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AGRICULTURAL ENTERPRISE STUDIES
IN ENGLAND AND WALES

Economic Report No. 4

OUTDOOR PIG PRODUCTION

Report on an Economic Investigation

by

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SCHOOL OF RURAL ECONOMICS AND RELATED STUDIES

WYE COLLEGE
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Ashford
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FOREWORD

University departments of agricultural economics in England and Wales, which formed the Provincial Agricultural Economics Service, have for many years conducted economic studies of farm and horticultural enterprises. Such studies are now being undertaken as a co-ordinated programme of investigations commissioned by the Ministry of Agriculture, Fisheries and Food. The reports of these studies are being published by Universities in a national series entitled "Agricultural Enterprise Studies in England and Wales".

The studies are designed to assist farmers, growers, advisers and administrators by investigating problems and obtaining economic data to help in decision-making and planning. It is hoped that they will also be useful in teaching and research. The responsibility for formulating the programme of studies rests with a Sub-Committee of the Agricultural Economics Technical Committee on which the Universities and the Ministry (including the Agricultural Development and Advisory Service) are represented.

Copies of the reports may be obtained from the University Departments concerned. Details of earlier reports in this series and the addresses of the Departments are given at the end of this report.

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INTRODUCTION

The Origins of the Survey.

In 1967 the Enterprise Studies Committee of the Ministry of Agriculture Fisheries and Food suggested that a study should be made of the outdoor pig enterprise as part of the investigation into break crops for cereals. In South and South East England it appeared that the great rises in cereal yields which had been experienced during the 50's and early 60's had been checked and it was assumed that this was due to a considerable extent to the problems of pests and diseases associated with intensive and continuous cereal growing. It was known that pigs have been used as a break crop for cereals, especially on the light, chalk down-lands of Southern England where soil and climatic conditions are most suitable, and this study of the enterprise was commissioned in the same spirit as those on oil-seed rape and field beans: the spirit of search for a suitable break crop to fit the large-scale cereal producer's farming pattern without making severe demands on capital and labour resources.

The survey was planned over the autumn and winter of 1967-68. It was agreed that the then Department of Economics at Wye College should direct the survey with the co-operation of the Department of Agricultural Economics at Reading. Initially three stages were planned. The first was to be a postal survey of two thirds of all pig producers, with more than fifteen sows and gilts, in twelve southern and south eastern counties. The objective of this survey was primarily to locate those producers who kept their breeding herds outside for all or part of the year. In fact the survey yielded a great deal more data than this, and enabled the more important outdoor pig areas to be located and some of the basic characteristics of the outdoor pig herd to be discovered.

The second stage was to contact individual farmers with outdoor pig herds and seek their co-operation in keeping monthly records of costs and returns, inputs and outputs, for the outdoor breeding herd. This stage was scheduled to last for three six-monthly periods and it was hoped that it would start in mid-winter 1967/8. The protracted nature of the foot and mouth epidemic led to the postponment of the start until April 1st, 1968. Thus we collected records for two summer periods and one winter period. Some 75 farmers initially agreed to co-operate but with natural wastage

(those not completing the first six months for some reason) this number fell to 46 in the first six months, and 43 in the second six months. In the last period the numbers were increased to 46 again through further recruiting by Reading University.

The final stage of the survey planned was to be a case-study approach, in depth, of three or four farms felt to be fairly representative of those farms using large pig herds as a break crop. Four farms were chosen and agreed to co-operate in the scheme. The farms were very different in character and cropping and would have provided an insight into the effect of pigs as a break crop and allowed comparisons with other break crops in use on two of these farms. It became apparent, however, that the successful completion of this work would have involved the expenditure of considerable quantities of time and finance, which the results would not have justified, and thus it was abandoned.

This survey has been carried out as a joint venture between Wye College and Reading University. It was the first co-operative survey of this nature carried out and also involved the agreement of Bristol and Exeter Universities for Reading to carry out some field-work in their provinces. Naturally certain difficulties have arisen in attempting to co-ordinate such a survey over some distance but, in general, the work has gone forward very smoothly and the advantages of such co-operation, where numbers of possible farmer-contacts were few, are most apparent. Reading University have shouldered a great deal of the field-work and have gathered about two thirds of all the records. Wye has been responsible for collecting the remaining third of the records, co-ordinating and directing the progress of the work, analysing the completed records for report and writing the reports.

The present report is the third, the first being the Interim Report issued in May 1969, and the second the Preliminary Report produced in June 1970. Apart from these there have been a number of side articles produced on the subject since early 1969 and a full list of these and related works on outdoor pigs is produced in the appendices.

Records Collected.

A general questionnaire, dealing with overall farm structure and policy, was completed for each farm at the beginning of the survey period. Thereafter each co-operating farmer filled out a monthly costings sheet: valuations were made at six monthly intervals, of all pigs and stores, and details of fixed costs relating to the pig enterprise were collected.

The final number of records collected was as follows:

Period		Reading Province [1]	Wye Province	Total
1	April 1968-September 1968	30	16	46
2	October 1968-March 1969	30	14	44
3	April 1969-September 1969	33	13	46

[1] including Dorset and Wiltshire.

Thirty-nine farms co-operated in all three periods; three farms co-operated in the first two periods only, three in the first one alone, one in the first and the last periods, two in the second and the last and four in the last period only. Altogether 52 farmers co-operated to the extent at least one six monthly recording period.

Period Numbers	Number of co-operators
1, 2 and 3	39
1 and 2	3
1	3
1 and 3	1
2 and 3	2
3	4
Total number of co-operators	52

Acknowledgements

We are deeply indebted to all those farmers who co-operated in providing data at all stages of the survey, particularly those who so painstakingly completed their costings records during the second stage of the survey. The confidentiality of their records does not allow us to mention them by name. I should also like to thank those members of the staff of the agricultural economics departments, listed below, who helped with the collection and analysis of data. Mr. Donald Sykes of Wye College and Mr. A.K. Giles of Reading University also provided help and guidance on many occasions and I am pleased to record my appreciation of their services. The responsibility for this report rests entirely with the author who must accept full liability for any shortcomings.

M.A.B. Boddington,
Wye College,
May, 1971.

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CHAPTER 1

The Results of the Postal Survey

1:1 The aims of the Survey

In 1967 very little was known of any aspect of outdoor pigkeeping. A few articles had been published on the subject but these were mostly specific to certain farms. The standard texts on pig husbandry mostly include a short section on keeping the breeding herd outside without going into any detail. There was thus very little in the way of an established literature available on the subject and little to guide the form of any investigation into the enterprise.

Another problem which presented itself was that of how those who operated such a system could be contacted. One solution was to enquire of officers of the N.A.A.S. and M.L.C. (then PIDA) in the locality if they could provide the names and addresses of any farmers known to be using such a pig breeding system. Whilst this approach served to provide a very valuable basic list, the numbers of farmers with outdoor pig enterprises discovered in this way were not sufficient for the sound operation of a sizable costings survey. Also some of the farmers, when contacted, proved to have abandoned the enterprise or else to have kept only dry sows out of doors.

Initially, therefore, the postal survey had two firm objectives: to gather information which would provide some of the detail of the enterprise in general and to locate farmers who would be willing to co-operate in a further costings survey. The questionnaire was kept very brief but the amount of data provided proved of the greatest assistance and a considerable insight was gained into the outdoor pig enterprise as a result.

The postal survey was limited in extent to southern England where, it was decided, climatic and soil conditions would be more amenable to outdoor pig production than in other parts of the country. It was also thought that this area of England was that which was most troubled with the problems of finding a suitable break crop for intensive cereals.

The survey was thus concentrated in twelve counties stretching from Dorset and Wiltshire in the west to Kent and Essex in the east. The area comprises about 4.8 million acres of crops and grass of which 41 percent. is under cereals. Table 1 shows the total area of crops and grass in each county in 1968, the acreage of cereals and the numbers of pigs. It may be seen that the proportion of total crops and grass occupied by cereal crops is substantially higher than the average for England and Wales. Whilst the

Table 1

Some agricultural characteristics of surveyed counties, 1968.

County	000 Acres Crops and Grass (1)	Cereals 000 Acres (2)	Cereals As a % of (1) (3)	Breeding Sows 000's (4)	Breeding Sows Nos/100 Acres (5)	Breeding Sows Nos/herd[1] (6)
Berkshire	312.2	155.5	50	11.7	3.75	29
Buckinghamshire	354.5	130.2	37	12.7	3.58	18
Dorset	451.0	116.4	26	12.2	2.71	14
Essex	666.8	384.5	58	27.7	4.15	22
Hampshire & I.O.W.	605.5	278.5	46	21.6	3.57	20
Kent	615.4	208.5	34	18.2	2.96	18
Oxfordshire	378.3	184.6	49	13.1	3.46	21
Surrey	171.6	49.7	29	9.0	5.24	23
Sussex East	320.9	87.0	27	8.3	2.59	20
West	251.8	97.6	39	6.0	2.38	23
Wiltshire	628.6	259.1	41	12.9	2.05	13
Greater London	45.3	14.5	32	2.6	5.74	18
All areas	4801.9	1966.1	41	156.0	3.25	19
As a % of England and Wales	20	24		22		
England and Wales	24246.3	8047.3	33	721.1	2.97	11

[1] Figures for 1966 only available.

selected counties possess only 20 percent of the crops and grass, they grow some 24 percent of the total cereal acreage.

These twelve counties also have 22 percent of the breeding sows of the country, but these sows are concentrated into 13 percent of the herds. Thus the average size of breeding herds in the counties was 70 percent larger than the national average at the time of the survey, 19 sows as compared with 11 sows per breeding herd. According to the agricultural census returns for 1966, the latest available early in 1968, about two thirds of the sows and gilts in England and Wales were in herds of 15 and over, and it was decided to circulate a representative sample of such herds in the twelve counties on the assumption that they were commerically, if not numerically, most important.

Approximately 900 pig breeders were circulated, or one in three of the farmers with more than 15 sows. The response was remarkably good at rather over 50 percent replying on first circulation and a further 30 percent on second contact, giving an overall response of about 80 percent. Table 2 shows the response rate by county.

Table 2

Response to the postal survey, by county.

County	Circulation No.	Response No.	Response %
Berkshire	49	38	78
Buckinghamshire	60	47	78
Dorset	76	56	74
Essex	185	136	74
Hampshire & I.O.W.	118	95	81
Kent	117	105	90
Oxfordshire	54	45	83
Surrey	65	50	77
Sussex East	64	53	83
West	36	33	92
Wiltshire	80	63	79
All counties	904	721	80

1:2 The Principal findings from the postal questionnaires:

The questionnaire allowed space for comment from individual farmers and many farmers took advantage of this to describe their enterprises. From these comments it was possible to see that the range of different systems for keeping sows outside was considerable and it was necessary to define the outdoor breeding herd for the purposes of the survey. The definition used was as follows:

> Any breeding herd in which the sows and litters are housed at pasture for the greater part of the lactation period.
>
> A breeding herd which is outside part year is defined as:
>
> any herd for which the above definition is true for at least six months of the year.

The range of different systems which these definitions allow will be the subject of later discussion. For the present they should be borne in mind when studying Table 3 which shows the proportion of herds which are outside either all year or part year in different counties.

Table 3

Outdoor sow herds in southern England

(Herds with 15 or more sows as a % of all herds with 15 or more sows)

County	Outdoors		County	Outdoors	
	All year %	Part year %		All year %	Part year %
Dorset	15	33	Surrey	7	29
Berkshire	12	27	Buckinghamshire	7	20
Hampshire & I.O.W.	11	23	East Sussex	4	20
West Sussex	11	18	Essex	2	21
Oxfordshire	10	35	Kent	2	15
Wiltshire	7	33	All counties	7	24

There is a well defined tendency for outdoor herds, as a proportion of the total number of herds, to decline from west to east. This is more readily explained by the proportion of light land in the counties concerned, and to a lesser extent by rainfall statistics. The relationship is not clearly demonstrated by the proportion of herds kept outside during the summer months. This difference may be attributed to the fact that soil and weather conditions are not so important for producers who put their sows outside during the summer months only as they are for those who have them out all the year.

There are important differences as between outdoor and indoor pig units in so far as herd size is concerned. The true outdoor herd appears to be far larger than its indoor counterpart, whilst the herd which is kept indoors for part of the year and outdoors at other times is in its turn smaller than the indoor herd. It is possible that the explanation can be sought in the level of capital investment per sow, which will tend to be lowest for outdoor herds, high for herds kept entirely inside and higher still on farms which are equipped for both indoor and outdoor production. This is a subject which is examined in more detail in Chapter 2.

THE POSTAL QUESTIONNAIRE

Dear Sir,

Wye College, University of London, and Reading University are together making a survey of the economics of pig production.

We should be most grateful if you could help us by answering the four questions below. A post-paid envelope is enclosed for your reply.

Yours sincerely,

1. How many sows do you normally keep? .....

2. What pigs do you keep outdoors?
(Please tick whichever is applicable)

Pigs kept outdoors	*all year*	*part year*	*never*
dry stock			
sows and litters			
growers			
fatteners			

3. How many feeding pigs do you normally keep? .....

4. What types of fat pigs do you normally sell?
(Please tick whichever is applicable)

none
porkers
cutters
baconers
heavy hogs

We are especially interested in systems of outdoor pig keeping and would welcome additional notes from outdoor pig producers:

.....

.....

.....

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Code Number:

Table 4

An analysis of herd size according to system of production

Herd Size (Nos sows & gilts)	Herd Outdoors: All year No.	%	Part year No.	%	Never No.	%	Total No.	%
Under 15[1]	-	-	14	10	28	7	42	7
15-19	2	5	10	7	32	8	44	7
20-29	8	19	34	23	82	19	124	21
30-49	11	26	50	34	122	30	183	30
50-99	14	33	29	20	112	26	155	26
over 100	7	16	10	7	40	10	57	9
Total	42	100	147	100	416	100	605	100
Average size*	71		42		50		49	

* No. of sows and gilts per herd.

[1]Herds of less than 15 sows and gilts are those which declined in size between the date of the compilation of the address list and the date that the survey was carried out.

We are fortunate enough to know which size group each farmer we circulated was in in the Summer of 1966 and we discovered which group they were in in February/March 1968, some 21 months later. From this information we can tell which categories are growing at what rate (i.e. which are moving into higher size groups and which into lower size groups).

Table 5

Movement between size groups

	Sows and Litters Outside: All year	Part year	Never	Total
Percentage:				
Moving to higher size group	43	41	35	37
Moving to lower size group	10	18	13	14
Staying in same size group	47	41	52	49
Falling below 15 sows and gilts	0	10	7	7

It can be seen that herds which are outdoors all year have a much greater tendency to move to a higher size group, and a lesser tendency to

Table 6

An analysis of end product sold by outdoor and indoor producers

End Product	Herds Outdoors						Total	
	All year		Part year		Never			
	No.	%	No.	%	No.	%	No.	%
Weaners	15	44	32	33	104	32	151	33
Stores	7	20	5	5	24	7	36	8
Porkers	4	12	36	37	116	36	156	34
Cutters	2	6	5	5	16	6	23	5
Baconers	2	6	9	9	41	12	52	12
Heavy Hogs	4	12	11	11	20	7	35	8
Total	34	100	98	100	321	100	453	100

move to a lower size group, than those in either of the other categories. Also, not one single fully outdoor herd fell below our original limit for selection of 15 sows and gilts.

The other major point of difference which arose between the systems was that of type of end product. Difficulties of classification arose here since many herds produce more than one end product (for instance, porkers and baconers). For ease, only those farms producing a single end product are listed in Table 6.

It is immediately remarkable that of fully outdoor herds (that is, those who keep their breeding herds outdoors all the year round) nearly two thirds sell weaners or stores as compared with about two fifths of those indoor herds or herds out only part of the year.

Whilst the numbers are rather small, it should be noted that a not inconsiderable proportion of outdoor breeders take progeny through to the heavy hog stage. This may be due to the fact that many of the herds are based on saddlebacks which produce a weaner pig well suited to heavy hog production. Many of those selling weaners or stores in fact sell them to heavy hog producers.

It would appear also that outdoor herds tend to be more specialised than their counterparts indoors. This is shown by Table 7 which includes the numbers of producers on different systems of production who produce either one, two or three types of end product.

Table 7

Number of end products according to system of production

Number of end products	Herds Outside: All year No.	%	Part year No.	%	Never No.	%	Total No.	%
One	34	81	98	67	321	77	453	75
Two	8	19	42	28	84	20	134	22
Three	-	-	7	5	11	3	18	3
Total	42	100	147	100	416	100	605	100

Producers were also asked to provide information on the classes of stock other than sows and litters which were kept outside. As expected very few pig farmers kept any fattening pigs outside, whilst a large proportion did keep dry or pregnant sows out of doors. Table 8 shows the distribution of such activities.

Table 8

Classes of stock kept outside at different times of the year

Pigs Kept Outside	All year No.[1]	%	Part year No.	%	Never No.	%	Total No.	%
Dry stock	219	36	277	46	109	18	605	100
Sows and litters	42	7	147	24	416	69	605	100
Growers	25	8	50	15	247	77	322	100
Fatteners	5	2	3	1	278	97	286	100

[1]Number of herds with this class of stock outside or otherwise.

Apart from such heavily statistical data producers also provided information on their systems of production. It is clear from the wide range of systems described that there are almost as many methods of outdoor pig keeping as there are farmers practising them. The length of time during the year in which pigs are kept outside differs considerably, from a strict round the year routine to those who put their sows and litters out for a few months during the summer only, or when the weather is fine. About 60 percent of the herds farrow indoors and the sows and litters are moved to outside arks between three days and three weeks later. The remainder farrow outside in arks and their little pigs are left out until weaned or later. At the time of the survey most pigs were weaned at eight weeks although rather more than twenty percent were weaned at five weeks.

Grazing systems vary from a small run attached to the front of the ark, which is moved frequently, through paddocks to free range. Some farmers

use the same field every year and others adopt a rotation for moving their pigs around the farm. This is especially the case where pigs are used specifically as a break crop.

In the same way as variations were found in the system of outdoor pig production, so too was there a wide range in the reasons supplied for selecting such a system. These were numerous, but predominant among them were as follows:

1. to use small permanent pasture paddocks and orchards (39%)
2. to produce stronger, healthier stores or weaners (22%)
3. to provide a break for cereals and other crops (18%)
4. to rest farrowing accommodation (10%)
5. to minimize the amount of capital tied up in buildings (6%)
6. to save labour

(percentages in parantheses refer to the proportion of all farmers giving this reason).

The second reason is usually one which follows rather than promotes outdoor pig keeping. Having decided to keep pigs outdoors for one reason or another, it becomes evident that a strong store pig is produced, for which there is a useful market demand. Farmers also listed some of the disadvantages they had experienced with the outdoor pig herd. Whilst little pigs are generally healthier, soil eating can become a problem and some producers reported intestinal irritations in their pigs, even to the extent of inverted bowels. This would appear to be mostly a problem associated with light sandy soils. This type of soil, however, is not likely to present the nuisance of severe mud which comes mainly with heavier land and which has apparently obliged some farmers to abandon outdoor pigs. Food loss can occur through incorporation with the soil, especially on muddy land, or through depredation by birds.

Some pigs show little respect for electric fencing and, in these cases, stout pig fencing must be erected. The physical task of moving fences, and huts, can present high labour demands at certain times of the year, especially if the fencing is fixed or the huts substantial and cumbersome. Heavy labour requirements may also be experienced at other times such as for castration, and the job of feeding, inspection and supervision may be a burden on outlying land, especially at farrowing times. A further problem which was recorded by several farmers was the loss of little pigs to foxes. This last, together with mud, was the most frequently recorded disadvantage.

