AGRICULTURAL ADJUSTMENT UNIT · UNIVERSITY OF NEWCASTLE UPON TYNE

Management Techniques for Reducing Costs or Increasing Revenues

by R. W. Helme, B.Sc., N.D.A.

TP 3

THE AGRICULTURAL ADJUSTMENT UNIT
THE UNIVERSITY OF NEWCASTLE UPON TYNE

In recent years the forces of change have been reshaping the whole economy and, in the process, the economic framework of our society has been subject to pressures from which the agricultural sector of the economy is not insulated. The rate of technical advance and innovation in agriculture has increased, generating inescapable economic forces. The organisation of production and marketing, as well as the social structure, come inevitably under stress.

In February 1966 the Agricultural Adjustment Unit was established within the Department of Agricultural Economics at the University of Newcastle upon Tyne. This was facilitated by a grant from the W. K. Kellogg Foundation at Battle Creek, Michigan, U.S.A. The purpose of the Unit is to collect and disseminate information concerning the changing role of agriculture in the British and Irish economies, in the belief that a better understanding of the problems and processes of change can lead to a smoother, less painful and more efficient adaptation to new conditions.

Publications

To achieve its major aim of disseminating information the Unit will be publishing a series of pamphlets, bulletins and books covering various aspects of agricultural adjustment. These publications will arise in a number of ways. They may report on special studies carried out by individuals; they may be the result of joint studies; they may be the reproduction of papers prepared in a particular context, but thought to be of more general interest.

The Unit would welcome comments on its publications and suggestions for future work. The Unit would also welcome approaches from other organisations and groups interested in the subject of agricultural adjustment. All such enquiries should be addressed to the Director of the Unit.

Unit Staff

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PREFACE

"The Agricultural Development Association and the Agricultural Adjustment Unit together put on a one week course under the title 'Taxation, Partnership and Capital in Agriculture'.

Several of the papers prepared for this course dealt with technical and financial subjects in an authoritative way and it was decided to issue the papers so that a wider audience could benefit from the information which had been assembled."

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Analysis of Farm Records

In spite of the rapid developments of modern and more complex management techniques account analysis is still the starting point in the appraisal of most farm management cases. The development and almost universal acceptance of the gross margin system of recording means that the initial point can be the usual annual accounts or the same figures itemised by enterprise gross margins and fixed costs. In predominantly arable areas, more and more farmers and advisers are using "normalized" gross margins figures as the one method of analysing their past performances.

The weaknesses of the account analysis method of business appraisal are well known. Firstly, it tends to look at one year only although this can be easily overcome, secondly the accounts are usually prepared for inland revenue purposes and lastly and more seriously are usually out of date. The advent of the Farm Business Recording scheme has changed all this and on many farms today none of these so called weaknesses apply. The scheme has already meant that on 95% of the cases coming forward the adviser has both the trading account (M.A.1. and M.A.2) and gross margin analysis (M.A.4.).

M.A.1. and M.A.2. (Specimens attached)

The M.A.1. is the standardised farm trading account with supplementary physical information while the M.A.2. is the subsequent report form on the same figures.

The M.A.2. is in eight main sections:-

1. Summary of Costs and Gross Output.
2. Examination of business profitability and capital.
3. Gross and Net Output per acre.
4. Density of Stocking.
5. Enterprise outputs - Crops and Livestock.
6. Concentrate feed use.
7. Net Output per £100 labour and machinery.
8. Basic or Fixed Costs.

1. Summary of Costs and Gross Output

These figures show at a glance the output from the main sections of the business and the costs incurred in achieving them. The balancing figure being the management surplus or deficit. Frequently too much attention is devoted to this surplus or deficit figure especially in one year. The importance of the

gross output figures are, they indicate at once to the adviser the size of the business in financial terms, i.e. is a small business with an output of £5,000 per year or less or a big one with output exceeding £100,000. In either case it can be seen immediately what the total is and how it is made up. Using the crop acreages and livestock numbers, standard outputs can be applied to them relative to the farm in question and quick assessment made as to whether the gross output of the business is above or below standard.

