS INCOME	£5330

APPENDIX II

Simple Analysis of Your Own Farm

I Farm Income per acre.

Calculate Gross Income from Livestock and Crops.

CROP OR STOCK	OPENING VALUATION	CLOSING VALUATION	DIFFERENCE	SALES	GROSS INCOME
1.					
2.					
3.					
4.					
5.					
6.					
7.					

Revised Trading Account

COSTS	TOTAL £	PER ACRE £	STD. £	RETURNS	TOTAL £	PER ACRE £	STD. £
Wages				Cereals and Pulses ..			
Machinery				Sugar beet and potatoes			
Livestock				Other crops			
Feedingstuffs				Dairy produce ..			
Seed				Cattle			
Fertiliser				Pigs			
Rent				Sheep			
Miscellaneous ..				Poultry/Eggs ..			
				Horses..			
Gross Charges ..				Miscellaneous ..			
FARM INCOME ..							
				Gross Income ..			

II Net Output per Acre.

GROSS INCOME	£
LESS purchases of	£
Livestock	.....
Feedingstuffs ..	.....
Seed	.....
NET OUTPUT	

Net Output per Acre = ... Standard .....

III Net Output per £100 Labour and Machinery.

	£
Wages.....	.....
Allowance for occupier's manual labour @ £..... per week	
×.....weeks	.....
Total labour cost (a)	
Machinery.....	.....
Total labour and machinery cost (b)	

$$\frac{\text{Net Output}}{\text{Total (b)}} \times 100 \quad \text{——} \quad \times 100 = £\ldots\ldots \text{ Standard } £\ldots\ldots$$

IV Net Output per £100 Labour

$$\frac{\text{Net Output}}{\text{Total (a)}} \times 100 \quad \text{——} \quad \times 100 = £\ldots\ldots \text{ Standard } £\ldots\ldots$$

V Livestock Output per £100 Feedingstuffs.

(*a*) Livestock Output

	£
Gross Income from livestock and livestock products	.....
LESS purchases of livestock ..	.....
Livestock Output ..	

(*b*) Cost of Feedingstuffs

FEEDINGSTUFFS	QUANTITY	VALUE PER UNIT[1] £	TOTAL COST £
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
	X	Total Cost	.....

$$\frac{\text{Livestock Output}}{\text{Total cost of food}} \times 100 \quad \text{——————} \times 100 = \text{£}\ldots\ldots \quad \text{Standard}\ldots\ldots$$

Is it possible to separate the feedingstuffs between various livestock enterprises ? If so, it is suggested that a calculation similar to the one above be done for each.

[1]For suggested values see loose leaf supplement of standards. These values are primarily applicable to the Eastern Counties, but certain prices—e.g. cereals—may be common to all areas.

VI Physical Labour Efficiency.

Work Units Required

CROP	ACRES	UNITS PER ACRE[1]	TOTAL

LIVESTOCK	NUMBERS	UNITS PER HEAD[1]	TOTAL

A. Total labour required for crops and livestock.. .. .. ..

Work Units Available

		UNITS PER HEAD	TOTAL
Stockmen No. ..		300	
Daymen No.		250	
Casual Labour £ Value ..		0.7 (per £1)	
Manual Labour by: Farmer .. .. .. Family		up to 250 per head	

B. Total labour available .. ..

If the total labour available (B) exceeds requirements (A), this suggests that more labour is being used than is usual for the type of farm concerned.

[1]See Table overleaf.

Table of M.W.U's per Acre and per Head.

CROP	MAN-WORK UNITS PER ACRE	LIVESTOCK	MAN-WORK UNITS PER HEAD
Wheat, Barley, Oats, Mixed Corn	cut by: Combine 2, Binder 4	Dairy Cows	18
Peas, Beans	cut by: Combine 3, Binder 5	Nurse Cows	3
Sugar Beet	20	Cattle:	
Potatoes	20	Over 2 years	2
Fodder roots	20	1–2 years	3
Kale[1]	14	Under 1 year	$4\frac{1}{2}$
Arable Silage	4	Bulls	3
Bare fallow	$\frac{1}{2}$	Sows	5
Cabbages	20	Boars	$1\frac{1}{2}$
Brussels Sprouts	20	Fat Pigs (no. sold)	$\frac{3}{4}$
Celery	60	Laying Hens	$\frac{1}{4}$
Carrots	30	Pullets reared	$\frac{1}{10}$
Black Currants	35	Cockerels to 12 weeks	$\frac{1}{20}$
Strawberries	80	to 28 weeks	$\frac{1}{10}$
Raspberries	55	Ewes	$1\frac{1}{2}$
Gooseberries	25	Store Sheep	1
Apples	60	Rams	1
Pears	60		
Mustard	4		
Temporary Grass:—			
Hay/Silage	$2\frac{1}{2}$		
Seed (2nd cut)	1		
Grazing	$\frac{1}{2}$		
Grass seed	2		
Permanent Grass:—			
Hay/Silage	2		
Grazing	$\frac{1}{4}$		
Rough grazing	0		
Coleseed	5		
Parsnips	20		
Linseed	4		

[1]Kale Grazed 7 M.W.U's.

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