1:3 Conclusions

The postal survey proved invaluable, especially in indicating the most viable form of outdoor pig enterprise. It became apparent that herds which were kept inside during the winter and outside in summer tended to be smaller, less rapidly growing, less specialised and probably more highly capitalised than the true outdoor herd. It also allowed the next stage

of the survey to follow on smoothly since outdoor pig producers could contacted and asked to co-operate in the main costings survey.

Apart from such obvious immediate advantages, it was apparent that a great deal of data was available on the structure and output of the pig herd in southern England and this has proved of considerable interest in its own right.

CHAPTER 2

Financial and Physical Results in the Outdoor Pig Herd: The Results of the Costings Survey

2:1 Performance of the outdoor pig herd

One of the first questions asked about the outdoor pig enterprise was: does it give a satisfactory economic return? It was this question that was the prime consideration of the costings survey, together with its associated question: how financially successful are outdoor pig units? This area of investigation was thus concerned entirely with the system as a method of keeping pigs rather than as a part of the arable farm.

Table 9 shows that the outdoor pig farmers can expect the enterprise to be reasonably successful, yielding a surplus per sow of between £18 and £20 per annum. The figures in the second and fourth columns are obtained rather crudely by the simple aggregation of unidentical records from the first and second period to give the analysis in the first year, and similarly for the results for the second year. This method of treatment has the advantage that it does at least give a larger volume of information than the method using an identical sample, whose results are shown in the first and third columns of the Table. The factor which emerges almost immediately is that it seems to make little difference which twelve month period is taken and that the inclusion of non identical farms also has little effect on the figures. In some respects the identical sample shows rather better results per sow than does the complete sample but this is predominantly because the liveweight produced per sow averages about 30 or 40 lbs higher. On the whole the results show a remarkable conformity: as a result of this conformity the main detailed analysis of the records in the remainder of this chapter will be carried out on the results of 41 herds whose records were completed for both the second and third periods. Some figures relating to the first and second periods will be found in the appendices.

Few conclusions can be drawn from Table 9 in isolation. Of great interest is the comparison between the second (winter) period and the first and third (summer) periods, and the relation of the profitability of outdoor herds to that of indoor, intensive, breeding herds. The next two sections deal with these aspects.

Table 9

Results obtained from the outdoor pig herd: April 1st 1968 to March 31st 1969 and October 1st 1968 to September 30th 1969

Period		1 + 2		2+3	
		Identical Sample	Whole Survey	Identical Sample	Whole Survey
Costs and Returns per £100 G.O.					
Feed	(£)	62.50	62.45	62.49	62.50
GROSS MARGIN	(£)	23.17	23.16	23.07	23.14
TOTAL COSTS	(£)	81.30	81.38	81.71	81.64
SURPLUS	(£)	18.70	18.62	18.29	18.36
Litters per sow		1.77	1.71	1.78	1.73
Live births per litter		9.59	9.55	9.53	9.42
Pigs weaned per litter		8.43	8.40	8.31	8.21
Average weight of pigs at sale	(lb)	60.37	62.51	61.41	61.21
Feed conversion rate (lbs per lb. l.w.g.)		4.73	4.73	4.81	4.84
Liveweight produced per sow (lbs)		916	883	900	861

(See Appendix D for Detailed Figures)

2:2 Comparison of results for Summer and Winter Periods

Table 10 sets out the financial results, together with some productivity standards, for the three different recording periods.

Bearing in mind that the second recording period is the winter period and that the other two periods are summer periods, several disparities may be seen immediately. Surplus per £100 gross output fell by almost £10 in the winter period, and all costs per £100 gross output are markedly higher. An inspection of other figures in this part of the table suggests that the increase in feed costs contributed substantially to the drop in surplus. However, the cost of feed per ton and the feed cost per sow remain remarkably constant through all three periods. The decline in surplus would appear to be due to a fall in gross output during the winter period,

Table 10

Financial results and production standards for the three recording periods

Cost and returns per £100 G.O.	Recording Period 1 (£)	2 (£)	3 (£)
Feed costs	58.55	66.41	59.00
Total costs	76.45	86.30	77.46
Surplus	23.55	13.70	22.54
Costs and returns per sow			
Gross output	53.39	47.32	53.17
Surplus	12.51	6.47	11.99
Costs and returns per lb liveweight gain	(p)	(p)	(p)
Gross output	11.46	11.24	12.02
Feed cost	6.71	7.49	7.09
Total cost	8.76	9.74	9.31
Surplus	2.70	1.55	2.71
	(£)	(£)	(£)
Average sale price per pig	7.14	7.23	6.98
Number of litters per sow	0.88	0.83	0.90
Number born alive per sow	8.61	7.73	8.59
Number died per sow	0.84	1.10	0.99
Number weaned per sow	7.77	6.63	7.60
Number born alive per litter	9.79	9.31	9.53
Number died per litter	0.96	1.33	1.10
Feed conversion rate	4.52	4.98	4.70

(See Appendix E for detailed figures)

as may be seen from the figure for gross output per sow which fell by about £6 per sow in the six months' winter recording period. This decline contributes almost exclusively to the fall from about £12 surplus per sow in the summer period, to £6.47 in the winter.

An inspection of the figures for costs and returns per pound liveweight gain shows that the reduction in winter surplus may be variously attributed to fluctuations in all figures: gross output declined and feed cost increased. At the same time the average price received for pigs and the weight at sale did not vary greatly.

The section of Table 10 dealing with the production standards reveals much of the underlying causes of these variations and the decline in surplus during winter. The number of litters born per sow fell, the number of pigs born alive per litter fell and the number of deaths per litter increased, all leading to a substantial reduction in the number of pigs weaned per sow of about 1 pig. Taking note of the average sale price per pig and allowing for a small saving in feed and other costs as a result of a smaller number of pigs reared, the reduction in surplus per sow can be directly attributed to this shortfall in numbers of pigs weaned per litter, during the winter period.

The reasons for the lower number of litters born per sow during the winter are obscure, but it could be that farmers attempt to organise their farrowing pattern in such a way that the majority of farrowings fall between April and September rather than October and March. It would not seem reasonable to expect that difficulties occur in getting sows in to pig to farrow during the winter months, since mating must occur between June and November for sows to farrow down in the winter period and there would seem to be no peculiar problems attached to service in these months. The drop in number born alive per litter, on the other hand, could be an indication that runts are more frequently found dead in the more rigorous conditions which pertain in the winter and a similar explanation may be put forward for the higher mortality rate experienced.

Finally, note should be taken of the fact that the feed conversion rate was substantially higher during the winter period. This can be chiefly accounted for by the decline in numbers of pigs weaned, since the sow would generally be fed at a similar level during pregnancy regardless of the number of pigs born or eventually weaned.

2:3 A Comparison of Outdoor and Indoor Herd Performance

Table 11

A comparison of results from outdoor units with those obtained from intensive breeding units

Recording centre:	Outdoor Herds Reading & Wye[1]	Indoor Herds Cambridge[1]	Exeter[1]	Wye[2]
No. of Herds:	41	20	27	12
Costs & Returns/£100 G.O.				
Feed (£)	62.49	60.0	63.1	62.6
Labour (£)	9.49	13.0	10.9	11.5
Other (£)	9.73	13.9	8.9	12.1
Surplus (£)	18.29	13.1	17.1	13.9
Surplus/sow (£)	19.12	14.85	18.3	11.65
Litters/sow	1.78	1.95	1.76	1.67
Live births/sow	16.95	20.28	N.A.	17.22
Piglet deaths/sow	2.17	3.51	N.A.	2.48
Pigs weaned/sow	14.78	16.77	14.3	14.74
F.c.r. (lbs/lb l.w.g.)	4.81	4.6	4.85	5.47

(See Appendix F for detailed figures)

Notes to Table 11

1 For year ending September 30th, 1969.

2 For year ending March 31st, 1969.

Figures in parenthesis against other costs per £100 gross output indicate the sum of costs excluding feed and labour.

Sources: Ridgeon, R.F., **Results of Pig Management Scheme, 1969.** Agricultural Economics Unit, Department of Land Economy, University of Cambridge, 1969.

Burnside, Estelle and Rickard, R.C., **An Economic Study of Pig Production in South West England, 1968/69.** University of Exeter, Agricultural Economics Unit, Report No. 180, 1970.

Boddington, M.A.B., **Pig Production in Kent:** Results for a Small Sample of Farms, School of Rural Economics and Related Studies, Wye College, 1970.

The second question considered important in Section 2:1 above was the relative profitability and productivity of outdoor pig herds in com-

parison with conventional indoor systems. There is a considerable body of material available today showing the results obtained from different costings surveys of intensive pig production systems, and some of this material has been presented in Table 11 for comparative purposes. The MLC regularly publishes economic data for a large number of herds. Unfortunately the data are analysed and presented in a way which makes them unsuitable for comparison, so that no resort may be had to them here. The survey carried out by Cambridge is of very long standing and covers a large number of herds, of which 20 operated breeding only herds in the costing year 1968/69 equivalent to the final year of the outdoor pig survey.

The Exeter survey covers farms in the South West Province (Cornwall, Devonshire and Dorset) where production conditions are often very different from those experienced elsewhere in the country. Many producers sell stores and weaners exclusively and the size of herd tends to be rather small. Results from the Wye survey are also not strictly comparable since the number of farms is very small and all of them were breeding herds attached to feeding herds so that a degree of estimation was involved in some of the figures. Again, pig production in Kent is in no way typical of the industry as a whole. Bearing these reservations in mind it is still possible to draw several broad conclusions on the basis of the comparison. Except in the case of the Wye survey the average weight of weaners and stores produced was fairly comparable, and this may be regarded as an important parameter affecting many of the other variables such as feed conversion efficiency.

It can be said that the surplus per £100 gross output in the outdoor pig enterprise is not at all inferior by the standards of results from other surveys. Indeed, it appears to be approached only by the Exeter results. The Exeter success lies in the remarkably low level of costs throughout, and especially in low costs apart from feed. The total of costs other than feed and labour of £8.9 was remarkably low, and nearly £1 below the similar figure for outdoor herds. Financially, the outdoor pig herd appears to compare very favourably with intensive breeding systems.

Turning to the measures of productivity, the outdoor herd does not compare favourably with the indoor breeding unit on any score. In the final analysis the numbers weaned per sow per annum is about two lower than would be expected of most indoor herds. This is to be expected in an extensive system where little control is exercised over mating and farrowing is largely unsupervised.

The outdoor herd exchanges high productivity for low capital cost, low labour charges and a system which permits greater ease of management. It would seem that the results, in terms of surplus per £100 Gross Output or surplus per sow, would justify this approach and suggest a profitable enterprise may be run on an extensive basis without forfeiting financial success.

2:4 A comparison of herds outdoors part year with those outdoors all year

It was earlier noted that the sample included herds which are kept out of doors for the summer months only as well as those kept out of doors all through the year. Of the 52 herds partaking in the survey at one time or another seven were only out of doors in the summer and of these four completed the records for the last two periods. This section gives a brief analysis of the results achieved by those four herds in comparison with those kept out of doors all through the year. This latter group is again further broken into those herds in which sows farrow down indoors and are later moved to pasture with their little pigs as against herds which stay at pasture throughout the year.

The evidence of Table 12 suggests that the more truly outdoors the herd the more profitable it is. This can be seen in the rows labelled surplus per £100 gross output, surplus per sow and surplus per pound liveweight gain. The samples for the first two columns are very small and may be distorted by the influence of a single dominant herd so that no great weight must be placed on the figures. The general indication is that herds with some degree of environmental control, either during the winter or at farrowing time, achieve a higher degree of productivity but that the expense involved in achieving it more than offsets the gains thereby obtained. The litters per sow per annum tend to be higher and the numbers weaned per sow are likewise well up. The percentage mortality is also lower for herds housed in winter. However, feed conversion rate, contrary to expectations, is lower in winter-indoor housed herds than in those which are housed for farrowing only, which, in turn, show a poorer efficiency in conversion than herds which are totally out of doors. This is reflected in the figures for feed cost per £100 gross output. Labour costs per £100 gross output are considerably increased as soon as steps are taken to bring pigs inside to any degree, and the same is true of veterinary and medicine charges.

The housing charges per £100 gross output for herds kept indoors in the winter are more than three times those for herds kept entirely at pasture (more than four times on a per sow basis). This major discrepancy arises because farmers who house their breeding stock indoors during the winter months and at pasture during the summer have to invest in both indoor and outdoor accommodation. In this case the housing overhead will be higher than for the average herd housed completely indoors, thus doing away with a major advantage of outdoor production. A compensating factor is that grazing charges are down, but only slightly since the main burden of the cost of pasture falls during the summer months.

Generally all costs per £100 gross output are higher for the herds at pasture for only part of the year, and many of those for herds farrowing indoors are higher than for herds completely at pasture.

Table 12

Comparison of results between herds kept out of doors for part of the year with those kept out of doors all year

	Herds kept out of doors				All Herds
	Part Year	All Year			
		Farrowing[1] Inside	Farrowing Outside	Total all year	
Number of farms	4	4	33	37	41
Average herd size	131	83	185	174	170
Per £100 G.O. (£)					
Feed	68.27	62.27	61.86	61.88	62.49
Labour	17.05	14.59	8.40	8.70	9.49
Vet & Medicines	3.66	1.26	1.20	1.21	1.44
Sundries	6.02	3.12	3.41	3.39	3.58
Housing	3.46	1.63	1.05	1.08	1.31
Equipment	1.17	0.35	0.81	0.79	0.83
Grazing	2.27	3.19	2.29	2.34	2.33
Other Overheads	0.70	0.13	0.29	0.28	0.24
Total Costs	102.60	86.54	79.31	79.67	81.71
Surplus	-2.60	13.46	20.69	20.33	18.29
Litters per sow p.a.	1.85	1.74	1.78	1.77	1.78
Pigs reared per sow p.a.	16.27	14.68	14.66	14.66	14.78
percentage mortality[2]	10.61	13.65	12.97	13.01	12.82
F.c.r.	4.96	4.84	4.78	4.79	4.81

1 Farrowing down in indoor accommodation but moving outside in 1 to 2 weeks.

2 See Section 3.3, 'Piglet mortality'.

(See Appendix H for detailed figures)

2:5 The Profitability of Herds Selling Weaners and Stores Compared to those Transferring to a Feeding Herd

One factor which worried both farmers in the survey and the investigators was that many herds were not costed as whole systems. In the survey we were concerned only with the breeding herd outside and as soon as the weaner or store was disposed of either at sale or to a feeding herd on

Table 13

A comparison of results between herds selling stores and weaners and those transferring to a feeding herd

		Transferring	Selling	Total
No. of Farms		15	26	41
Average size of herd		241	128	170
Per £100 G.O.				
Feed cost	(£)	60.13	64.95	62.49
Total Costs	(£)	79.85	83.36	81.71
Surplus	(£)	20.15	16.64	18.29
Gross output per sow	(£)	102.18	106.48	104.24
Surplus per sow	(£)	20.60	17.72	19.12
Ave. wt. at sale or transfer	(lb)	61.39	61.43	61.41
Ave. price at sale or transfer	(£)	6.90	7.37	7.11
Feed conversion rate		4.68	4.94	4.81
Cost of feed per ton	(£)	32.02	35.57	33.74

(See Appendix I for detailed figures)

the farm it became of no further interest. Eighteen herds on the survey transferred small pigs or stores to their own feeding herds and it was thus necessary to make some estimate of the likely market value of these pigs at the time and weight of transfer (see Appendix A on Estimation) in order to arrive at a figure for total receipts. This valuation did not present insuperable difficulties in the majority of cases where market values were fairly easily ascertained for the weight of pig involved: but in certain cases no true market value existed and this was particularly so for herds where weaning was effected at an early age and the small pigs immediately transferred to the fattening herd at weights of less than 30 lbs. It was also hard to reconcile an apparent substantial loss on the breeding herd operation where other costings showed the whole pig enterprise to be quite profitable. Other difficulties arose in the allocation of the total pig labour bill, vet bill and other costs between the breeding and feeding herds.

In order to attempt to see whether any noticeable bias arose in the figures for herds transferring little pigs to feeding herds, as opposed to those selling weaners and stores, an analysis has been made of the identical sample of 41 farms in the year October 1968 to September 1969. The results are set out in Table 13. It will be noticed that there are some disparities between the figures. Whilst the figure for gross output per sow is comparable the total variable costs show quite a marked variation and surplus per sow is £3 in favour of herds transferring. From this it might be

deduced that pigs are being overvalued upon transfer to the feeding herd but the figure for average price at sale or transfer shows that pigs of very similar weights are undervalued by nearly £0.50. The major reason for this disparity in surplus (without resorting to an analysis of sow productivity) would appear to lie in the much more advantageous feed conversion rate achieved by herds transferring, and in the lower price paid per ton of feed.

Overall it can be said that there is little to suggest that the inclusion of herds which transfer out has markedly biased the sample. The main discrepancy appears to lie in the undervaluation of store pigs.

2:6 A comparison of results according to location of production

It was seen in Chapter 1 that the concentration of outdoor pig herds was greater to the west and dwindled towards the east. From these data the inference might be drawn that the enterprise is likely to be more profitable in the western counties of the survey area. The figures in Table 14 attempt to locate differences in performance according to location of production. Because of the very small sample size in some counties it has been necessary to aggregate the data. Where aggregation has been carried out it has been, as far as possible, between counties with similar characteristics of soil, climate and cropping pattern - at least in the areas where outdoor pig production is carried on. The sample of 12 in the first column includes 9 from Hampshire and the Isle of Wight and three from Dorset and Wiltshire.

When profitability is measured in terms of surplus per £100 gross output, surplus per sow or surplus per pound liveweight gain it can be seen that Berkshire and Buckinghamshire easily head the list, whilst West Sussex appears to have the least profitable herds. In fact, the removal of one herd from the sample of six in West Sussex has the effect of making the results for that county very closely comparable with those from Berkshire and Buckinghamshire.

Herds in Oxfordshire also appear to achieve a high degree of success, but it is surprising to see that the Hampshire and neighbouring farms are well down the list in comparison with the contiguous counties of Berkshire and Oxfordshire. The Hampshire group fares no better than the Kent group in the last column.

Whether location is a major factor in the profitability of production is difficult to say, but the herds in the Oxfordshire, Berkshire and Buckinghamshire region certainly seem to be at a considerable advantage over those in other areas. An exception may be made for West Sussex, bearing in mind the reservation stated above.

Table 14

Comparison of results by location

	Counties					
	Hants I.O.W. Dorset Wilts.	Oxon	Berks. Bucks.	W.Sussex	E.Sussex Surrey Kent	Total
Number of farms	12	7	9	6	7	41
Average herd size	184	227	184	81	134	170
Per £100 G.O. (£)						
Feed	69.56	61.34	53.28	67.80	64.75	62.49
Total Costs	89.58	76.86	69.22	95.49	89.58	81.71
Surplus	10.42	23.14	30.78	4.51	10.42	18.29
Per Sow (£)						
Surplus	9.09	25.76	35.69	6.03	9.77	19.12
Per lb l.w.g. (p)						
Surplus	1.15	2.78	3.63	0.44	1.42	2.12
Litter per sow p.a.	1.71	1.94	1.86	1.66	1.60	1.78
Pigs reared per sow p.a.	15.05	16.77	15.05	15.50	14.00	14.78
Per cent mortality	11.52	10.69	11.52	9.65	17.13	12.82
F.c.r.	5.22	4.80	4.40	4.69	4.84	4.81
lbs l.wt. produced per sow	787	926	984	1371	689	900

(See Appendix J for detailed figures)

2:7 Large arable pig farm

It was suggested by the Hampshire Outdoor Pigs Study Group that an analysis should be made of the results for large arable pig farms. The criteria laid down by the Group for such farms were as follows:

1. the average herd size should not be less than 100 sows for any one herd;
2. no more than £25 should have been spent per hut;
3. they should be located on chalk or light land;
4. no herd should be included whose pigs were sold or transferred out at under 40 lbs liveweight;
5. all herds should farrow in at least four batches a year;
6. sows should run in groups of at least 12.