Should the output level prove satisfactory it is then possible to say what the level of costs should be relative to this output. The efficient business, depending on the type of production, would not expect costs to be more than 80-85% of the output. Hence a quick and immediate check can be made to see if low profits are due to low output, high costs or a combination of both.

The analysis so far has not involved any reference to university handbooks or other published standards although from here on this is frequently the case. Experience has shown that in many cases the root of the problem can be found without going further. However, the rest of analysis, going into more detail does facilitate the farm under examination to be compared with farms of a similar size and type and following a similar pattern of production.

The eight main items of costs are listed on a total and per acre basis set against a standard. Three of these - machinery, labour and sundries - are the ones worthy of most attention as likely to be the cause of low profits and requiring further analysis. Labour and machinery form the main part of the fixed costs and must be looked at as a single input factor. Frequently one may be low and the other high in any farming system but where both are high fixed costs may be such that profits are low.

Inputs of seed and fertiliser either in total or on a per acre basis cannot be compared too closely with any standards. They must be considered in strict relation to the system of farming being followed.

2. Examination of Business Profitability and Capital

A simple comparison of management income per acre with standards is possible but must be read with caution. At this point many farmers are no longer interested in average or standard performance but prefer to know what level should be achieved under first class management or what is being achieved by the "top ten" in similar circumstances. Thus it is often better to use target figures for income per acre rather than standards.

A comparison that takes a brief and somewhat unsatisfactory look at capital from the tenant's angle is income shown as a percentage return on tenant's capital and care must be taken to ascertain that realistic market valuations have been used. This is frequently not so and valuations of ten years ago or more are often quoted. It is advisable to demonstrate to the farmer what his income per acre will have to be by asking what return on his tenant's capital he is prepared to accept. For example, if he expects a 15% return on an investment of £75 per acre, the management and investment income will need to be £12.5 per acre.

3. Output

The gross and net output figures on a per acre basis are important factors affecting farm profits. They must also be looked at relative to each other. A satisfactory gross output accompanied by a low net output usually reflects a poor utilisation of purchased feed. Where the gross output per acre is extremely high, say over £80 per acre, care must be exercised that the per acre descriptions is applicable as much of the production may be from pigs or poultry and not actually using acres. A high net output is invariably associated with satisfactory profits.

4. Density of Stocking

Again care needs to be exercised against the use of published standards. It is essential to check the composition of the grazing livestock units at this point. In the drive for increasing intensity many farmers can achieve a very low rate of acres per livestock unit but before putting these forward as targets factors such as type of soil, drainage, layout and the ability of the farmer must be carefully assessed.

The analysis also takes into account the purchase or sale of forage or grazing hired or leased. This distinction is important as many farmers have a high stocking density, through the use of bought hay or other roughage. This may be good business, especially on poor land but such a system may be totally unsuitable to a neighbouring farm.

5. Enterprise Outputs

a. Crops Here the comparisons are a reflection of the yield and price for that year compared with farms on a similar system. Comparisons of output between crops, e.g. wheat as against barley or oats, are often more meaningful than comparisons with the standard outputs.

b. Livestock The livestock analysis demonstrates the gross output by the various types of livestock on the farm and subsequently the output less concentrate costs.

The whole of the enterprise performance both in relation to crops and livestock is better examined on the M.A.4., gross margin analysis. This enables the details to be studied, especially in relation to the composition of the variable costs which then influence our final gross margins. Therefore, the gross margin data on the M.A.4., adjusted to reflect a normal year's performance, is used in any subsequent farm planning exercise.

6. Concentrate Feed Use

This analysis looks at feed use in relation to dairy cows, other cattle, pigs and poultry. The standards required by the various types of livestock are well known and this section illustrates that high feed use in relation to output can and often is the cause of low profits. With pigs or laying poultry for

example where the feed costs are more than 70% of the output, these enterprises must be making a negligible contribution to profits.

7. Labour and Machinery

This section measures net output of the business per £100 spent on labour and machinery. A low figure here may mean low output, high labour or machinery costs or a combination of both. High labour productivity is essential for high profits. Farmers are now achieving a net output of 3½ to 5 times the labour cost.