Using these criteria it was possible to select 14 herds for the analysis.

Table 15

Results for large arable pig farms

	Arable Pig Farms		All herds out - doors all year	All Herds
	Best	Average		
Number of Farms	7	14	37	41
Average herd size	351	276	174	170
Per £100 gross output (£)				
Feed	53.38	59.94	61.88	62.49
Labour	6.77	7.44	8.70	9.49
Total costs	68.48	75.79	79.67	81.71
Surplus	31.52	24.21	20.33	18.29
Average sale price of pigs (£)	6.84	7.17	7.02	7.11
Average wt. of pigs sold (lb)	57.79	62.87	60.35	61.41
Litters per sow p.a.	1.87	1.85	1.77	1.78
Pigs reared per sow p.a.	15.90	14.95	14.66	14.78
Per cent mortality	9.22	11.86	13.01	12.82
F.c.r.	4.45	4.79	4.79	4.81
lbs l.wt. per sow	885	893	871	900

(See Appendix K for detailed figures)

The Group also suggested that the top ten most profitable herds should be put to a separate scrutiny but in view of the limited total number falling in the cateogory it was decided to look at the top 50 percent. (7 herds rather than 10) for an indication of performance of the most profitable herds. These 7 herds all achieved a surplus per £100 gross output of more than £20.

The results of the analysis are set out in Table 15 which shows that the true arable pig herd, as defined, is 60 per cent larger than the mean sample size and that the most successful group is nearly 30 per cent larger than that and twice the mean sample herd size. The arable pig farmer achieves a surplus per £100 gross output and per sow about £6 above that of the whole sample. Nearly all the figures for the large arable pig farm are an improvement on those for the whole sample and those for the best group are a further improvement. The best group makes its savings predominantly on feed and labour, the former achieved by a very much more favourable feed conversion rate and an extra pig weaned per sow each year.

In this sample it was characteristic that all herds comprised either saddleback or saddleback cross sows and the majority used large white boars, although about one third used landrace boars. There appeared to be no single age at weaning that could be said to be representative, the

Table 16

Cropping and Stocking[1] on arable pig farms

	Total of 14 Farms		Best 7 Farms	
	'Average farm' (Acres)	%	'Average farm' (Acres)	%
Crops and Grass				
Cereals	489	61.2	694	63.4
Other Cash Crops	48	6.0	88	8.1
Fodder Crops	10	1.3	7	0.7
Grass	247	30.9	293	26.8
Fallow	6	0.6	11	1.0
Total	800	100.0	1093	100.0
Livestock	Numbers	Numbers/ 100 acres	Numbers	Numbers/ 100 acres
Dairy Cattle	100	12.5	47	4.3
Beef Cattle	4	0.5	7	0.6
Ewes	40	5.0	80	7.3
Sows	276	34.5	351	32.1

[1] Excluding intensive livestock.

(See Appendix K for detailed figures)

distribution of age at weaning being very similar to that shown by the whole sample. Every herd in the small sample of 14 used half-round, galvanised-iron huts for housing.

The cropping and stocking pattern of the farms is laid out in Table 16. The true arable pig farm, and in particular the more profitable one, is very much bigger than the average for the whole survey. The 14 farms had an average acreage of 800 acres against 449 for the whole sample. The seven best farms averaged nearly 1,100 acres. The proportion of land under cereals was also rather higher on the arable pig farms and the area under grass rather lower.

This analysis might reflect more upon the impact of overall size of business on the success of the pig enterprise rather than suggest that the pig enterprise integrated with an arable cropping system is more profitable than the general outdoor pig system, whether on an arable farm or not. The criteria listed at the beginning of this section ensured that only larger

enterprises were chosen, and those with low housing costs. This limited the sample to large farm businesses, in every sense of the word, and such businesses often employ good management so that it is not unexpected that the results of the pig enterprises are rather better than average.

2:8 Factors affecting profitability

The profitability of a pig herd (expressed here as either surplus per £100 gross output or surplus per sow) is thought to be related to the following factors:

(a) number of pigs reared per sow per annum
(b) liveweight of pigs sold or transferred out
(c) liveweight produced per sow per annum
(d) size of business, expressed in terms of gross output or else herd size.

It is recognised that such things as location, level of investment in overhead capital, labour usage, sundry expenditure, managerial ability and stockmanship all have a direct or indirect effect on profitability and some of these are dealt with elsewhere. The investigation that follows is not intended to be exhaustive but merely attempts to isolate those factors which appear to have a direct effect on the level of surplus achieved.

An inspection of Table 17 shows that increases in surplus per sow are not closely associated with improved physical performance measures. The number of pigs reared per sow per annum is higher in the more profitable groups but there is no clear trend; similarly the more successful herds do not appear to produce a greater liveweight per sow each year than the less profitable groups, nor is the liveweight of pigs sold consistently higher. Only the feed conversion efficiency figures show consistent improvement as the average surplus per sow increases, suggesting that this may be a fairly dominant factor in determining profitability. Herd size, also, appears to play very little part in determining the magnitude of the surplus.

Table 17

Surplus per sow per annum compared with physical measures of performance

Per sow per annum				Average l.wt. of pigs sold (lbs)	F.c.r.	Average size of herd [1]	No. of Farms
Surplus (£) Range	Average	Pigs reared (No)	L.wt. produced (lbs)				
Under 0	-11.55	13.49	764	51.46	5.51	184	7
0 to 9.99	4.67	13.55	706	59.86	6.01	150	5
10 to 14.99	13.10	13.30	1011	79.12	4.93	173	5
15 to 19.99	18.07	13.48	704	50.85	4.96	77	8
20 to 29.99	24.92	16.21	831	51.18	4.80	190	8
30 and over	43.70	16.08	1135	73.12	4.12	240	8
Averages	19.12	14.73	900	61.41	4.81	170	41

[1]No. of sows and gilts

Table 18

Surplus per sow per annum compared with financial measures of performance

Surplus (£)	Costs and returns per £100 Gross Ouput					Feed Cost per ton	Sale price pig sold 1	G.O. per sow
	Surplus	Feed	Labour	Over-heads	Other direct			
Under 0	- 13.44	76.53	18.26	7.62	11.01	34.97	6.18	85.89
0 to 9.99	5.37	75.17	9.62	5.75	4.08	34.49	7.41	86.94
10 to 14.99	12.72	70.49	8.55	4.40	3.87	32.65	7.94	103.04
15 to 19.99	20.47	60.30	11.57	3.57	4.09	34.15	6.53	88.28
20 to 29.99	24.41	60.37	7.28	4.51	3.43	34.62	6.44	102.09
30 and over	33.44	51.92	6.82	3.40	4.41	32.54	8.05	130.68
Averages	18.29	62.49	9.49	4.71	5.02	33.74	7.11	104.24

[1] Net receipts for pigs sold or imputed value of pigs transferred out.

A comparison between the group with an average annual surplus per sow of 0 to £9.99 and that with a surplus of £15 to £19.99 shows that many of the characteristics are very similar and it is difficult to say that any one of these performance measures is responsible for the difference of £13.4 in surplus per sow between the two groups. On the other hand the group with the highest surplus per sow has a high number of pigs reared,

a high level of liveweight production per sow, a high average liveweight of pigs sold, a very good feed conversion rate and also has a much higher average herd size than all the other groups. It would thus seem to be at an advantage in many respects.

Turning to Table 18 showing the financial performance figures there is a very obvious gradation of feed cost per £100 gross output and this is much more clear cut than the decline in any of the other costs per £100 gross output. Most of the costs per £100 gross output do show some tendency to decline with increasing profitability, although other direct costs fluctuate somewhat following the fall between the first two groups. It would seem that the main reason for the poor performance of the low profit groups is the generally high level of all costs. At the same time gross output per sow is very low in these groups but, again, there seems to be no well defined tendency for gross output to increase with increasing profitability.

The analysis of results showing surplus per sow compared with feed conversion rate (Table 19) shows quite closely that better feed conversion rates are associated with higher surpluses per sow. Not only does feed conversion rate improve as surplus per sow increases (see last two columns) but the tendency for surplus per sow to increase with better food conversion efficiency is equally well demonstrated (see bottom two rows). Reference to the section dealing with factors affecting feed conversion rate will clarify the reasons for this.

Table 19

Surplus per sow compared with feed conversion rate

Surplus per sow (£)	Feed conversion rate (pounds per pound liveweight gain)					Average surplus/sow	Average F.c.r.
	Under 4	4 to 4.49	4.5 to 4.99	5 to 5.99	6 and over		
	Distribution of herds						
Under 0	-	-	2	1	4	-11.55	5.51
0 to 9.99	-	-	1	1	3	4.67	6.01
10 to 14.99	-	1	2	-	2	13.10	4.93
15 to 19.99	-	2	2	4	-	18.07	4.96
20 to 29.99	1	2	2	2	1	24.92	4.80
30 and over	2	4	1	1	-	43.70	4.12
Average surplus/sow	44.58	33.29	14.62	12.21	0.42	19.12	
Average F.c.r.	3.68	4.25	4.81	5.30	7.53		4.81

Table 20

Surplus per sow compared with gross output per sow

Surplus per sow (£)	Gross output per sow (£)					Average surplus/sow (£)	Average G.O./sow (£)
	Under 70	70 to 89.99	90 to 99.99	100 to 119.99	120 and over		
	Distribution of herds						
Under 0	3	3	-	-	1	-11.55	85.89
0 to 9.99	1	2	-	2	-	4.67	86.94
10 to 14.99	-	1	1	2	1	13.10	103.05
15 to 19.99	1	1	4	1	1	18.07	88.28
20 to 29.99	-	1	1	4	2	24.92	102.29
30 and over	-	1	-	1	6	43.70	130.68
Average surplus/sow	-1.44	8.05	23.75	16.33	33.69	19.12	
Average G.O./sow	52.91	81.20	94.21	105.83	140.46		104.24

Whilst Table 18 above did not conclusively show a well defined tendency for surplus per sow to increase with increasing levels of gross output per sow, Table 20 shows that there is some association between the two. It may be seen that it is still possible for a farmer whose sows have a gross output in excess of £120 per annum to make a deficit per sow. The general indication demonstrated in the final two columns of Table 20, and rather more clearly in the bottom two rows, is for surplus per sow to be positively correlated to a limited degree with the level of gross output per sow.

Table 21 also demonstrates that surplus per sow was fairly closely associated with the level of feed cost per £100 gross output, surplus rising as feed cost fell. Again this correlation may be deduced from Table 24 showing the relationship between surplus and feed conversion rate. It would be expected that as feed conversion efficiency improved so would feed cost per £100 gross output decline. That both feed conversion rate and feed cost per £100 gross output show a fairly close relationship to surplus per sow is thus not altogether surprising.

Table 21

Surplus per sow compared with feed cost per £100 gross output

Surplus per sow £	Feed cost per £100 gross output (£)						Average Surplus sow (£)	Average Feedcost £100 G.O. (£)
	Under 55	55 to 59.99	60 to 64.99	65 to 69.99	70 to 74.99	Over 75		
	Distribution of herds							
Under 0	-	-	-	-	4	3	-11.55	76.53
0 to 9.99	-	-	1	-	1	3	4.67	75.17
10 to 14.99	-	-	-	2	3	-	13.10	70.49
15 to 19.99	1	2	2	3	-	-	18.07	60.30
20 to 29.99	1	2	3	1	-	1	24.92	60.37
30 and over	5	3	-	-	-	-	43.70	51.92
Average surplus/sow	42.57	31.00	20.04	16.08	3.37	-12.17	19.12	
Ave. feed cost/£100 G.O.	49.10	57.52	62.78	66.91	72.33	80.90		62.49

2:9 Factors affecting feed conversion rate

It would be generally expected that feed conversion rates in any breeding herd would be affected by the number of pigs reared, the weight at which they are sold off and the cost of the feed - the last being assumed to be a form of feed quality index.

From Table 22 to 25 the effects of these various factors are demonstrated by means of group averages within certain specified ranges of feed conversion rate and the factors analysed. First it can be seen that weight at sale does have some bearing on the feed conversion rate: broadly speaking lower feed conversion rates tend to be associated with higher weights at sale, whilst poor conversion rates are correlated to low sale weights. This is entirely expected when it is remembered that the conversion rate is a ratio of the total amount of feed fed to the whole breeding herd to the pounds liveweight produced. Small pigs have very high conversion rates, but the lower the average weight of pigs sold the larger the quantity of feed fed to sows, gilts and boars has to be borne per pound of liveweight sold.

The bottom two rows of Table 22 show that feed conversion rate does tend to improve as the average weight of pigs sold increases. The poorest conversion rates are shown by pigs achieving an average weight under 40 lbs and the best by those reaching weights in excess of 80 lbs before they leave the breeding herd.

If the cost of feed has any effect on the efficiency of its conversion it

Table 22

Feed conversion rate compared with liveweight of pigs at sale

F.c.r.	Liveweight of pigs at sale (lbs)					F.c.r. (Ave)	Weight at sale (Ave lb.)
	Under 40	40 to 49.9	50 to 59.9	60 to 69.9	Over 70		
	Distribution of Herds						
Under 4.00	-	1	1	-	1	3.68	67.27
4.00 to 4.49	-	1	2	2	4	4.25	64.37
4.50 to 4.99	1	1	3	2	3	4.81	80.56
5.00 to 5.99	-	3	3	1	2	5.30	53.14
Over 6.00	3	5	1	1	-	7.53	37.45
Ave F.c.r.	8.10	5.14	4.95	5.41	4.40	4.81	
Ave wt. at sale	24.10	43.18	54.26	62.60	85.80		61.41

Table 23

Feed conversion rate compared with feed cost per ton

F.c.r.	Feed cost per ton (£)					Average F.c.r.	Average Feed Cost per ton (£)
	Under 30	30 to 32.49	32.50 to 34.99	35 to 37.49	Over 37.5		
	Distribution of Herds						
Under 4.00	-	1	1	1	-	3.68	32.77
4.00 to 4.49	1	-	4	1	3	4.25	34.01
4.50 to 4.99	-	2	2	3	3	4.81	32.88
5.00 to 5.99	2	1	-	4	2	5.30	36.45
Over 6.00	3	2	-	4	1	7.53	31.62
Average F.c.r.	5.42	5.21	4.14	5.21	4.80	4.81	
Cost of feed/ton	29.46	31.10	33.71	36.19	40.60		33.74

is masked by the more dominant factors of weight at sale or numbers reared per sow per year. Certainly there is little in Table 23 to suggest that herds with good conversion rates are using more expensive feed, or that more expensive feed leads to better conversion efficiency. Some of these effects may be masked by quantity discounts.

On the other hand there appears to be a reasonably strong correlation between the number of piglets reared per sow and gilt per annum and the efficiency of feed use. Table 24 demonstrates that more advantageous feed conversion rates are allied to larger numbers reared and, conversely, that poor feed conversion rates are allied to larger numbers reared and, con-

Table 24

Feed conversion rate compared with number reared per sow per annum

F.c.r.	Number reared per sow per annum					Average F.c.r.	Average No reared/sow
	Under 12	12 to 13.99	14 to 15.99	16 to 17.99	Over 18		
	Distribution of Herds						
Under 4.00	1	-	1	1	-	3.68	15.54
4.00 to 4.49	-	1	2	5	1	4.25	17.08
4.50 to 4.99	1	4	2	1	2	4.81	14.44
5.00 to 5.99	1	5	2	1	-	5.30	13.41
Over 6.00	2	7	1	-	-	7.53	12.44
F.c.r.	5.83	5.43	4.46	4.26	4.58	4.81	
No. reared/sow	11.19	13.03	15.23	17.05	18.63		14.78

Table 25

Summary of factors related to feed conversion rate

F.c.r. Range	F.c.r. Average	L.wt. of pigs @ sale lb	Feed Cost per ton lb	Numbers reared/ sow/annum No.	Surplus per sow/annum £
Under 4.00	3.68	67.27	32.77	15.54	44.58
4.00 - 4.49	4.25	64.37	34.01	17.08	33.29
4.50 - 4.99	4.81	80.56	32.88	14.44	14.62
5.00 - 5.99	5.30	53.14	36.45	13.41	13.21
Over 6.00	7.53	37.45	31.62	12.44	0.42
Averages	4.81	61.41	33.74	14.78	19.12

versely, that poor feed conversion is related to small numbers reared. The bottom two rows of the column also suggest that as numbers reared increase so feed conversion efficiency improves. These results again are not particularly surprising since the larger numbers reared will tend to spread the overhead of adult stock feed over a greater number of pigs sold.

Table 25 summarises the results of the previous three tables and also shows that there is a strong relationship between feed conversion efficiency and profitability per sow. This was investigated more fully in Section 2:8 entitled 'Factors affecting profitability'.

The results shown in Table 25 also infer that there might be some relationship between the number of pigs reared per sow and weight of the pigs at sale. That this is in fact the case is shown more clearly in the analysis presented in Table 26. The reason behind this correlation is obscure

Table 26

The relationship between the number of pigs reared per sow per annum and the weight of pigs sold

Weight at sale (lbs)	Numbers reared per sow per annum					Average wt at sale (lb)	Average No reared
	Under 12	12 to 13.99	14 to 15.99	16 to 17.99	Over 18		
	Distribution of Herds						
Under 40	1	3	-	-	-	24.10	12.29
40 to 49.9	4	4	1	-	2	43.18	14.46
50 to 59.9	-	6	1	3	-	54.26	14.75
60 to 69.9	-	3	5	2	-	62.60	15.08
Over 70	-	1	1	3	1	85.80	15.55
Average Weight	42.89	54.60	65.86	76.65	61.30	61.41	
Average no. reared	11.19	13.03	15.23	17.05	18.63		14.78

and has not been investigated. It does, however, have a considerable bearing on profitability, as has been demonstrated.

The effects of various factors on the efficiency of feed use can only be demonstrated in the most general way by the methods used above. A thorough examination of the subject involves the use of statistical correlation which has not been employed in this analysis.

2:10 The effect of size of business on performance

Size of business may be measured in many different ways (capital invested, number of sows and gilts, turnover, area of land used); in this analysis turnover, in form of gross output, and herd size are used as criteria.

Tables 27 and 28 show various measures of performance for different size groups defined by level of gross output and herd size respectively. In Table 27 little evidence of a distinct trend can be distinguished in the figures relating to £100 gross output. The major noticeable factor is that the smallest size group shows the lowest surplus and some of the highest costs whilst the largest size group exhibits the highest surplus and costs which are amongst the lowest. The considerable fluctuations in the intervening groups are too great to be able to lay any emphasis on trend in economies of scale. Very similar comments are true of the figures relating to the sow in the herd.

Trend does emerge in the data per pound liveweight gain where both

Table 27

Performance of herds according to size of business defined by level of gross output per annum

	Level of Gross Output per annum (£)						
	Under 5,000	5000 to 7,499	7500 to 9,999	10000 to 14,999	15000 to 24,999	25000 to 49,999	50,000 and over
No. of Farms	8	8	4	8	4	6	3
Average herd size	46	73	95	145	208	285	645
Per £100 G.O. (£)							
Feed	68.45	65.28	69.88	65.82	62.32	64.14	56.52
Labour	15.78	6.92	10.65	11.21	7.87	10.99	7.30
Total Costs	96.97	81.25	89.70	87.87	78.47	85.84	72.47
Surplus	3.03	18.75	10.30	12.13	21.53	14.16	27.63
Per sow (£)							
Feed	52.28	57.14	61.82	55.99	62.28	83.82	60.79
Labour	12.05	6.06	9.42	9.54	7.86	14.36	7.85
Total costs	74.06	71.12	79.35	74.76	78.42	112.18	77.94
Surplus	2.31	16.41	9.11	10.32	21.51	18.51	29.72
Per lb. l.w.g.(p)							
Feed	9.25	9.10	8.43	8.21	8.09	7.18	6.17
Total costs	13.09	11.32	10.81	10.96	10.18	9.60	7.91
Surplus	0.41	2.61	1.24	1.51	2.79	1.58	3.01
Litters per sow p.a.	1.60	1.60	1.59	1.70	1.87	1.78	1.91
Pigs reared per sow p.a.	13.42	12.90	12.96	13.69	14.12	15.86	15.92
Ave lwt. of pigs sold	40.25	50.54	56.26	47.14	57.16	78.26	63.52
Feed conversion rate	6.07	5.52	5.21	5.44	5.57	4.48	4.29

(See Appendix L for detailed figures)

feed costs and total costs decline with increasing herd size. The tendancy is less clear cut in surplus per pound liveweight gain.

In terms of productivity it would seem that large businesses achieve higher numbers of piglets reared per sow and an improved feed conversion rate. These factors may be related to other important variables whose random variation may introduce an element of chance in the distribution, but the trend seems generally fairly clear-cut.

Examining Table 28, where performance is related to herd size, a rather different distribution of figures emerges from that noted above. In the first section of the table, in which performance measures are described in terms of £100 units of gross output, it can be seen that there tends at first to be a decline in relative profitability as herds get larger and then an

Table 28

Performance of herds according to size of business defined by average herd size

	Average herd size (number of sows and gilts)				
	Under 50	50 to 99	100 to 199	200 to 299	Over 300
Number of Farms	9	10	10	7	5
Average herd size	35	82	143	236	548
Per £100 G.O. (£)					
Feed	63.55	62.18	71.29	61.12	58.73
Labour	10.22	10.82	12.35	8.61	8.09
Total Costs	81.51	82.08	95.69	78.30	76.11
Surplus	18.49	17.92	4.31	21.70	23.89
Per Sow (£)					
Feed	71.88	58.74	74.41	63.88	62.18
Labour	11.56	10.22	12.89	9.00	8.57
Total Costs	92.20	77.54	99.87	81.83	80.59
Surplus	20.90	16.93	4.50	22.68	25.29
Per lb l.w.g.(p)					
Feed	8.22	7.87	8.48	7.25	6.60
Total Costs	10.54	10.38	11.38	9.29	8.55
Surplus	2.39	2.27	0.51	2.57	2.68
Feed cost per ton (£)	36.82	35.60	31.71	34.38	33.81
Litters per sow p.a.	1.75	1.62	1.77	1.75	1.85
Pigs reared per sow p.a.	14.76	13.64	14.16	14.85	15.40
Ave lwt. of pigs sold	55.97	54.46	66.75	58.37	63.38
Feed conversion rate	5.04	4.79	5.64	4.78	4.38

(See Appendix L for detailed figures)

improvement. This characteristic is demonstrated by nearly all the figures. It is also displayed in the comparison of surplus per sow, for the different size groups, and in surplus per pound liveweight. It is also interesting to note that this relationship seems to be inversely correlated to the cost of feed per ton, although no causative effect is suggested since it is not borne out by an examination of the figures in Table 18.

Ignoring the first column, the trend in pigs reared per sow seen in Table 28 is also noticeable in this instance and there does also appear to be some improvement in feed conversion rate as herds get larger although this is by no means well defined.

In all it may be said that the very largest herds, however defined, appear to be more efficient, productive and profitable than the very smallest but that no trend is definitely discernible over the middle size groups.

2:11 Costs and returns per pig sold and weight at sale

It is interesting in any production enterprise to ponder at which point more is added to costs than returns by the production of further units of output. With a large enough sample it is possible to construct a scale of levels of output and compare costs and returns at each different level to draw some conclusions. Alternatively a rather sophisticated statistical function may be fitted to the data to give some precision and an indication of their reliability. No such manipulation is carried out here, but averages on small groups of farms have been worked out according to the weight of pigs at sale or transfer in order to give some indication of the level of costs and returns at different weight ranges and the apparently most profitable range within which to produce.

In this analysis units of production are not taken as the weaner or store pigs sold or transferred out but the actual pounds liveweight of the individual pig. This approach could be extended to take into account both the number of pigs sold or transferred as well as their weight, or units could be analysed according to the total weight produced per herd, or the pounds liveweight produced per sow. Most farmers, however, aim to produce a weaner or store of a certain weight rather than a total poundage or a given quantity of liveweight per sow, so that the presentation adopted here will probably be more meaningful.

The 41 herds, with complete records for the year October 1968 to September 1969, have been split into six groups according to the weight at which they sell or transfer their small pigs and the analysis of costs and returns per pig is presented in Table 29. Most of the results are quite in accordance with expectation except that it will be noted that it actually costs less to produce a pig of 73 lbs liveweight than one of 63 lbs. This seemingly odd result may well be a feature of the small sample in the 70 to 79.9 lb liveweight range. On the other hand, the figures for the average cost of producing 10 lbs liveweight appear to follow a quite logical pattern, falling quite sharply over the first five groups as the overhead of keeping gestating sows is spread over more and more pounds of liveweight production, and then rising slightly in the very heaviest weight range when the increasing amount of feed required to produce a pound of liveweight gain begins to outweigh this early advantage.

Marginal cost (MC) could be expected to increase throughout the range, and generally the figures bear out this anticipation. The sequence is again marred by the discontinuity between the 60 to 69.9 lbs and the 70 to 79.9 lbs groups where MC is actually negative (as would be suggested by the drop in total costs).

Total receipts per pig increase over the whole range as could be anticipated, the heavier pigs selling for rather more than lighter ones. At the

same time the average receipts per 10 lbs liveweight gain falls over the whole range. This is not unexpected since pigs of 40 lbs liveweight could be expected to sell at about 3/- (15p) per lb at the time of the survey and increasing weights above this earned a progressive penalty.

Unfortunately the marginal receipts (MR) shows very little order and the steady decline one would have hoped to see does not emerge clearly. The severe drop in MR between the 60 - 69.9 and the 70 to 79.9lb groups is offset by the even severer decline in MC.

The greatest difference between MC and MR occurs in the weight range 24 lbs to 43 lbs liveweight, but the production of additional 10 lb units of liveweight continues to yield more than it costs right up to the heaviest weight range where the increment in cost is greater than the increment in receipts. This would tend to suggest that production becomes less profitable at some stage between 73 lb and 97 lb liveweight pigs.

An attempt to represent these findings graphically is given in Figures 1 and 2. Figure 1 shows the relationship between Total Cost and Total Revenue, and it can be seen that the two lines are tending to draw together at the higher weight ranges suggesting that profitability is being reduced. The curves in Figure 2 are very hypothetical and take no account of the two highly deviant points for the fifth size group. The point for MR of the fourth size group also lies some way from the supposed MR curve. In Figure 2 the implication is that the additional cost of producing further pounds liveweight becomes greater than the revenue received from the sale of these pounds at about 58 lbs liveweight. This, as has been shown, is belied by the results for the 70 to 79.9 lb liveweight group.

In order to diminish some of the wide variation between groups, the fourth and fifth group were amalgamated to give a revised fourth group with a sample size of ten. The results of this analysis, which appear much more rational, are in Table 30 and are plotted in Figures 3 and 4. In Figure 4 it may be seen that the points lie much closer to the lines although there is still some variation. Here the cross-over point between the MC and MR lines is at about 67 lbs liveweight, suggesting that a pig 10 pounds heavier than that supposed in the previous analysis is more likely to produce a maximum profit.

This analysis works on the basis of averages and should only be taken as the most general of indications. Farmers producing store pigs of 100 pounds liveweight may still be adding more to revenue than to costs by increasing the liveweight of their pigs, whilst those selling stores at 50 lbs may have already passed the point where additional liveweight returns more than it costs to produce. Much will depend upon the individual level of management and the system operated.

Table 29

Costs and returns per pig sold compared with weight at sale

Weight at Range (lbs)	Sale Average (lbs)	Number of Farms	Total Cost per pig (£)	Average Cost per 10 lb l.w.g. (p)	Marginal Cost per 10 lb l.w.g. (p)	Total receipts per pig (£)	Average receipts per 10lb l.w.g. (p)	Marginal receipts/10 lb l.w.g.(p)
Under 40	24.10	4	4.26	176.9		3.98	165.3	
40 to 49.9	43.18	11	4.79	111.0	27.8	5.87	135.9	98.8
50 to 59.9	54.26	10	5.45	100.5	59.6	6.83	125.9	86.9
60 to 69.9	62.60	6	6.12	97.7	79.5	7.70	123.0	104.1
70 to 79.9	73.02	4	5.93	81.1	-17.9	8.01	109.7	29.8
Over 80	96.54	6	8.16	84.5	94.7	9.34	96.7	56.3

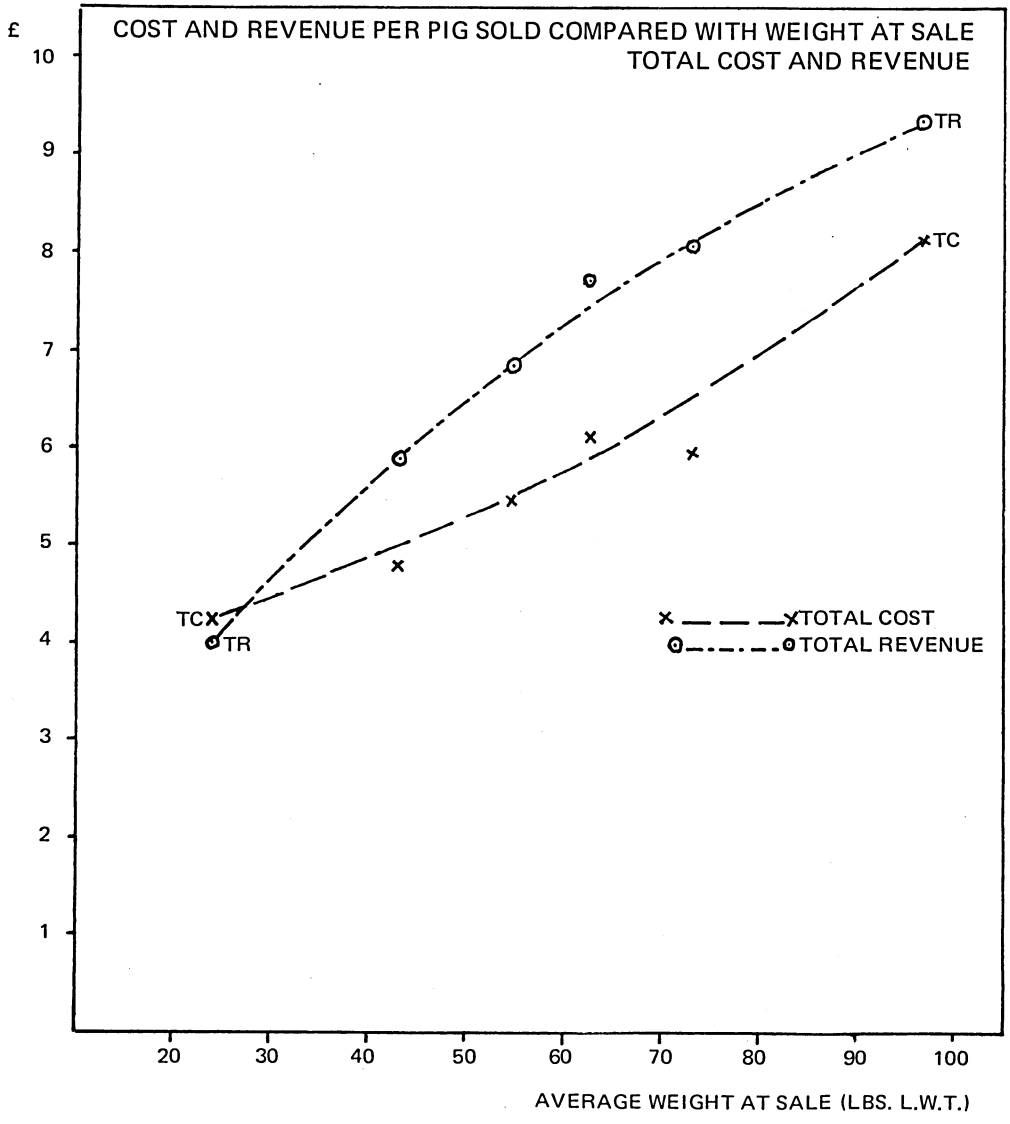
Notes: Costs per pig are based on the average cost of one pound of liveweight production multiplied up by the average weight of pigs in the size group.

Receipts per pig are the actual or imputed total cash returns from the sale or transfer of weaners and stores divided by the number of weaners and stores sold or transferred out.

Marginal cost per 10 lb liveweight gain is the addition to total costs incurred by an increase in liveweight of 10 lbs between the stated weight ranges.

Marginal receipts per 10 lb liveweight gain is the addition to total receipts generated by an increase of 10 lb in the average weight at sale or transfer between the stated weight ranges.

FIGURE 1


£
COST AND REVENUE PER PIG SOLD COMPARED WITH WEIGHT AT SALE
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TOTAL COST
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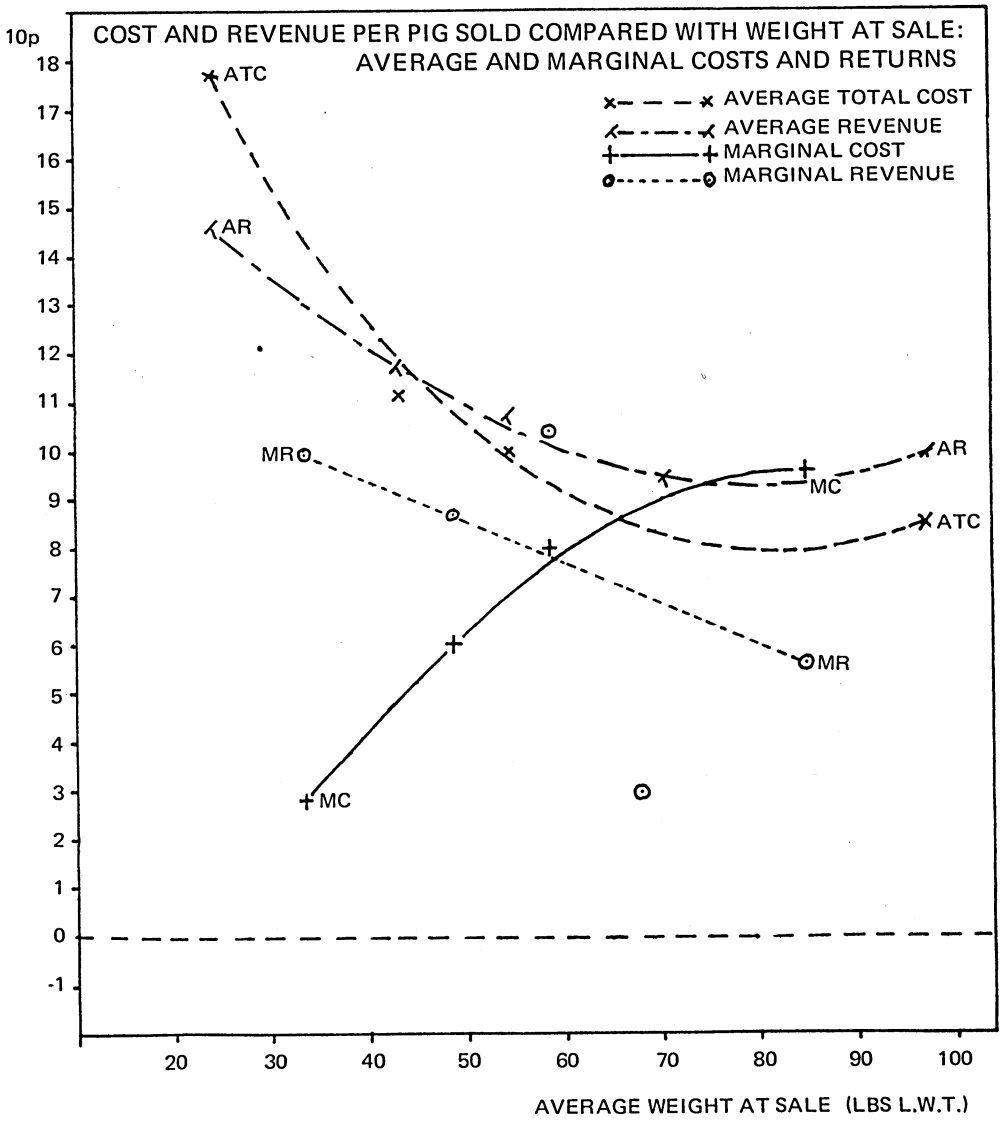
AVERAGE WEIGHT AT SALE (LBS. L.W.T.)

FIGURE 2


COST AND REVENUE PER PIG SOLD COMPARED WITH WEIGHT AT SALE:
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AVERAGE TOTAL COST
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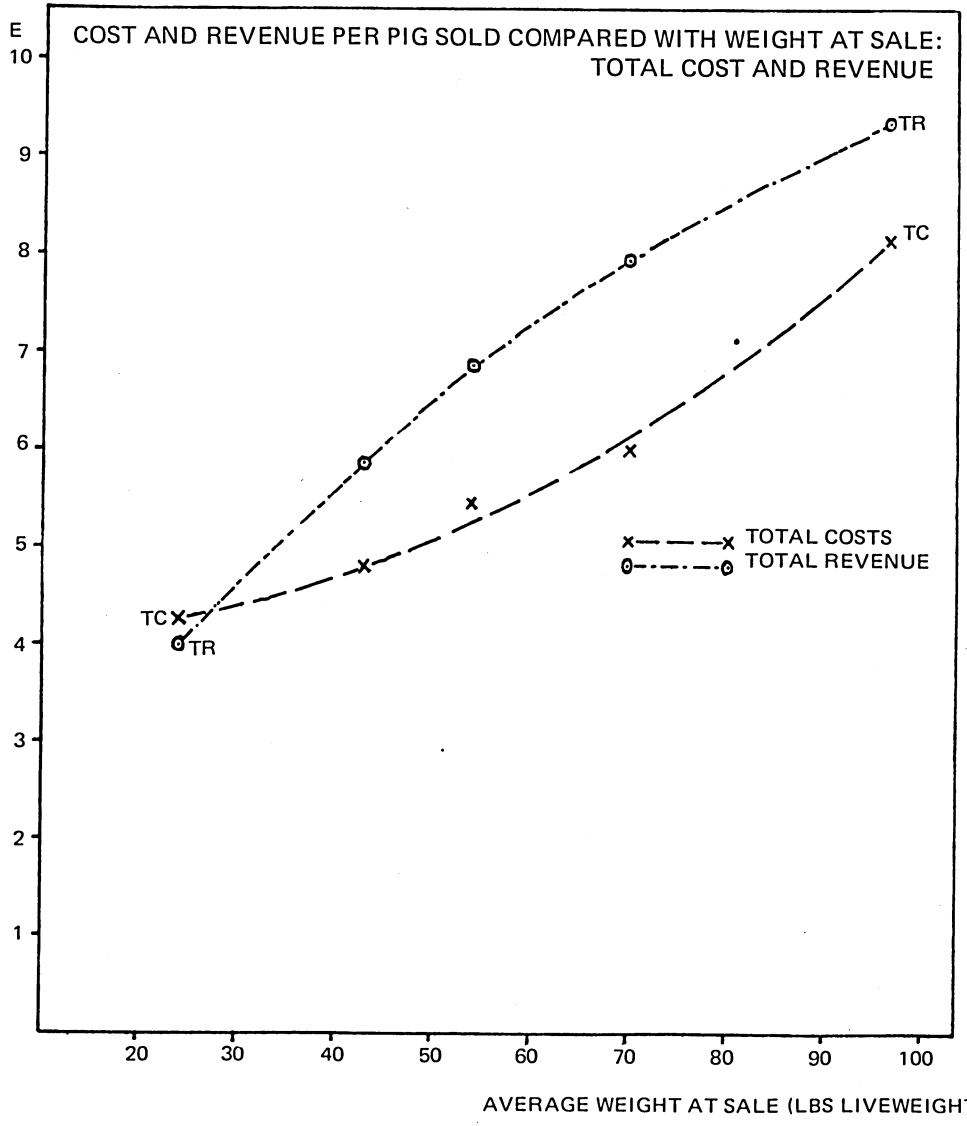
AVERAGE WEIGHT AT SALE (LBS L.W.T.)