This section only provides an introduction into labour and machinery performance. Any weaknesses found here are usually pursued by further analysis using techniques specially designed to go into the problem.

8. Basic Costs

This is an extremely important section and shows the total basic or fixed costs that the particular farm is having to carry. It may be that some of these costs can be reduced by better use of labour, alteration of machinery policy, etc., but frequently it impresses on the farmer the level of intensity necessary to meet the fixed overheads. Although it is always theoretically possible to reduce fixed costs a closer examination usually reveals about one third to one half of these are outside the farmer's conttol and hence increased output by higher yield, price or intensity is the only way to increase profits.

Comparative account analysis provides a good look at the technical strength or weakness of the business. The economic analysis is limited to the year's figures at hand and does not look at the important capital structure of the business. Some information on this can be ascertained by looking at Bank Charges and Interest and also any Mortgage Interest Payments. High charges on either of these will often reflect the difficulties of farming with large amounts of borrowed capital or the dangers of high land prices for farms of low potential output. It is essential to examine the farm balance sheet if there are to be any serious discussions on the farmer's capital position. This can often show that being under-capitalised can be just as harmful to business progress as being over-capitalised.

Gross Margin Analysis M.A.4.

This is now regarded as an essential part of farm business analysis and invaluable at subsequent farm planning stages. It enables each enterprise to be analysed in relation to physical and economic performance. The output can be seen as sales and/or valuation changes. The transfers of crops or livestock between one section of the farm and the other are recorded.

The variable costs are itemised in detail. The effect of high feed costs in relation to the livestock output for example may be the cause of low gross margins. Would the fertiliser costs increase crop yields? The adviser and the farmer can get together to discuss technical performance of all enterprises and how much they can be improved. Alternatively it may be obvious that some

I. SUMMARY OF COSTS AND GROSS OUTPUT

Costs [1] (for Definitions see back page)

	Your Farm £ Totals	Your Farm £ per acre	Standards
Fertilizers	1720	5.0	4.8
Rent & Rates	1450	4.1	5.2
Machinery	2043	6	11.1
Paid Labour	4821	14.2	13.5
Unpaid Labour	NIL		
Sundries	1555	4.6	5.5
Sub Total	11544	33.9	40.1
Bought Feed	2623	7.7	17.0
Bought Seed	974	2.9	3.2
Total Costs	15141	44.5	60.3
Management & Investment Income (Surplus)	3294		

Gross Outputs [2]

	Your Farm £ Totals	Your Farm %
Grain	6098	33.1
Other Crops	3454	18.7
Forage & Tillage Valuation Changes	55	0.3
Milk	5441	29.5
Cattle	999	5.4
Sheep	-	-
Pigs	-	-
Poultry	2305	12.5
Other Receipts	83	0.5
Total Gross Output	18435	100
Management & Investment Income (Deficit)		

The Income from your farm business for personal spending, taxation and reinvestment was arrived at as follows:

Debits	£	Credits	£
Management and Investment Deficit	-	Management and Investment Surplus	3294
Bank charges and Interest	215	Unpaid Manual Labour	-
Mortgage Payments	-	Rental Value if owner occupier	-
Allowances for Car, House and Produce	-	Depreciation	989
Other Owner Occupier Expenses	600	Other Income	-
Total	815	Total	4283
Surplus	3468	Deficit (to be met from other sources)	

II. EXAMINING YOUR FARM BUSINESS

Profitability In calculating your 'management and investment' income, a charge has first been made for any unpaid manual labour. The income has then been expressed as a % of the capital invested in machinery, tillages, live and deadstock.

	Your Farm	Standards
(a) Management and Investment Income per acre	£ 9.7	£ 14.4
(b) Investment in machinery, tillages, live and deadstock per acre	£ 44.5	£ 68
(c) Return on above capital	21.8 %	21 %

The following items are important factors affecting your profits.