FIGURE 3


COST AND REVENUE PER PIG SOLD COMPARED WITH WEIGHT AT SALE:
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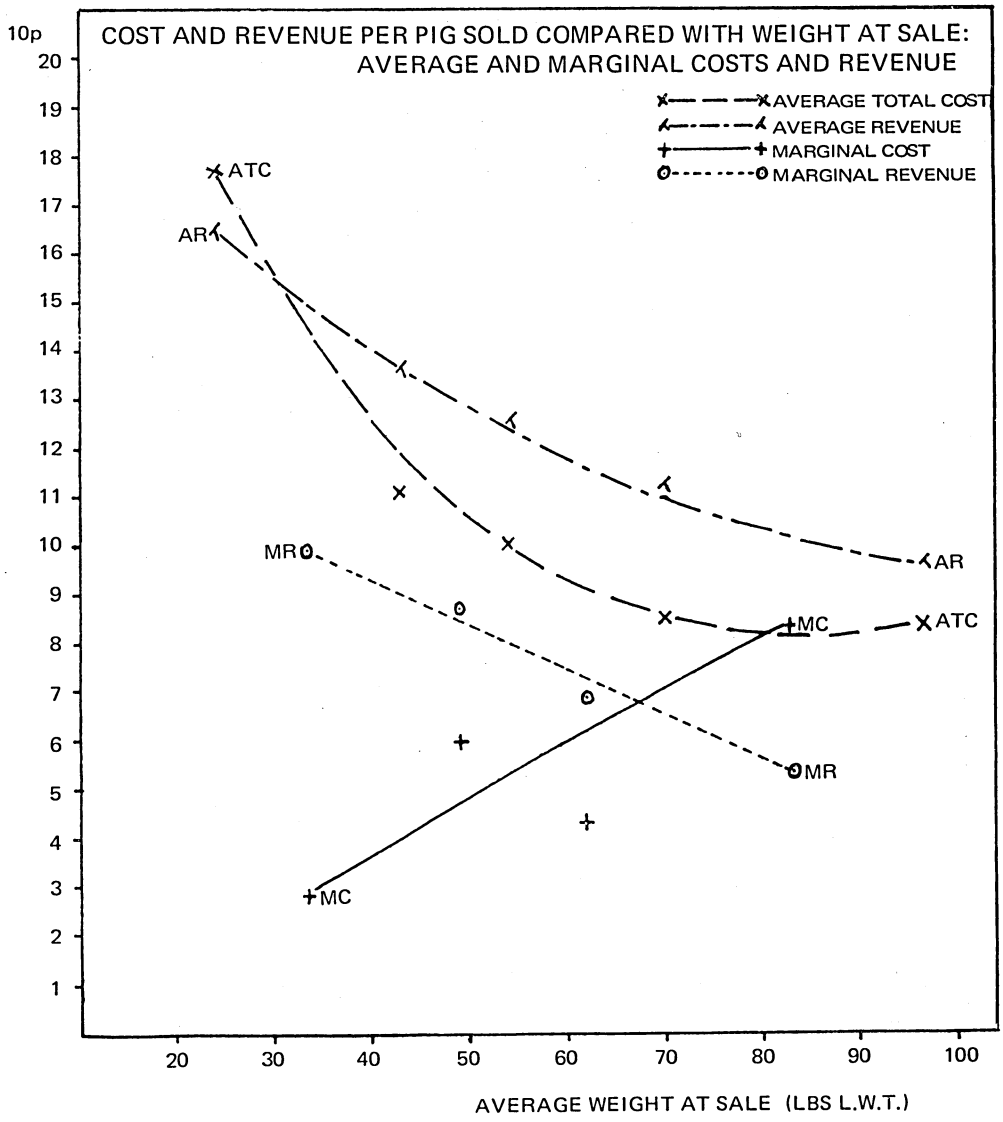
AVERAGE WEIGHT AT SALE (LBS LIVEWEIGHT)

FIGURE 4


COST AND REVENUE PER PIG SOLD COMPARED WITH WEIGHT AT SALE:
AVERAGE AND MARGINAL COSTS AND REVENUE
AVERAGE TOTAL COST
AVERAGE REVENUE
MARGINAL COST
MARGINAL REVENUE
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8
7
6
5
4
3
2
1
ATC
AR
MR
MC
AR
MC
ATC
MR
20
30
40
50
60
70
80
90
100
AVERAGE WEIGHT AT SALE (LBS L.W.T.)

Table 30

Costs and returns per pig sold compared with weight at sale

Weight at Range (lbs)	Sale Average (lbs)	Number of Farms	Total Cost per pig (£)	Average Cost per 10 lb l.w.g. (p)	Marginal Cost per 10lb l.w.g. (p)	Total receipts per pig (£)	Average receipts per 10 lb l.w.g. (p)	Marginal receipts/10 lb l.w.g. (p)
Under 40	24.10	4	4.26	176.9		3.98	165.3	
40 to 49.9	43.18	11	4.79	111.0	27.8	5.87	135.9	98.8
50 to 59.9	54.26	10	5.45	100.5	59.6	6.83	125.9	86.9
60 to 79.9	70.22	10	5.98	85.2	43.2	7.93	112.9	68.7
80 and over	96.54	6	8.16	84.5	82.6	9.34	96.7	53.5

Notes: Costs per pig are based on the average cost of one pound of liveweight production multiplied up by the average weight of pigs in the size group.

Receipts per pig are the actual or imputed total cash returns from the sale or transfer of weaners and stores divided by the number of weaners and stores sold or transferred out.

Marginal cost per 10 lb liveweight gain is the addition to total costs incurred by an increase in liveweight of 10 lbs between the stated weight ranges.

Marginal receipts per 10 lb liveweight gain is the addition to total receipts generated by an increase of 10 lb in the average weight at sale or transfer between the stated weight ranges.

CHAPTER 3

Some Characteristics of Outdoor Pig Herds and Farms

3:1 General farm details

Farm size on the outdoor pig farms ranged from eight acres up to rather more than 2,300 acres. The average size of 46 farms for which details are available was 449 acres of which 294 acres, or nearly two thirds, was arable land. If temporary grass is included in the figure for arable land, the figures become 405 acres and 88 percent. The farms were thus large by present day standards and contained a very high proportion of arable land. The predominant crops grown were cereals, as can be seen in Table 31, accounting for 55 percent of the total acreage. Barley alone constituted one third of the acreage with wheat, contributing a further fifth. Few other crops, except temporary grass, were of any great importance. Only three farms had no arable crops whatsoever and these were all under 40 acres in total size. Thirty nine farms, or 85 percent. of the sample grew cereals, and a third of the farms grew other cash crops.

Less than a quarter of the farms had any dairy enterprises, although rather more had dairy followers, many of them providing keep for neighbours' cattle. Pigs constituted the most important single outdoor livestock enterprise although the dairy herd represented a considerable investment on the farms where it was present, with an average herd size of 130 cows and bulls. Table 31, however, clearly indicates the importance of pigs on the farms concerned.

Table 31

Cropping and Stocking[1] on 46 Outdoor Pig Farms 1968/9.

Crops and Grass	No. of farms with enterprise	Total (Acres)	%	'Average Farm' (Acres)
CEREALS				
Wheat	27	3,996	19.4	86.9
Barley	39	6,949	33.7	151.1
Oats	6	422	2.0	9.2
Total	39	11,367	55.1	247.2
OTHER CASH CROPS	16	1,396	6.7	30.3
FODDER CROPS	11	479	2.3	10.5
GRASS				
Temporary[2]	41	5,110	24.8	111.1
Permanent	28	2,033	9.8	44.2
Total	46	7,143	34.6	155.3
FALLOW	8	261	1.3	5.7
TOTAL	46	20,646	100.0	449.0

Livestock		(Numbers)	(Numbers/100 acres)	(Numbers)
DAIRY CATTLE	18	2,831	13.7	61.6
BEEF CATTLE	11	852	4.1	18.5
EWES	7	1,550	7.5	33.7
SOWS	46	6,205	30.1	134.9

(See Appendix M for detailed figures)

[1] Excluding intensive livestock enterprises.

[2] Includes grass grown for seed.

Table 32 shows the main type of soil on the farms concerned.

Table 32

Soil type on farms with outdoor pig herds

Soil Type	Number of farms	Percent
Chalk or chalk loam	17	36
Light or medium loam	16	34
Clay, clay with flints	8	17
Sand or gravel	6	13
Total	47	100

Chalk soils predominated in this sample of farms, and were mainly located on the Downland. Over four fifths of the farms consisted mostly of light to medium soils, including sand and gravel. Although some farmers do manage successful outdoor enterprises on clay or heavy soils, the advantages of free draining light land soils are very apparent, especially when pigs are kept outside in wet winter conditions.

3:2 Breed

Breed of both sow and boar used demonstrates once more the great variability of the system. It is impossible to draw up any meaningful table showing the distribution of different breeds or crosses: this difficulty arises in part out of the fact that many farmers use not merely one single breed or cross but as many as three individual breeds together with their crosses. As a general statement it may be said that the saddleback forms the basis of the sow herd and the majority of the boars used are either Large White or Landrace. Besides these breeds the use of Welsh or Welsh cross sows is quite common and several farmers use Welsh boars. The most common single breed combination was Landrace-cross-Wessex Saddleback sows and Large White boars; eight herds (17 percent) used this particular combination. Four others used straight Wessex sows together with Large White boars. Altogether 54 percent of herds had Saddleback crosses and 22 percent used pure Saddleback sows. A further 15 percent had Welsh or Welsh cross herds. Only 13 percent of the herds were pure white (Large White or Landrace or crosses of these breeds) although many mixed herds do include individual white sows.

The figures quoted above, apart from those relating to pure white herds, include a good degree of overlap. Two farmers, for instance, had mixed herds including both Saddleback cross and pure Saddleback sows and were included in the figures for both. The same comments apply to the following table relating to breeds of boar: it is not uncommon for a

farmer to run both Large White and Landrace boars, or some other combination of the four listed.

Table 33

Breed of boar used

	Number of Farms	Proportion of total Number of farms (%)
Large White	30	65
Landrace	20	43
Wessex Saddleback	3	7
Welsh	5	11

3:3 Piglet mortality

Co-operators were asked to complete a small section on the monthly records indicating the cause of death of little pigs but this section was invariably left blank or death was attributed to crushing. Cold weather in winter was not mentioned as a major cause of death. Farmers were mostly of the opinion that small pigs can withstand cold provided they are kept dry and have an adequate food supply and good straw bedding.

Table 34

The incidence of piglet mortality by herd size and in comparison with results for indoor herds

Herd Size (No of sows and gilts)	Per cent of little pigs dying	Number of farms
Under 50	13.99	9
50 to 99	11.19	10
100 to 199	14.57	10
200 to 299	12.93	7
300 and over	12.18	5
All herds	12.82	41
Summer	9.78	46
Winter	14.24	43
Summer	11.55	46
Cambridge	16.54[1]	107[2]
Exeter	12.58	27
Wye	14.67	16[2]
MLC[3]	15.6	889[2]
MLC[4]	15.0	835[2]

Notes to Table 34 on opposite page.

Notes to Table 34

'Per cent of little pigs dying' is the number dying during the period expressed as a percentage of the number born in the period. Summer and winter refer to the three recording periods in chronological order.

1 pigs dying before eight weeks of age only.

2 includes breeding herds on farms both breeding and fattening.

3 results for six months ending March 1969.

4 results for six months ending September 1969.

Whilst cold in itself may not have any bearing on the number of small pigs dying there is undoubtedly a higher proportion of deaths during the winter months than the summer. This could be caused by diseases associated with damp, rather than the effects of cold itself.

It can be seen that size of herd appears to have little effect on the percentage mortality although this may decline slightly with increasing herd size. This, however should not be put down solely to management and the advantages of full time pigmen. There is a good possibility that, on an extensive outdoor system where personal supervision is difficult, many pigs which die within the first 24 hours of farrowing are listed as born dead and not amongst the live births. The tendancy for this to occur could be expected to increase with increasing herd size. This, together with the use of a blue pig, may also account partly for the apparently low productivity in the outdoor herd in terms of number born alive, noted in Section 2:2 above.

One problem which arises, and which may be listed as peculiar to the outdoor system, is the loss of little pigs through the depredations of foxes. One farmer in the survey eventually went out of business as a result of this nuisance. It could be that the importance of foxes is exaggerated and that many deaths and losses attributed to foxes are in fact the result of savaging by sows.

In all the proportion of pigs dying in the outdoor herd compares very favourably with the experience of the indoor herd. Here again caution must be used in interpreting the figures in view of the possibility mentioned previously that many pigs which die very early in life may not be recorded as born alive.

3:4 Marketing arrangements

It was anticipated at the beginning of the survey that the nature of outdoor pig production might give rise to marketing problems, due mainly to the fact that outdoor pig producers were thought to farrow their herds predominantly twice per annum, in March and in September. This is a

technique which gained popularity in the outdoor pig lore since it was employed by Richard Roadnight on his pioneering unit in Oxfordshire and presented obvious advantages: pigs born in September were weaned and inside before mid-November, whilst those born in March would be suckled and raised in the early Spring. In this way the worst of the winter weather was to be avoided for the little pigs. Other systems including four batch farrowings per annum and more were also known.

It will be apparent that large numbers of big herds, often concentrated in certain areas of the country, could produce an embarrassment of weaner or store pigs in November-December and May-June if this practice of two farrowings per annum were to be widely adopted.

In turn such large numbers could temporarily depress the price for weaner and store pigs at those times, making the enterprise rather less attractive financially than the low capital involvement would otherwise suggest.

It was thus of some importance to discover the extent to which pigs were born, and thus marketed, in distinct seasonal humps. The results of this part of the survey give few reasons for apprehension, as will be seen from Table 35.

Table 35

Farrowing patterns and marketing arrangements adopted by outdoor pig producers

Farrowing Pattern	Number of Farmers	Percent	Marketing Arrangement	Number of Farmers	Percent
Continuous) Monthly)	26	75	Transfer to own fattening herd	18	37
8 batches p.a.	1	3	Contractual Arrangement	13	26
6 batches p.a.	1	3	Private Agreement	13	26
4 batches p.a.	4	11	Market	5	10
2 batches p.a.	3	8		49	100
Total	36	100			

By far the majority of farmers who provided information upon this subject farrow their sows down either continuously or else on a monthly basis. That this is the case rather goes against the notions related to bad winter weather outlined above. The reasons behind such a policy follow from the fact that there are managerial problems associated with any system of limited batch farrowing, prime amongst them being that, under normal systems, the difficulties and expense of providing sufficient

numbers of boars to deal with 170 sows within, say four weeks are quite considerable. One method of overcoming this difficulty is the use of A1, to which several farmers do in fact have resort. The stage of development of the pig A1 technique at the time the survey was run was not, however, such as to commend it for use in a system whose very nature implies an extensive management. Handling pigs under this system is very difficult and this, allied with the low conception rate achieved on many farms at the time made it an unsuitable substitute for natural service. Given these strictures it is not unnatural that outdoor pig herds should be run on a system which does not call for the brief use of a large number of boars.

The marketing arrangements used are not unexpected. Sixty-three percent of producers on the survey sold their pigs as weaners or stores, as against 37 percent transferring to their own fattening unit. This agrees remarkably well with the results obtained from the postal survey and quoted in Chapter 1. Few producers sell their product through the market, as would be expected. The blue store produced by many of the herds is in particularly good demand for heavy hog production and it is generally established that the pig is healthy and grows very well when brought into the fattening herd. Good prices may thus be obtained through private or contractual arrangements where continuity of supply is important.

3:5 Age of weaning

As with any other breeding pig system farmers choose to wean their pigs at a variety of weights and ages. There would appear to be no correlation between lower weaning ages and the transference of little pigs into a fattening herd. The distribution of weaning ages is given in Table 36.

Table 36

Distribution of age at weaning

Age at weaning (weeks)	Number of farms	Percentage
9	2	5
8	16	39
7	6	15
6	10	25
5	5	12
4	1	2
3	1	2
	41	100

Nearly half of the farmers on the survey still wean at the traditional eight to nine weeks, but a quarter now wean at the popular six week age. Many farmers gave a weaning age range (say, 6 to 8 weeks) and in these cases the median age was taken. Where the two ages were consecutive the upper figure was used.

3:6 Sow replacement

At the outset of the costings survey farmers were asked what proportion of the sow herd was replaced each year. Many of them were unable to answer this question, either because they never approached the replacement problem on a proportional basis or because they had not been going sufficiently long to establish a replacement pattern. Only 20 farmers, out of a potential 52, ventured a figure. Two said 10 to 15 percent of the sow herd was replaced each year, two 15 to 20 percent, five 20 percent, one 20 to 25 percent, eight 25 percent, two 25 to 30 percent, one 33 percent and one 30 to 40 percent.

From the costings records it was possible to get a more accurate figure of the replacement ratio. In Table 37 the number of sows sold during the year is expressed as a percentage of the number of sows at the beginning of the year. This shows that proportion of the original herd replaced during the year. The figures do not include gilts which join the herd temporarily and which are sold off due to failure to farrow.

Table 37

Proportion of sows replaced annually

	Herd Size (Average No. of Sows and Gilts)					
Periods 1 and 2	Over 300	200-299	100-199	50-99	Under 50	All
Number of herds	5	7	10	12	8	42
Average size	510	238	141	73	33	161
Average no. sold	89	57	29	13	6	32
Replacement rate (%)	17	24	21	18	16	20
Periods 2 and 3						
Number of herds	5	7	10	11	8	41
Average size	548	236	142	79	33	170
Average no. sows sold	76	72	36	15	5	35
Replacement rate (%)	14	30	26	19	15	21

N.B. Figures are all rounded averages: replacement rates were worked out on the gross figures and may not exactly correspond with the rounded figures shown.

Whilst the average replacement rate seems fairly steady at about the 20 percent mark, suggesting that most herds are replaced completely once every 5 years, there appear to be some fairly large fluctuations between size groups and between time periods. It is most interesting to note that the very largest herds apparently replace their sows only once every six or seven years, implying that the average sow will have about thirteen litters.

This same phenomenon appears true of herds at the bottom end of the size scale, whilst there is a strong tendency for the replacement rate to increase rapidly from one in six to one in four or three as size increases, up to the second largest herd size group.

The explanation for this could be sought in several ways. First, there is the point that farmers with smaller herds may be able to exercise greater stockmanship and thus prolong the life of their sows. It would be natural to expect this element to decline as the size of the herd increases. Similarly, larger extensive herds may have a much more general approach to replacement policy, not regarding the merits of an individual sow but disposing of a whole batch at one time, on a more regular basis.

The anomaly of the low replacement rate for the very largest herds is probably explained by the fact that these herds are expanding very rapidly. It may be seen from Table 37 that in the space of six months these herds grew from 510 sows and gilts to 548 on average, a growth rate of about 7.5 percent. The next two size groups in the table exhibited little or no growth, in common with very small herds. The 50-99 sow size group exhibited a similar growth rate to the largest group, but the number of herds changed, thus making the figures incomparable. Table 38 shows the annual rate of growth experienced by the different herd sizes.

Table 38

Annual percentage increase in herd size of outdoor pig herds

Herd size	Over 300	200-299	100-199	50-99	Under 50	All herds
No. of herds	5	7	8	11	8	39
Growth rate p.a.(%)	+15	+6	+15	+14	-5	+12

These growth rates are based on the change in average herd sizes of an identical sample of herds, from mid-summer 1968 to mid-summer 1969. A high rate of growth in a particular size group will tend to distort the replacement rate figures since a herd which started in 1966 at 300 sows and grows to 500 sows by 1968 will only be replacing 75 sows a year in 1968, at a rate of 25 percent per annum of the original 300. This will appear as a 15 percent replacement rate when measured against the current 500.

In order to avoid this problem as far as possible a calculation was made of the replacement rate of those herds which exhibited no growth during the survey period. This showed that herds in a static situation replace about 23 percent of their sows per annum. 19 herds fall into the zero growth rate category and herds from each size group are represented.

However, the average size is only 105 sows and gilts per herd as compared with the 170 in the overall survey average, suggesting that rather more of the smaller herds are in the sub sample. This might tend to distort the figure of replacement rate downwards for other reasons than growth. Also it should be emphasised that it is not axiomatic that herds were not growing rapidly before the survey period just because they were static during the period.

3:7 Growth of herds

The growth of herds was discussed at some length in the previous section. Mention should be made of the fact that the 39 herds which completed the three survey periods exhibited a rate of growth of herd size of 12 percent per annum. A natural rate of compound growth of 12 percent per annum should double any sum in six years. It would be rash to suggest that the herds on the survey exhibited their normal rate of growth in the survey period, but the increase in size is considerable enough to allow speculation as to the future size of the outdoor pig herd. It might also be noted from Table 38 that the smallest herds are actually declining in size. It would seem that this size sector is fairly stagnant and that the larger herds are more representative of the arable pig herd.

3:8 Feeding and grazing

Feeding and grazing costs have already been considered in Section 2:1 entitled 'Performance of the outdoor pig herd' and elsewhere. This section will briefly outline some common practices in feeding and grazing and the relationship between them where it exists.

It might be expected that sows which are at grass could be fed on a smaller ration than their counterparts inside. Generally this is not the case; most farmers feed their sows at much the same level of nutrition as they would if they kept them inside. Reductions may be made in the amount of food fed at certain times of the year and especially during the spring flush of grass, but these occasions do not last for long periods of time and nor is the reduction very great. The largest noted reduction in food fed is 2 lbs per dry sow per day during the spring flush, and reductions in lactating sows rations are very rare. Most farmers regard the grass as an added bonus which contributes to the health standard of the outdoor herd.

There are some exceptions to the practices outlined above. Some farmers grow special crops for their pigs and allow for a lowering of the plane of nutrition accordingly. Chicory is a well-known example of this and special pig leys containing chicory are still used by a few farmers. Most leys used for pigs have a perennial ryegrass or timothy/meadow-fescue base, depending upon the expected duration of the ley. By far the majority

of farmers use a ley for one year only for pigs. Generally the ley is sown down for two or three years and used for other classes of stock either before or after pigs. One matter considered of vital importance by many co-operators, was that sows should have clean ground for farrowing.

A few farmers use kale for winter feeding and make an allowance of up to 2 lbs of meal per day for dry sows and a proportionate reduction for sows with litters. Marrow-stem kale is used by one farmer for feeding before Christmas and thousand-headed after Christmas. This type of controlled grazing demands very light soils which will stand a good deal of treading. Another farmer, on a large horticultural holding, grazes pigs over the aftermath of brassica crops, using his sows as a means of achieving rapid breakdown of crop remains. He, however, makes no allowance for this in his feeding policy.

Similar in many respects is the practice often adopted of turning pigs onto stubbles and allowing them to scavange cereal remains after harvesting. Again, this is sometimes allowed for in the feed.

Those pig keepers who mill and mix their own rations may make some reductions in the level of vitamins and minerals included in the feed during the summer time. Some co-operators completely abandoned additives through the summer, seemingly without harmful effects and with substantial financial advantage.

Systems of grazing vary from huts with small runs moved daily to free range, which is most common. Many farmers operate a paddock system, moving the sows and litters round at regular intervals. Paddocks make for a great deal more labour and the free range system appears to work quite adequately. Stocking densities of 4 sows and litters per acre are most common although this may go up to eight or even ten in some cases. Dry sows are kept at roughly similar densities but may be slightly more intensive than sows and litters.

Breeding stock is generally fed some form of nut, cube or cake. Where the land is light this may be fed on the grass, but heavy land often becomes too muddy for this practice to be adopted successfully and the use of troughs is common in this latter instance. Only very few herds are provided with individual feeders, most sows being left to battle with the herd for their shares. This problem is often not as great as it is portrayed since management of feeding can overcome it.

Little pigs are fed pelletted creep in a special creep feeder. These creep feeders may be mobile and will often serve as many as twelve litters. Less expensive creeps may be static and may even consist of a simple galvanised iron structure which has been home-made.

Water is generally supplied through alkathene piping to troughs, although a few farms use water tankers and troughs and one carried water to his small herd in buckets. In winter time surface alkathene piping may present considerable problems, necessitating carting water by tanker. This may be overcome by burying the pipe and several farmers do have water mains and stand pipes.

3:9 Housing

As grazing systems vary in the outdoor herd so also does housing; but, just as there is a common grazing system in free range, so is there a common housing type in the half round shelter and variations upon it. Some producers use rather elaborate housing at pasture for their sows and litters, with large huts containing farrowing crates or rails, runs and even butane gas creep lamps. This type of housing constituted very much the minority and over two thirds of the producers on the survey used half-rounds (see Table 39) with wooden backs. Some added floors and half fronts but most producers keep them as simple as possible.

At the time (1968/69) the half round hut could be purchased or made up on the farm for between £8 and £15, whereas a Seaford hut with run cost about £80 with the others falling in between. The home-made huts were all very different but generally were rather more sophisticated than the half-round variety. Usually they were made up of second-hand materials.

Table 39

Proportion of outdoor pig producers using different types of housing

Type		% of Producers
Half rounds		68
Seaford Huts		8
Home-made huts:	Wooden	5
	Galvanised	5
Huts and folds		5
Mixed		6
Pigloos		3
Total		100

The standard housing requirement is one hut per sow and litter but the total number of houses required by the herd depends upon the number of times it farrows in the year. Thus a 100 sow herd farrowing down twice a year as a whole will require 100 huts. If farrowing takes place four times a year then only 50 huts will be needed, and at six times a year 35 would be sufficient.

Half-rounds are often used for dry sows as well, with one hut to about 4 sows. Other arrangements include temporary galvanised-iron structures, often with straw-bale walls, and wooden huts on skids. Store pigs may be similarly accommodated.

3:10 Labour requirements

The calculation of labour requirements of the outdoor herd is somewhat bedevilled by the need to standardise the different types of labour used and by the fact that the herd may not take up the whole time of any one man. The calculation has been effected by dividing the total wage bill for each farm by the standard hourly wage for an adult male general farm worker at the time of the survey, and dividing further by the standard working week in operation at the time of the survey. The resultant figure was then divided by 50 to give an approximation of the number of men employed on each herd. Table 40 shows the number of men, according to this method, working on units of different sizes.

Table 40

Labour requirements for outdoor pig herds according to herd size

Herd Size		No. of	Number of men	
Range	Average	herds.	Per herd	Per 100 sows and gilts
Under 50	33	8	0.48	1.44
50-99.9	79	11	1.08	1.37
100-199.9	143	10	1.76	1.23
200-299.9	236	7	2.77	1.17
Over 300	548	5	6.12	1.12
Average	170	41	2.01	1.19

The measure of number of men per 100 sows and gilts is given in order to present a readily recognised standard. It will be noted that some economies of scale appear to exist in the use of labour and that the number of men employed per 100 sows and gilts declines with increasing herd size.

The figure usually quoted by farmers with outdoor herds is one man and a boy for a herd of 100 sows and gilts. It is also thought that two men and a boy can manged a herd of 200. The tabulated figures would seem to agree with such generalisation.

The labour requirements of the outdoor pig herd are fairly smooth throughout the year. There may be occasional peaks when pigs and huts are moved to fresh pastures, at castration time or at farrowing time. These peaks will be smoothed somewhat if the herd is farrowed down regularly throughout the year rather than in batches two or four times a year.

Labour's task may be somewhat onerous if the pigs are located in isolated fields or paddocks. Frequent visiting at farrowing time may be a rather irksome job especially at night.

3:11 Advantages of the outdoor pig herd

The outdoor herd has many attractive features to recommend it. Some of the more important ones are:

1) profitability compares very favourably with the indoor herd,
2) strong healthy store pigs are produced for which there is a good demand,
3) labour costs are lower than in the indoor herd,
4) there is no slurry problem,
5) capital outlay is low.

3:12 Disadvantages of the outdoor pig herd

Whilst there are considerable drawbacks in the outdoor herd these are often offset by the advantages. Drawbacks to the enterprise include:

1) Productivity tends to be low,
2) it is hard to manage individual animals and controlling pigs is not easy,
3) barren sows and sterile boars may be carried for some time before they are recognised,
4) the enterprise is generally restricted to light land,
5) fencing requirements may be heavy and sows may not respect the fences,
6) mud can become a major problem in winter,
7) visiting pigs on outlying land, especially in winter, may be a difficult task,
8) foxes may take young pigs and birds will almost certainly steal food.

Chapter 4.
Outdoor Pigs as a break crop

4:1 Estimational Considerations

At the outset of the survey it was intended that considerable emphasis should be placed upon the effectiveness of the outdoor pig enterprise as a cereal break. It was appreciated that many of the attributes of a cereal break could be found in the enterprise and the hope was expressed that work could be carried out demonstrating the effect of outdoor pigs on subsequent cereal performance, especially having regard to the level of yield, the incidence of pests and diseases and the effect on subsequent fertiliser practice. All these factors should be measurable and the net benefits accruing to pigs as a break crop could be expressed in financial terms to show the total financial position of the outdoor herd in the overall farm budget.

During the course of the costings survey all farmers operating an arable pig system were regularly asked details of the level of yields obtained from their cereals, the amount of fertiliser applied, the number of cultivations used in preparing the seed bed and details of any pests or diseases experienced in the cereals. At another time farmers were asked to estimate any increases or decreases in cereal yields obtained during the years after the pig break.

It was mentioned in the Introduction that it was envisaged that part of the research programme would constitute an investigation of certain farms in considerable detail with a view to more precisely correlating the various factors mentioned with the use of the outdoor herd as a break. Several farms were approached and agreed to co-operate in the case studies. Not unnaturally most of these farmers added the proviso that they were not prepared to undertake additional recording themselves. When a programme of data recording was drawn up it became apparent that the amount of time a research worker would have to spend upon each of the farms would be quite considerable and that this would represent a major item of expenditure.

As an alternative a recording booklet was prepared along rather simplified lines in an attempt to obtain a brief outline of cereal performance from each of the case study farms. One of the farmers concerned agreed to complete the booklet and we have details from that particular farm. These details include the following:

(1) Moisture content of cereals.
(2) Cereal type.
(3) Cereal variety.
(4) Date sown.

(5) Date harvested.
(6) Yield obtained.
(7) Types of disease noted.
(8) Severity of disease incidence.
(9) Types of weeds noted.
(10) Severity of weed infestation.
(11) Type of weed killer applied.
(12) Application rate of weed killer.
(13) Degree of cereal lodging.
(14) Type of fertiliser applied.
(15) Application rate of fertiliser.
(16) Method of application of fertiliser.
(17) Date of application of fertiliser.
(18) Soil type in field.
(19) Previous cropping in field.
(20) Last time pigs were grazed.

These will be among the more important factors affecting the yield of cereals in any one year. At the same time there is likely to be considerable variation from year to year, and from place to place, according to climatic variations and the differential intensity of various locally experienced diseases.

When the data from the farm was laid out in matrix form it was apparent that the number of correlations which could exist is large and that the problem of establishing any statistical significance between level of yield and the use of pigs becomes virtually impossible, given the limited number of observations for the dependent variable, yield.

Table 41 gives a summary of the level of yield together with the rate of fertiliser application in the year after pigs, where applicable. It would be extremely dangerous, even if it were not so difficult, to attempt to draw any conclusions from this table in view of the number of other variables involved which are not specified in the Table. It should be noted that four different varieities of spring barley were grown; the soils included loam, gravel loam, gravel, chalk and clay, with gradations; green manuring had been carried out in one field eighteen months previously; the crops suffered from mild attacks of mildew, rhyncosporium and smut and some crops were undersown with a pig ley, which included chicory; and the cereals were variously treated with different types of weed killer.

The results gained from this farm, together with those data gathered from all arable pig farms on the survey, suggest that the case study approach would have been capable of yielding very little extra information of any value. It is now apparent that, if the necessary data on the effect of pigs on subsequent cropping are to be obtained, there is a need for controlled experimentation under precisely defined conditions. Such experimentation would also need to be conducted over considerably more

Table 41

Yields of barley grown on an outdoor pig farm

Year after pigs	Acreage	Crop Grown	Yield/acre cwt[1]	Units of fertiliser per acre N	P	K
1st	71	Spring Barley	34.9	76	42.5	42.5
2nd	61	Spring Barley	37.7	74	42.5	42.5
3rd	20	Spring Barley	34.0	84.5	42.5	42.5
	30	Winter Barley	55.0	64	55	44
4th	14	Spring Barley	36.4	74	42.5	42.5
Continuous Cereals	12	Spring Barley	30.0	102	42	42

[1] yield after drying to 14% m.c. and cleaning.

cropping years than the two, rather atypical, harvest seasons covered by our own costings survey. It would appear that positive data relating to the arable pig system could be obtained if an outdoor breeding herd were to be established, and carefully integrated in the cereal cropping pattern, on an experimental farm. It would only be from such work, where specialists in livestock husbandry, crop husbandry and cereal diseases could make exact measurements, that the necessary parameters could be established with any degree of accuracy.

4:2 The effect of pigs on subsequent cropping

Arable pig farmers on the costings survey differed widely in their estimates of the effect on subsequent cereal yields of a pig break. Only six farmers out of twenty-two with some form of arable rotation involving pigs would make any quantitative estimate of the yield benefits, or otherwise, to be derived from a pig break. These estimates varied from an increase in yield of 10 cwt per acre to a decrease of five hundredweights in the first year after pigs. Three farmers put the increase at about three hundredweights, with variations either side and one suggested that the decrease was of the order of one hundredweight per acre. Eleven farmers refused to put any figure on the benefit and of these seven said that there was a yield improvement in cereals on their farms in the first year after pigs, whilst four thought that the effect of pigs was negligible.

Three farmers put figures on the increase in yield in subsequent years and a further four thought that there was some increase but did not commit themselves to any figures.

All the remaining farmers refused to hazard any information at all on the residual effect of pigs as a break crop.

With respect to the use of fertilisers on crops following pigs, four farmers said that they used some standard quantity less, varying from 15 units of nitrogen to two hundredweight of an unspecified compound fertiliser. Four others noted that they used much less fertiliser on the first crop after the pig break, and two said they would use less on the second crop.

Whilst it may seem easier to specify fertiliser policy than yield increases, this policy may vary greatly according to the particular circumstances of weather, soil type, and crop. Again, the increases to be expected in yield from any one crop will also be hard to specify in the light of alternative crops and crop varieties used under a variety of different conditions.

On one horticultural holding the grower indicated that pigs were a substantial aid to improving soil structure and fertility. In this system the pigs often acted as scavengers after cabbages, broccoli, Brussels sprouts, lettuces and cauliflowers. There were also specific pig leys sown as breaks between brassicae crops and it appeared that cabbages benefitted considerably from such a break.

It has taken many years and a great deal of experimentation to tentatively establish some of the effects of grass leys as a break for cereals. With a more complex enterprise such as pigs it might be expected that similar time and experimentation could well be expended to discover its suitability and effectiveness on the cereal farm.

4:3 Some general break crop considerations

Whilst it has been shown that the difficulties surrounding the estimation of precise data on the effect of outdoor pigs as a break crop are virtually insuperable on the commercial farm costings survey, there are still some general conclusions which may be drawn regarding the use of the enterprise as a break crop. It is possible to say that outdoor pigs will have the following advantages as part of an arable rotation:

1. labour requirements, although higher than for most arable crops are fairly even throughout the year.
2. they produce a very high gross margin when compared with many other crops,
3. they may add to soil fertility, whilst the ley will help restore soil structure to some degree,

4. they may allow a measure of cereal disease control to be achieved.
5. they may help to eradicate certain weed species.

There are also disadvantages associated with the use of the arable pig crop. In common with many other crops the outdoor pig thrives better on a certain limited range of soil types and this generally means light land soils. This may not represent too much of a disadvantage since the very type of land which is most in need of such an enterprise is the light cereal land of south and south east England. However, the distribution of outdoor pigs is somewhat limited by this constraint. Furthermore, at the level of stocking density most commonly practised of between two and four sows per acre, very large herds are required to make up a large break. On an arable farm of 800 acres a 400 sow pig herd may only take up 100 acres and may need up to four men to tend it. This represents a capital investment of about £250 per acre, inclusive of fencing and housing, and a labour requirement of 1 man per 25 acres. Both of these would appear high on the average arable farm.

The standard limit to the size of herd suggested by some arable pig men is two acres of total farm size for every sow on the land. This is a limit which many of them have decided upon by experience, suggesting that herds larger than this are generally not very successful. In fact 45 percent of the recorded herds have less than two farm acres per sow. There appears to be no correlation between increasing financial efficiency in the pig herd and increasing farm acres per sow amongst this sample of farms.

Pigs may also present problems to the arable farmer in terms of fencing requirements. Provided docile sows are chosen and used this may not be a difficulty in that sows may not be tempted to break out. However there are still problems of moving fences with the rotation of crops. A single strand electric fence may suffice and again this will tend to minimise the difficulty.

In most cases there appear to be few problems created by rooting. A combination of regular feeding, good pasture lightly stocked and regularly replenished, and nose ringing helps to overcome such a nuisance. Where rooting does occur it is usually light and subsequent cultivations deal quite easily with it.