I. **Output**	£	£
(a) Gross Output [2] per acre	54.22	76
(b) Net Output [3] per acre	43.6	56
(c) Net Output per acre from crops and grazing livestock (excl. pigs and poultry)	41.9	

ENT REPORT

2. Density of Stocking

	Your Farm acres	Standards acres
(a) Forage acres [4] per grazing livestock unit [6]	1.31	
Adjusted [5]	1.31	1.5

3. Enterprise Outputs

	£	£
(a) Crops (Gross output per acre)		
1. Cereals	40.9	
2. Wheat	49.3	40
3. Barley	35.6	35
4. Potatoes	150.17	100
5.		
(b) Livestock		
Gross output less Bought Feed per forage acre	42.9	

(From 107 acres = 31 % Farm)

This figure is made up from:—

	Total Gross Output	Total Concentrates (inc. Farm Grain)	Gross Output Less Concentrates	% of Total Gross Output Less Bought Feed	% of Total Grazing Livestock Units
Dairy Cows	5687	1146	4541	98.9	58.7
Other Cattle	807	756	51	1.1	41.3
Sheep	-	-	-	-	-
Forage (Valuation changes, Purchases, Sales & Keep)	+ — -	——	+ —	-	——
Gross Output less Bought Feed			4592	100%	100%

4. Concentrate Feed Use

	Your Farm	Sales per Cow	£	Standard £
(a) Milk Production per Cow	754 Gals.		113.4	823/127
Concentrate per gallon and per cow	2.51 lbs.		23.9	25
Margin over Concentrates			89.5	100
(b) Concentrate Feed Costs per £100 Other Cattle output			92.7	35
(c) Pig Food Costs per £100 Pig Output			-	
(d) Poultry Food Costs per £100 Poultry Output			74.2	65

5. Labour and Machinery

	£	£
(a) Net Output per £100 labour (paid and unpaid)	308	378
(b) Net Output from crops and grazing livestock per £100 machinery costs	697	425

6. Basic Costs (rent, regular wages, allowance for unpaid labour, depreciation, fuel, repairs, general insurance and office expenses).

			£	£
Total	£ 8776	Per acre	25.8	32

Please read footnotes before completing this section.

Farm Acreage: 340

ENTERPRISE ANALYSIS

A CROPS (Enter all figures for whole crop to nearest £)

Type of crop	CASH CROPS: Wheat	Barley	Potatoes				FORAGE CROPS: Grass Silage	Grazed
OUTPUT								
Closing Valuation	Straw 660	520						
Total Sales	1732	3461	3454					
Deficiency Payments H.G.C.A.	Straw 126	852						
Value of Transfers	80	793						
Sub Total (a)	2598	5756	3454					
LESS Opening Valuation (b)	Straw 60	1200	-					
CROP OUTPUT (c) (a–b) ..	2538	4556	3454					
VARIABLE COSTS								
Fertilizers (Net)	203	414	335				166	400
Seed	214	301	556					99
Sprays	73	50	94					
Casual Labour	70	189	294					
Contract	Sacks							
Others[1]	53	141	69					
Sub Total (d)	613	1095	1348				166	499
GROSS MARGIN[2] (c–d) ..	1925	3461	2106					
ACRES	48.5	130.5	23.0				42	50
GROSS MARGIN PER ACRE	39.7	26.5	91.6					

B LIVESTOCK (Enter all figures for whole enterprise to nearest £)

Class of stock	Dairy Cows	Followers	Poultry			
OUTPUT						
Closing Valuation	3360	2380	550			
Stock Sales	1331	69	222			
Produce Sales	5441	-	2696			
Subsidies	Milk 15 Livestock 54 Farm					
Value of transfers out	120	700				
Sub Total (a)	10321	3149	3468			
LESS Opening Valuation ..	3934	2120	569			
Stock Purchases	-	87	594			
Value of Transfers in	700	120	-			
Sub Total (b)	4634	2327	1163			
LIVESTOCK OUTPUT (c) (a–b)	5687	822	2305			
VARIABLE COSTS						
Bought concentrates ..	Milk 594	542	1487			
Home grown grain (at market value)	552	15 214	224			
Veterinary and medicines ..	139	40	-			
Others[1]	128	-	-			
Sub Total (d)	1413	811	1711			
GROSS MARGIN (c–d) (excluding forage)	4274	11	594			
AVERAGE NUMBERS	48	58	1100			
GROSS MARGIN PER HEAD	87	0.2	0.5			

Notes: [1] Includes twine, levies, haulage and transport, A.I. and livestock recording fees, dairy equipment, etc. For forage crops enter keep hired and forage purchased.
[2] For forage crops only, this total will be the net variable cost.

enterprises are making no contribution to the fixed costs and would be better eliminated. Only after gross margin figures have been produced that reflect a normal year's production can farm planning start.