As with moving fences, the operation of moving huts may create seasonal labour peaks. These may be lessened if huts are simple and are easily handled with a tractor. Many farmers use half-round, galvanised-iron huts, without floors, that may be stacked and moved on a buck-rake. Labour peaks may also be created at farrowing or castrating time. The former may prove a particularly onerous period if pigs are kept on outlying land in which case supervision and inspection can present problems.

Chapter 5

Summary and Conclusions

It was stated in the Introduction that the study of the outdoor pig enterprise was commissioned with a view to establishing its viability as a break crop in intensive cereal growing areas. The study was also intended to ascertain the economic parameters of the system as a method of keeping pigs. It can be fairly said that the second of these objectives has been handsomely achieved and we are now able to state quite firmly that pigs kept outdoors are in no way less profitable than those kept intensively. The position of outdoor pigs as a break crop, or as part of an arable system, is still not clearly defined although it appears to be used to good advantage on many large arable farms where it forms an integral part of the system.

As a pig enterprise the outdoor system shows up badly on productivity in comparison with indoor units. The numbers of litters, and of piglets reared, per sow each year is rather low. But these inadequacies are more than compensated by the very low costs incurred in terms of labour, sundry, housing, and other charges so that in the final analysis the surplus achieved, however measured, compares more than favourably with the performance of the indoor herd. This good surplus is the result of exceptional performance in the summer months and rather disappointing figures for the winter period. The fact that two summer periods were costed but only one winter period makes it improper to place a great deal of weight on the winter results. It is unlikely that winter results would be much worse on average than those obtained for the period October 1968 to March 1969, but the close agreement between the two sets of summer figures suggests that these are representative, given the price levels operating at that time.

The outdoor pig enterprise appears to present arable farmers on light land with an attractive alternative to other livestock possibilities. Its greater concentration in areas associated with chalk downs and intensive cereals, together with its greater financial success in many of these areas, imply that it is an alternative which is not infrequently used in these locations to good advantage.

Many of the advantages and drawbacks of the system have already been touched upon under previous headings. It is paradoxical that some of the advantages of outdoor pigs when they are viewed as a pig enterprise may appear as drawbacks when seen in the light of an arable farm. For instance, the possibility of providing farrowing houses for a herd at a cost of as little as £3 per sow appears very attractive to the pig keeper. The total capital investment in housing, fencing and equipment may be as low as £15 per sow. A comparable figure for an indoor breeding herd could be of the order of £60. On the other hand, when the enterprise is seen as part of an arable system the total cost per sow, including the investment in the

sow, may be as much as £50 and with a stocking density of 4 sows per acre this can give a total investment of £200 per acre, which is rather high in relation to other crops.

Labour is of a similar nature. Two men and a boy looking after a 200 sow herd do not constitute a large labour force for a pig herd. But concentrated onto 50 acres this is a heavy use of manpower on any arable farm.

It has been found difficult, if not impossible properly to assess the position of the enterprise as a break crop. The number of variables which directly impinge upon the yields of following crops is so large that the size of sample required, under uncontrolled conditions, to estimate the effects of each of these would be enormous. It has thus been recommended that an experimental unit, under precisely defined conditions should be established to examine this aspect.

Although no specific figures can be quoted it would seem that subsequent yields of cereal crops may be enhanced after a pig break and that the quantity of fertiliser applied to the cereals may be of a lower order than otherwise. In other circumstances the fertility of the ground may be so enriched as to make cereal crops lodge.

The general conclusion, to be drawn from the survey is that the enterprise certainly presents a profitable method of keeping pigs and that it also fits in well with many arable systems.

Appendix A

Estimation

At many points in a costings survey it is necessary to make estimates and this may present a lack of definitiveness in the data. In a survey such as the current one it is hoped that the eventual results will be a sufficiently true representation of fact. The justification for making such estimates is that if any data is to be produced on a system, to act as a guideline for farmers and their advisors, then it will often be necessary to make some judgement on such things as weights and values and occasionally the apportionment of certain costs. The main area for estimation comes in the valuation at the beginning and end of the period, but there are other items besides upon which one is beholden to place some subjective evaluation. Estimates are always made in the light of the best information available.

In the process of valuation it is common practice to lay down a set figure for maiden gilts, in-pig gilts, sows and boars. This had the advantage that if herd size and constitution does not vary widely between the beginning of the survey period and its end (e.g., a year) then the value remains roughly the same. This process becomes unrealistic when a herd is replaced as a whole at intervals of, say, three years. In this case it is better to take an appropriate proportion of the difference in price between the pigs when purchased and when sold and write them down by this amount each year. The same treatment may be applied to boars.

A rather more difficult problem arises in the treatment of little pigs, especially under the outdoor pig system. Not only is it necessary to arrive at a value for little pigs but their weight must also be known in order to calculate a figure for liveweight gain over the recording period. On a farm where there are some 2,000 small pigs roaming in comparative freedom it becomes virtually impossible to weigh all pigs. It may be possible to get data on the age distribution of the piglets, especially where sows are farrowed in regular batches, and reliable estimates may then be made of their likely weight. In a few cases even this method is not possible and it then becomes necessary to derive a figure of mean weight of small pigs based on their weight at sale or transfer. Whilst errors will undoubtedly arise in this case these will not be too great if the average age distribution or average number of piglets on hand does not vary too greatly from valuation to valuation.

The actual valuation of piglets is done according to a sliding scale based upon either their weight or age. This valuation may be somewhat artificial in that many of the piglets are too young to be marketable and the figures used in this case are related more closely to the level of cost of production rather than to any market value.

The difficulties which arise when pigs are transferred to a feeding herd on the same farm have already been partially dealt with in the section entitled 'The profitability of herds selling weaners and stores compared to those transferring to a feeding herd' in Chapter 2. In these cases pigs were valued for transfer on the basis of current market prices for pigs of similar age, breed and weight, in the locality of the farm. It was often possible to check these prices against those being gained by other outdoor producers in the vicinity. The problems of allocating labour, time, vet bills and other costs between the breeding and feeding herd could only be overcome by proportioning such changes on the basis of experience.

Many farmers grow and feed their own cereals and this also had to be valued. The figure thought appropriate in this instance was the amount which the farmer could have received, at the farm gate, had he sold it. This value represents the worth of the grain to the farmer.

Another valuation problem arises in housing and equipment. Frequently these items will have been written off on the books, but they still possess value. One method of ascertaining such value is to ask the farmer how much he would be prepared to pay for the equipment and write it back on the books at that figure. Alternatively one may ascertain how much he would pay for it and how much he would sell it for and take a mean figure. Probably the best system, where the information is available, is to find the original price and likely length of life of the equipment and deduce an annual value.

Finally, there may be difficulties in obtaining precise physical data relating to numbers of pigs born and numbers dying. This has been alluded to in the section of Chapter 3 headed 'Mortality of little pigs'. Very often pigs which die within 12 or 24 hours of birth are never seen alive by the stockman and are put down as born dead. Also, under very liberal free range systems, there may be no record of the number of litters or the numbers of piglets born. Under these systems, which are fortunately rare, pigs may be rounded up once a month and the only figures noted are those for number sold, weight and price received. In these cases estimation can only be very tentative indeed and the number of deaths and litters can only be based upon the experiences of more rigorously recorded herds of similar size and with similar systems. Emphasis, however, is placed more on the number reared per sow rather than the number born, so that this does not present too great a problem.

APPENDIX B

Table B1

RESULTS FOR THE PERIOD
APRIL 1st 1968 TO SEPTEMBER 30th 1968.

46 Farms

	No.	£	£	£
Opening Valuation	25897	266943.70		
Purchases	442.5	14444.80		
Births	59602	-		
Transfers In.	796	13876.50		
Sub Total	86737.5	295265.00		
Sales	31247	235428.75		
Deaths	6071	-		
Transfers Out	18458	127554.09		
Closing Valuation	30961.5	301776.30		
Sundry Receipts	-	8.60		
Sub Total	86737.5	664767.74		
Gross Output				369502.74

/cont'd over...

Table B1

Continued

		Tons	£	£	£
Variable Costs:-					
Feed:	Sows weaner meal.	4239.29	136576.20		
	Creep Feed	946.26	40097.96		
	Grower Meal	1263.01	39608.68		
	Other	3.27	64.20		
	Total	6451.83		216347.04	
Labour:	Paid		30474.56		
	Unpaid		2677.58		
	Total			33152.14	
Vet and Medicines				5297.73	
Haulage				350.47	
Farm Transport				6046.45	
Services - A.1., Boar				773.50	
Fuel and Water				1975.90	
Sundry				2542.60	
Total Direct Costs					266485.83
Gross Margin					103016.91
Fixed Costs:-					
Housing Charges				4213.00	
Depreciation of Equipment.				3154.45	
Grazing Charges				7834.80	
Other				795.55	
Total					15997.80
Surplus					87019.11

Table B2

RESULTS FOR THE PERIOD OCTOBER 1st 1968 TO MARCH 31st 1969.

44 Farms

	No.	£	£	£
Opening Valuation	29367.5	293423.80		
Purchases	587	16377.70		
Births	59220	-		
Transfers In	1247	22087.00		
Sub Total	90421.5	331878.50		
Sales	26084	206573.94		
Deaths	8847	-		
Transfers Out	25470	182948.48		
Closing Valuation	30020.5	304706.27		
Sundry Receipts	-	65.60		
Sub Total	90421.5	694228.69		
Gross Output				362350.19

/cont'd over .....

Table B2

Continued

		Tons	£	£	£
Gross Output					362350.19
Variable Costs:					
Feed:	Sow and weaner meal.	5132.98	165824.52		
	Creep Feed	907.61	40577.53		
	Grower Meal	1089.90	34063.44		
	Other	11.1	239.35		
	Total	7141.59		240704.84	
Labour:	Paid		32584.21		
	Unpaid		3460.89		
	Total			36045.10	
Vet and Medicines				5260.43	
Haulage				624.95	
Farm Transport				6281.43	
Services - A.1., Boar				891.00	
Fuel and Water				2078.85	
Sundry				3963.15	
Total Direct Costs					295849.75
Gross Margin					66500.44
Fixed Costs:-					
Housing Charges				4476.43	
Depreciation of Equipment.				3032.75	
Repairs and Maintenance.				515.80	
Grazing Charges				8325.39	
Other				603.80	
Total Fixed Costs					16954.17
Surplus					49546.27

Table B3

RESULTS FOR THE PERIOD
APRIL 1st 1969 TO SEPTEMBER 30th 1969.

46 Farms

	No.	£	£	£
Opening Valuation	30022.5	308416.80		
Purchases	235	7404.95		
Births	64634	-		
Transfers In	1433	21918.83		
Sub Total	96324.5	337740.58		
Sales	28160	218473.36		
Deaths	7152	-		
Transfers Out	27496	186741.68		
Closing Valuation	33516.5	337093.14		
Sundry Receipts	-	80.18		
Sub Total	96324.5	742388.36		
Gross Output				404647.78

/continued over.....

Table B4

continued

		Tons	£	£	£
Gross Output					404647.78
Variable Costs:-					
Feed:	Sow and weaner meal.	4600.30	149597.36		
	Creep Feed.	852.51	38602.63		
	Grower Meal	1610.23	50556.86		
	Other	0.01	2.72		
	Total	7063.05		238759.57	
Labour:	Paid		33325.22		
	Unpaid		2476.02		
	Total			35801.24	
Vet and Medicines				5547.64	
Haulage				902.95	
Farm Transport				6368.15	
Services - A.1., Boar				1094.00	
Fuel and Water				2683.10	
Sundry				2585.27	
Total Direct Costs					293741.92
Gross Margin					110905.86
Fixed Costs:-					
Housing Charges				5251.08	
Depreciation of Equipment				3283.10	
Repairs and Maintenance				597.61	
Grazing Charges				9841.75	
Other				727.80	
Total Fixed Costs					19701.34
Surplus					91204:52

APPENDIX C.

SIX MONTHLY RESULTS ANALYSED BY SIZE OF BUSINESS.

Table C1 RESULTS FOR THE PERIOD APRIL 1st 1968 TO SEPTEMBER 30th 1968 ACCORDING TO SIZE OF BUSINESS DEFINED BY LEVEL OF GROSS OUTPUT

	Level of Gross Output					
	Less than 1,500	1,500 -2,499	2,500 -4,999	5,000 -9,999	10,000 -19,000	More than 20,000
No. of Farms	4	8	12	10	8	4
Average size of herd[1]	25.5	43.6	79.1	147.5	253.1	505.3
Per £100 G.O.:						
Feed	62.33	57.05	64.05	55.12	59.63	57.67
Labour	20.02	11.32	11.52	7.71	9.60	7.49
Other Direct Costs	6.01	4.43	3.99	3.40	5.11	5.04
Overheads	4.23	4.29	4.56	4.82	4.28	4.00
Total Cost	92.59	77.09	84.12	71.05	78.62	74.20
Surplus	7.41	22.91	15.88	28.95	21.38	25.80
Feed cost per ton (£)	34.2	36.35	34.99	32.20	34.31	32.57
Feed cost per lb. l.w.g.(d)	17.94	19.27	18.44	17.51	16.00	14.39
Total cost per lb. l.w.g.(d)	26.66	26.06	24.22	22.57	21.10	18.51
Surplus per lb. l.w.g.(d)	2.13	7.72	4.57	9.20	5.74	6.44
Average price of pigs sold[3] (£)	6.33	6.59	6.62	6.40	7.69	7.52
Feed cost per sow (£)[2]	24.70	26.18	29.09	27.41	34.39	33.15
Total cost per sow (£)	36.70	35.40	38.21	35.33	45.34	42.66
Surplus per sow (£)	2.93	10.49	7.22	14.40	12.33	14.83
Litters per sow	0.77	0.93	0.82	0.90	0.88	0.89
Live births per litter	10.18	10.01	9.57	9.52	9.97	9.86
Pigs weaned per litter	8.54	8.67	8.62	8.71	8.72	9.17
Average l.wt. of pigs sold[3]	48.38	47.93	53.54	49.41	68.28	70.04
Feed conversion rate	4.89	5.00	4.92	5.04	4.35	4.12
lbs. l.wt. per sow[4]	330	326	379	376	516	553

[1] No. of sows and gilts

[2] 'Per sow' means per sow and gilt in herd.

[3] Sold and transferred out.

[4] Liveweight produced per sow.

Table C2

RESULTS FOR THE PERIOD OCTOBER 1st 1968 TO MARCH 31st 1969 ACCORDING TO SIZE OF BUSINESS DEFINED BY LEVEL OF GROSS OUTPUT

	Level of Gross Output				
	Less than 2,500	2,500 -4,999	5,000 -9,999	10,000 -19,999	More than 20,000
No. of Farms	9	13	12	6	4
Average size of herd	47.8	79.1	165.7	272.5	527.0
Per £100 G.O.:					
Feed	65.69	69.90	78.76	65.77	57.90
Labour	14.17	10.32	10.69	11.79	7.43
Other Direct Costs	7.61	3.89	4.86	6.98	4.46
Overheads	3.97	6.03	5.76	4.59	3.86
Total Cost	91.44	90.14	100.07	89.13	73.65
Surplus	8.56	9.86	-0.07	10.87	16.35
Feed cost per ton (£)	33.77	35.30	34.68	33.15	33.19
Feed cost per lb. l.w.g.(d)	21.16	21.37	22.74	16.41	15.12
Total cost per lb. l.w.g. (d)	29.53	27.36	28.89	22.25	19.24
Surplus per lb. l.w.g. (d)	2.69	3.21	-0. 01	2.69	6.88
Average price of pigs sold (£)	5.87	6.57	6.52	7.91	7.70
Feed cost per sow	25.31	30.78	31.96	37.55	34.74
Total cost per sow	35.33	39.42	40.60	50.93	44.20
Surplus per sow	3.21	4.62	-0.02	6.17	15.81
Litters per sow	0.78	0.79	0.87	0.89	0.96
Live births per litter	10.05	9.20	9.07	9.81	9.07
Pigs weaned per litter	8.24	8.03	7.44	8.40	8.09
Average l.wt. of pigs sold	42.32	54.81	51.80	74.12	70.86
Feed conversion rate	5.88	5.65	6.52	4.62	4.25
lbs. l.wt. produced. per sow.	287	346	337	549	551

Table C3

RESULTS FOR THE PERIOD APRIL 1st TO SEPTEMBER 30th 1969 ACCORDING TO SIZE OF BUSINESS DEFINED BY LEVEL OF GROSS OUTPUT

	Level of Gross Output					
	Less than 1,500	1,500 -2,499	2,500 -4,999	5,000 -9,999	10,000 -19,999	More than 20,000
No. of Farms	4	7	12	10	7	6
Average size of herd	28	46	86	144	225	522
Per £100 G.O.:						
Feed	67.34	61.27	64.33	60.52	57.79	57.31
Labour	11.38	13.32	8.82	9.15	10.48	7.42
Other Direct Costs	5.94	6.77	3.98	3.90	4.27	5.33
Overheads	7.23	5.47	5.47	5.28	5.65	4.00
Total Cost	91.89	86.83	82.60	78.85	78.19	74.06
Surplus	8.11	13.17	17.40	21.15	21.81	25.94
Feed cost per ton (£)	37.86	35.85	34.58	33.28	33.61	33.58
Feed cost per lb. l.w.g.(d)	31.48	16.69	19.40	18.90	16.52	15.88
Total cost per lb. l.w.g.(d)	42.98	23.66	24.92	24.62	22.65	20.53
Surplus per lb. l.w.g.(d)	3.77	3.58	5.24	6.61	6.24	7.18
Average price of pigs sold(£)	6.31	6.53	6.17	6.54	7.65	7.19
Feed cost per sow (£)	28.72	26.16	27.93	28.34	35.97	32.18
Total cost per sow (£)	39.21	37.08	35.88	36.92	48.66	41.59
Surplus per sow (£)	3.44	5.62	7.54	9.91	13.58	14.57
Litters per sow	0.75	0.75	0.86	0.88	0.94	0.93
Live births per litter	9.18	10.14	9.19	9.24	9.57	9.70
Pigs weaned per litter	8.13	8.90	8.23	7.91	8.68	8.56
Average l.wt. of pigs sold.	46.67	49.77	47.95	49.15	68.18	63.65
Feed conversion rate	7.76	4.35	5.24	5.30	4.59	4.41
lbs. l.w.t. per sow	219	376	346	360	523	486

APPENDIX D

Results obtained from the outdoor pig herd: April 1st 1968 to March 31st 1969 and October 1st 1968 to September 30th 1969

Period		1 + 2		2 + 3	
		Identical Sample	Whole Survey	Identical Sample	Whole Survey
Costs and Returns per £100 G.O.					
Feed	(£)	62.50	62.45	62.49	62.50
Labour	(£)	9.42	9.46	9.49	9.37
Other Direct Costs	(£)	4.91	4.93	5.02	4.99
GROSS MARGIN	(£)	23.17	23.16	23.07	23.14
Overheads	(£)	4.47	4.54	4.71	4.78
TOTAL COSTS	(£)	81.30	81.38	81.71	81.64
SURPLUS	(£)	18.70	18.62	18.29	18.36
Feed cost per ton	(£)	33.72	33.62	33.74	33.74
Feed cost per lb. l.w.g.	(p)	7.12	7.10	7.24	7.30
Total cost per lb. l.w.g.	(p)	9.26	9.26	9.46	9.53
Surplus per lb. l.w.g.	(p)	2.13	2.12	2.12	2.14
Average price of pigs sold	(£)	7.16	7.19	7.11	7.10
Costs and Returns per Sow					
Feed	(£)	65.15	62.62	65.14	62.79
Total	(£)	84.82	81.22	85.12	82.01
Surplus	(£)	19.42	19.18	19.12	18.45
Litters per sow		1.77	1.71	1.78	1.73
Live births per litter		9.59	9.55	9.53	9.42
Pigs weaned per litter		8.43	8.40	8.31	8.21
Average weight of pigs at sale (lb)		60.37	62.51	61.41	61.21
Feed conversion rate (lbs per lb. l.w.g.)		4.73	4.73	4.81	4.84
Liveweight produced per sow (lbs)		916	883	900	861