Alterations to the plan may only involve changes to the variable costs with little or no demand on medium or long term capital. Alternatively a policy of intensification may be decided upon with heavy demands on capital. Records presented in this way can be the basis for full analysis and base line for all future development.

Labour and Machinery

As already explained, rising fixed costs are one of the main problems on farms today. Labour and machinery will form from 60-80% of these fixed costs. Problems of labour distribution throughout the year can be tackled by labour profiles, gang work day charts and similar techniques. Where the problem is one of labour organisation, the answer may depend on the use of work study.

With a declining labour force and rapidly rising machinery costs the optimum organisation of men and machines is going to be of vital importance to the profitability of a farm business. The role of the work study specialist will become more important in planning future policy. The role and image of work study has therefore changed considerably since it was first introduced to farming in the mid nineteen fifties. Work study is no longer based on the stop watch routine of checking how operators do their jobs. The work study adviser has to be something of a fixed cost specialist. He knows not only average performance figures but what would be a good work rate of men and machines and more important the potential performance of any method of operating under specific conditions.

The U.K. unfortunately is lagging behind many European countries, notably Germany and Holland, in the publication of work study data. European work study is based on Predetermined Motion Time Systems (P.M.T.S.). This involves the publication of thousands of times for work elements all capable of being re-synthesised into full work routines for men and machines. In the U.K. various industrial concerns, e.g. I.C.I., have developed other systems B.W.D. Basic Work Data, M.S.D. Master Standard Data or M.T.M. Methods Time Measurement. Unfortunately there is a serious shortage of trained personnel in this country to collect this type of information and publish it in a form for the general adviser in farm planning.

However, considerable progress has been made with a small band of work study trained people. 1969 will see the first publication of tables of standard work study data in the N.A.A.S. Farm Management Handbook. This will give both average and target performance under a wide range of conditions for men and machines. In the livestock field there already exists published data on dairying and poultry to enable a very detailed analysis of work routines to be established for any type of production. The liaison between the planners of farm buildings and the work study adviser has been slow to establish but now that basic data is becoming available there should be better design and planning of new buildings in the future. Techniques such as Critical Path Analysis for example are being used in

large scale building projects and the basic data for such operations must be provided by work study. C.P.A. has also been used in developing large scale cropping programmes and projects involving buildings and livestock where the timing of the availability of capital is a critical factor.

Work study is no longer a distinct and separate discipline but is incorporated as part of any worthwhile farm management advisory business or unit. Its contribution to developing highly specialised farming systems will depend on a continual research programme to produce the basic data. This means that national organisations such as the N.A.A.S. or N.I.A.E. are going to have to provide the lead in this work.

Co-operation

After a detailed appraisal of the existing farm business the way to increase profits will be adopting one or more of the following steps:-

1. Increasing prices
2. Increasing yields
3. Increasing intensity
4. Cost Reduction

The possibility of increasing yields and the affect of increased intensity will be calculated after analysing the M.A.4. A new approach to increasing prices and/or cost reduction is emerging through the impact of co-operation on farm businesses. Co-operation in buying groups is now well established and has had a significant affect in trying to hold down farm costs. Whether this will be able to make the same impact over the next ten years is really doubtful and farmers are already devoting attention to either selling organisations or bigger business organisation as a means of meeting the problems of the 1970's.

Co-operation in production to achieve contracts for vegetable crops are becoming commonplace. New ventures in pig and lamb production have got off to encouraging starts. There is no doubt that there is a strong relationship between high returns per acre (either by yield or price) and total farm profits. Unfortunately, many potential co-operators in agriculture cannot think big enough to make any impact on markets or price negotiations. However, encouraging signs are now coming forward even from small grassland farmers who wish to co-operate in grassland management and suckler calf production. It has been possible to achieve savings of up to 33% in the capital for mechanisation in farming 700 acres of grass as one unit as opposed to three separate farms. The annual running costs also show a reduction of 20-25% on what they would be as individual units.

New developments in co-operation now coming forward involve the setting up of agri-businesses where the members can get some of the advantages of co-operation and yet retain the individual management of their own farms. This can involve agreed methods of costing and accounting; common machinery policies and standardisation of makes; labour pooling; centralised storing and handling of

root and grain crops etc. etc. Also joint purchase of store stock and common policies for building development and similar fixed equipment. Such businesses will need several thousand acres, preferably in the hands of a few farmers, but there is no doubt savings of 5-10% in operating costs are possible in addition to increased returns.

Economies of Scale

The demand of land even at present high prices shows no sign of slackening. Much of this demand comes from established farmers who feel that there must be considerable savings by being able to spread their costs over more and more acres. Unfortunately, the evidence of economies in real terms is not easy to find. Many businesses have not been able to expand fast enough to make the maximum use of high powered costly machinery. Cash root farms, for example, now have twice the capital investment per acre in machinery than they had ten years ago. The result of this is that machinery operating costs are twice what they were ten years ago.

The following table demonstrates that in relation to economies in labour, scale has made quite an impact.

NET OUTPUT PER £100 LABOUR

	- ACRES -			
	UNDER 50	51-150	151-300	300
DAIRYING	285	309	340	334
LIVESTOCK	234	274	314	355
MIXED	233	302	337	375
ARABLE	245	320	369	378

So far it has not been possible to show similar returns to scale for machinery although this may be related to the fact that very little data is available for the really large scale operators.

Comparison between large and small farms are not easy to find. The Types of Farming in Yorkshire publication does reveal the following interesting comparisons although the distinction between large and small is somewhat arbitrary.

Farming Type	Output		Expenses	
	Large	Small	Large	Small
	£s. per acre			
CASH ROOTS	61.4	66.1	48.2	56.1
MIXED	45.3	42.6	32.7	38.7
WOLD ARABLE	37.4	38.9	30.1	31.5
MAINLY DAIRYING	52.6	65.7	46.4	61.7
DALES MIXED	26.3	29.4	22.8	27.3

LIST OF PUBLICATIONS

Bulletins

	Price	Postage & Packing
1. Farmers and the Common Market .. .. .. B. H. Davey and S. J. Rogers	5s 0d	6d
2. Efficiency in Agriculture and the Share of the Domestic Market .. .. J. Ashton	5s 0d	6d
3. Trends in Agriculture: A Review of Current and Future Developments .. .. B. H. Davey	5s 0d	6d
4. Elements of Agricultural Adjustment .. .. .. S. J. Rogers	5s 0d	6d
5. Farming Systems and the Common Market .. .. C. S. Barnard, H. Casey and B. H. Davey	10s 0d	1s 0d
6. Farm Size Adjustment .. .. A Workshop Report	5s 0d	6d
7. Capital Adjustment in Agriculture .. .. .. A Workshop Report	5s 0d	6d

Books

Economic Change and Agriculture .. .. .. Edited by J. Ashton and S. J. Rogers (Oliver and Boyd 1967)	42s 0d	4s 6d
Research, Education and Extensions in Agriculture .. Edited by J. Ashton and R. F. Lord (Oliver and Boyd 1968)	30s 0d	3s 0d

Technical Papers

		Price	*Postage & Packing*
TP1.	Organisational Possibilities in Farming .. .. by M. A. Gregory	3s 0d	6d
TP2.	Life Assurance in the Farming Business .. .. by Leo Ménage	3s 0d	6d
TP3.	Management Techniques for Reducing Costs or Increasing Revenues .. .. by R. W. Helme	3s 0d	6d
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TP8.	Modern Management .. .. by J. R. Gemmell	3s 0d	6d

Details of the publication programme and a subscription scheme can be obtained from the Administrative Officer of the Unit.

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