APPENDIX E

Financial results and production standards for the three recording periods

	Recording Period 1	2	3
Cost and returns per £100 G.O.	(£)	(£)	(£)
Feed costs	58.55	66.41	59.00
Labour costs	8.97	9.94	8.85
Other direct costs	4.60	5.27	4.74
Overhead costs	4.33	4.68	4.87
Total costs	76.45	86.30	77.46
Surplus	23.55	13.70	22.54
Cost per ton of feeding stuffs			
Sow and weaner	32.22	32.20	32.52
Creep feed	42.38	44.71	45.28
Grower	31.36	31.25	31.40
All feeds	33.53	33.70	33.80
Costs and returns per sow			
Gross output	53.39	47.32	53.17
Feed cost	31.26	31.43	31.37
Total costs	40.82	40.85	41.18
Surplus	12.51	6.47	11.99
Costs and returns per lb liveweight gains	(p)	(p)	(p)
Gross output	11.46	11.24	12.02
Feed cost	6.71	7.49	7.09
Total cost	8.76	9.74	9.31
Surplus	2.70	1.55	2.71
	(£)	(£)	(£)
Average sale price per pig	7.14	7.23	6.98
Number of herds	46	44	46
Average size of herd (no. of sows and gilts)	152	174	165
Number of litters per sow	0.88	0.83	0.90
Number born alive per sow	8.61	7.73	8.59
Number died per sow	0.84	1.10	0.99
Number weaned per sow	7.77	6.63	7.60
Number born alive per litter	9.79	9.31	9.53
Number died per litter	0.96	1.33	1.10
Number weaned per litter	8.83	7.98	8.43
Average liveweight of pigs sold and transferred out (lbs)	61.46	63.50	59.05
Feed conversion rate	4.52	4.98	4.70
lbs liveweight produced per sow	480	419	442

2:3 APPENDIX F

A comparison of results from outdoor units with those obtained from intensive breeding herds

		Outdoor Herds	Indoor Herds		
Recording centre:		Reading & Wye[1]	Cambridge[1]	Exeter[1]	Wye[2]
No. of Herds:		41	20	27	12
Costs & returns/£100 G.O.					
Feed	(£)	62.49	60.0	63.1	62.6
Labour	(£)	9.49	13.0	10.9	11.5
Housing	(£)	1.31			3.3
Transport	(£)	1.85			1.6
Vet & Med	(£)	1.44			1.8
Grazing	(£)	2.33			
Equipment	(£)	0.83			
Other	(£)	1.97(9.73)	(13.9)	(8.9)	5.4(12.1)
Surplus	(£)	18.29	13.1	17.1	13.9
		100	100	100	100
Ave wt. of pigs reared	(lb)	61.41	54	60	40.52
Cost of food/ton	(£)	33.74	35.08	36.75	34.75
F.c.r. (lbs/lb. l.w.g.)		4.81	4.6	4.85	5.47
Feed cost/pig reared	(£)	4.44	3.95	4.70	3.57
Feed cost/lb. l.w.g.	(p)	7.24	7.08	7.83	8.33
Output/lb. l.w.g.	(p)	11.58	13.30	12.41	14.25
Margin over feed/lb. l.w.g.	(p)	4.34	6.22	4.58	5.92
Feed cost/sow	(£)	65.14	54.31	67.3	52.48
Output/sow	(£)	104.24	90.51	106.7	83.22
Margin over feed/sow	(£)	39.10	36.20	39.4	32.74
Other costs per sow	(£)	19.98	24.38	21.1	21.09
Surplus/sow	(£)	19.12	11.85	18.3	11.65
Litters/sow		1.78	1.95	1.76	1.67
Pigs born alive/litter		9.53	10.4		10.31
Pigs reared/litter		8.31	8.6	8.5	8.81
Meal equivalent/pig reared	(lb)	293	252	291	222
Live births/sow		16.95	20.28	N.A.	17.22
Piglet deaths/sow		2.17	3.51	N.A.	2.48
Pigs weaned/sow		14.78	16.77	14.3	14.74
Ave size of herd		170	N.A.	37.2	48.5

See Table 11 p. 24 for appropriate footnotes.

APPENDIX G. DETAILED COSTINGS

Table G1

Detailed breakdown of costs and returns per sow

Period	1 + 2		2 + 3	
	Identical Sample	Whole Survey	Identical Sample	Whole Survey
GROSS OUTPUT	104.24	100.40	104.24	100.46
DIRECT COSTS				
Feed	65.15	62.62	65.14	62.79
Paid Labour	9.03	8.64	9.14	8.63
Unpaid Labour	0.80	0.84	0.75	0.78
Veterinary Charges	1.16	1.04	1.13	1.07
Medicines	0.39	0.39	0.36	0.34
Haulage	0.14	0.13	0.22	0.20
Farm Transport	1.76	1.61	1.70	1.66
Services	0.25	0.22	0.26	0.26
Fuel and Water	0.57	0.53	0.62	0.62
Sundries	0.89	0.85	0.90	0.86
TOTAL DIRECT COSTS	80.14	76.87	80.21	77.21
GROSS MARGIN	24.10	23.53	24.03	23.25
OVERHEAD COSTS				
Housing	1.27	1.14	1.34	1.27
Equipment Depreciation	0.85	0.81	0.86	0.83
Grazing Charges	2.25	2.12	2.40	2.38
Repairs and Maintenance	0.10	0.10	0.12	0.15
Other	0.21	0.18	0.19	0.17
TOTAL OVERHEADS	4.68	4.35	4.91	4.80
ALL COSTS	84.82	81.22	85.12	82.01
SURPLUS	19.42	19.18	19.12	18.45

Table G2

A comparison of costs per sow and per weaner with results from the Cambridge Survey

	Cambridge results		Outdoor herds	
	Per weaner	Per sow	Per weaner	Per sow
Number of farms	91	91	41	41
Feed	3.21	54.32	4.25	65.14
Labour	0.86	14.56	0.67	9.89
Vet and Medicines	0.17	2.83	0.10	1.48
Farm Transport	0.07	1.10	0.12	1.70
Fuel and Water	0.11	1.95	0.04	0.62
Sundry	0.15	2.55	0.25	1.38
Total Direct Costs	4.57	77.31	5.43	80.21
Overheads				
Housing	0.21	3.52	0.09	1.34
Equipment	0.07	1.09	0.06	0.86
Grazing	0.03	0.59	0.16	2.40
Repairs and Maintenance	0.05	0.79	0.01	0.12
Other Overheads	-	-	0.01	0.19
Total Overheads	0.36	5.99	0.33	4.91
Stock Depreciation[1]	0.22	3.63	-	-
Total Costs	5.15	86.93	5.76	85.12

1 This item has been removed in the calculation of gross output in the Outdoor Pig Survey.

N.B. The Cambridge results are not strictly comparable with those for outdoor herds. Cambridge costings are all for herds producing 40 lb weaners as opposed to the 61 lb stores produced by the outdoor herds.

APPENDIX H

Comparison of results between herds kept out of doors for part of the year with those kept out of doors all year

	Herds kept out of doors				All Herds
	Part Year	All Year			
		Farrowing Inside[1]	Farrowing Inside	Total All Year	
Number of Farms	4	4	33	37	41
Average herd size	131	83	185	174	170
Per £100 G.O. (£)					
Feed	68.27	62.27	61.86	61.88	62.49
Labour	17.05	14.59	8.40	8.70	9.49
Vet & Medicines	3.66	1.26	1.20	1.21	1.44
Sundries	6.02	3.12	3.41	3.39	3.58
Housing	3.46	1.63	1.05	1.08	1.31
Equipment	1.17	0.35	0.81	0.79	0.83
Grazing	2.27	3.19	2.29	2.34	2.33
Other Overheads	0.70	0.13	0.29	0.28	0.24
Total Costs	102.60	86.54	79.31	79.67	81.71
Surplus	-2.60	13.46	20.69	20.33	18.29
Total Costs per sow (£)	134.25	83.57	81.08	81.19	85.12
Surplus per sow (£)	-3.41	12.99	21.15	20.72	19.12
Total Cost per lb l.w.g. (p)	11.08	10.94	9.24	9.32	9.46
Surplus pe lb l.w.g. (p)	-0.28	1.70	2.41	2.38	2.12
Ave price of pigs sold (£)	8.20	6.25	7.06	7.02	7.11
Ave l.wt. of pigs sold (lb)	76.78	49.20	60.64	60.35	61.41
Litters per sow p.a.	1.85	1.74	1.78	1.77	1.78
Pigs reared per sow p.a.	16.27	14.68	14.66	14.66	14.78
Percentage mortality[2]	10.61	13.65	12.97	13.01	12.82
F.c.r.	4.96	4.84	4.78	4.79	4.81

1 Farrowing down in indoor accommodation but moving outside in 1 to 2 weeks.

2 See Section 3.3 'Piglet mortality'.

APPENDIX I

A comparison of results between herds selling stores and weaners and those transferring to a feeding herd

		Transferring	Selling	Total
No. of Farms		15	26	41
Average size of herd		241	128	170
Per £100 G.O.				
Feed cost	(£)	60.13	64.95	62.49
Other variable costs	(£)	14.74	14.14	14.51
Overheads	(£)	4.98	4.27	4.71
Total costs	(£)	79.85	83.36	81.71
Surplus	(£)	20.15	16.64	18.29
Gross output per sow	(£)	102.18	106.48	104.24
Variable costs per sow	(£)	76.49	84.22	80.21
Gross margin per sow	(£)	25.69	22.26	24.03
Overheads per sow	(£)	5.09	4.54	4.91
Surplus per sow	(£)	20.60	17.72	19.12
Liveweight produced per sow	(lb)	917	881	900
Feed cost per lb. l.w.g.	(p)	6.69	7.84	7.24
Other variable costs per lb. l.w.g.	(p)	1.64	1.71	1.68
Overheads per lb. l.w.g.	(p)	0.55	0.52	0.54
Total costs per lb. l.w.g.	(p)	8.88	10.07	9.45
Gross output per lb. l.w.g.	(p)	11.14	12.08	11.58
Surplus per lb. l.w.g.	(p)	2.26	2.01	1.12
Ave. wt. at sale or transfer	(lb)	61.39	61.43	61.41
Ave. price at sale or transfer	(£)	6.90	7.37	7.11
Feed conversion rate		4.68	4.94	4.81
Cost of feed per ton	(£)	32.02	35.57	33.74

APPENDIX J

Comparison of results by location

	Counties					
	Hants I.O.W. Dorset Wilts.	Oxon	Berks. Bucks.	W.Sussex	E.Sussex Surrey Kent	Total
Number of Farms	12	7	9	6	7	41
Average herd size	184	227	184	81	134	170
Per £100 G.O. (£)						
Feed	69.56	61.34	53.28	67.80	64.75	62.49
Labour	10.28	6.80	7.61	14.61	12.88	9.49
Sundries	4.27	3.81	4.80	6.75	7.59	5.02
Overheads	5.47	4.91	3.53	6.33	4.36	4.71
Total Costs	89.58	76.86	69.22	95.49	89.58	81.71
Surplus	10.42	23.14	30.78	4.51	10.42	18.29
Per Sow (£)						
Feed	60.68	68.29	61.78	90.61	60.72	65.14
Total Costs	78.13	85.57	80.26	127.62	84.01	85.12
Surplus	9.09	25.76	35.69	6.03	9.77	19.12
Per lb l.w.g. (p)						
Feed	7.70	7.38	6.28	6.61	8.81	7.24
Total Costs	9.92	9.24	8.15	9.30	12.18	9.46
Surplus	1.15	2.78	3.63	0.44	1.42	2.12
Feed cost per ton (£)	33.06	34.44	31.95	31.55	40.83	33.72
Ave price of pigs sold (£)	6.70	6.89	7.65	8.69	6.48	7.11
Ave wt. of pigs sold (lb)	59.81	56.17	68.03	85.46	47.48	61.41
Litter per sow p.a.	1.71	1.94	1.86	1.66	1.60	1.78
Pigs reared per sow p.a.	15.05	16.77	15.05	15.50	14.00	14.78
Live births per litter	9.02	9.68	9.15	10.31	10.56	9.53
Pigs reared per litter	7.68	8.65	8.09	9.31	8.75	8.31
Per cent mortality	11.52	10.69	11.52	9.65	17.13	12.82
F.c.r.	5.22	4.80	4.40	4.69	4.84	4.81
lbs l.wt. produced per sow	787	926	984	1371	689	900

APPENDIX K
Table K1

Results for large arable pig farms

	Arable Pig Farms		All herds out-doors all year	All Herds
	Best	Average		
Number of Farms	7	14	37	41
Average herd size	351	276	174	170
Per £100 gross output (£)				
Feed	53.38	59.94	61.88	62.49
Labour	6.77	7.44	8.70	9.49
Vet. & Med.	1.54	1.22	1.21	1.44
Sundries	2.94	2.91	3.39	3.58
Housing	0.95	0.86	1.08	1.31
Equipment	0.72	1.00	0.79	0.83
Grazing	2.00	2.24	2.34	2.33
Other Overheads	0.18	0.18	0.28	0.24
Total costs	68.48	75.79	79.67	81.71
Surplus	31.52	24.21	20.33	18.29
Per Sow (£)				
Total costs	73.02	77.30	81.19	85.12
Surplus	33.61	24.69	20.72	19.12
Per lb. l.wt. gain (p)				
Total costs	8.24	8.80	9.32	9.46
Surplus	3.80	2.81	2.38	2.12
Feed cost per ton (£)	32.35	32.54	33.93	33.74
Ave sale price of pigs (£)	6.84	7.17	7.02	7.11
Ave wt. of pigs sold (lb)	57.79	62.87	60.35	61.41
Litters per sow p.a.	1.87	1.85	1.77	1.78
Pigs reared per sow p.a.	15.90	14.95	14.66	14.78
Live births per litter	9.36	9.18	9.50	9.53
Pigs reared per litter	8.50	8.10	8.26	8.31
Per cent mortality	9.22	11.86	13.01	12.82
F.c.r.	4.45	4.79	4.79	4.81
lbs l.wt. per sow	885	893	871	900

APPENDIX K
Table K2

Cropping and Stocking[1] on arable pig farms

	Total of 14 Farms 'Average Farm' (Acres)		%		Best 7 Farms 'Average Farm' (Acres)		%	
Crops and Grass								
CEREALS								
Wheat	178		22.3		277		25.3	
Barley	307		38.4		410		37.5	
Oats	4		0.5		7		0.6	
Total		489		61.2		694		63.4
OTHER CASH CROPS								
Potatoes	4		0.5		8		0.7	
Beans	24		3.0		40		3.7	
Peas	7		0.9		14		1.3	
Oil Seed Rape	11		1.4		22		2.0	
Other	2		0.3		4		0.4	
Total		48		6.0		88		8.1
FODDER CROPS								
Kale	7		0.9		2		0.2	
Other	3		0.4		5		0.5	
Total		10		1.3		7		0.7
GRASS								
Temporary[2]	183		22.9		218		19.9	
Permanent	64		8.0		75		6.9	
Total		247		30.9		293		26.8
FALLOW		6		0.6		11		1.0
TOTAL		800		100.0		1093		100.0
Livestock	Numbers		Numbers/ 100 acres		Numbers		Numbers/ 100 acres	
DAIRY CATTLE								
Cows and bulls	52		6.5		28		2.6	
Followers	48		6.0		19		1.7	
Total		100		12.5		47		4.3
BEEF CATTLE		4		0.5		7		0.6
EWES		40		5.0		80		7.3
SOWS		276		34.5		351		32.1

1 Excluding intensive livestock

2 Including grass grown for seeds.

APPENDIX L
Table L1

Performance of herds according to size of business defined by level of gross output per annum

	Level of Gross Output per annum (£)						
	Under 5,000	5000 to 7,499	7500 to 9,999	10000 to 14,999	15000 to 24,999	25000 to 49,999	50,000 and over
No. of Farms	8	8	4	8	4	6	3
Average herd size	46	73	95	145	208	285	645
Per £100 G.O. (£)							
Feed	68.45	65.28	69.88	65.82	62.32	64.14	56.52
Labour	15.78	6.92	10.65	11.21	7.87	10.99	7.30
Sundries	7.94	3.80	3.61	5.25	3.92	5.83	4.79
Overheads	4.80	5.25	5.56	5.59	4.36	4.88	3.76
Total Costs	96.97	81.25	89.70	87.87	78.47	85.84	72.47
Surplus	3.03	18.75	10.30	12.13	21.53	14.16	27.63
Per sow (£)							
Feed	52.28	57.14	61.82	55.99	62.28	83.82	60.79
Labour	12.05	6.06	9.42	9.54	7.86	14.36	7.85
Sundries	6.06	3.33	3.19	4.47	3.92	7.62	5.15
Overheads	3.67	4.60	4.92	4.76	4.36	6.38	4.04
Total costs	74.06	71.12	79.35	74.76	78.42	112.18	77.94
Surplus	2.31	16.41	9.11	10.32	21.51	18.51	29.72
Per lb. l.w.g. (p)							
Feed	9.25	9.10	8.43	8.21	8.09	7.18	6.17
Total costs	13.09	11.32	10.81	10.96	10.18	9.60	7.91
Surplus	0.41	2.61	1.24	1.51	2.79	1.58	3.01
Feed cost per ton (£)	34.42	34.96	35.24	33.21	33.21	34.30	32.78
Ave price of pigs sold (£)	5.59	6.62	6.94	6.13	7.06	8.39	7.00
Litters per sow p.a.	1.60	1.60	1.59	1.70	1.87	1.78	1.91
Pigs reared per sow p.a.	13.42	12.90	12.96	13.69	14.12	15.86	15.92
Live births per litter	10.20	8.94	9.20	9.45	8.82	10.34	9.30
Pigs weaned per litter	8.39	8.06	8.15	8.04	7.54	8.93	8.34
Ave lwt. of pigs sold	40.25	50.54	56.26	47.14	57.16	78.26	63.52
Feed conversion rate	6.07	5.52	5.21	5.44	5.57	4.48	4.29
lbs lwt. prodn/sow	566	628	734	682	770	1168	985

APPENDIX L
Table L2
Performance of herds according to size of business defined by average herd size

	Average herd size (Number of sows and gilts)				
	Under 50	50 to 99	100 to 199	200 to 299	Over 300
Number of Farms	9	10	10	7	5
Average herd size	35	82	143	236	548
Per £100 G.O. (£)					
Feed	63.55	62.18	71.29	61.12	58.73
Labour	10.22	10.82	12.35	8.61	8.09
Sundries	4.40	4.48	5.78	3.85	5.39
Overheads	3.34	4.60	6.27	4.72	3.91
Total Costs	81.51	82.08	95.69	78.30	76.11
Surplus	18.49	17.92	4.31	21.70	23.89
Per Sow (£)					
Feed	71.88	58.74	74.41	63.88	62.18
Labour	11.56	10.22	12.89	9.00	8.57
Sundries	4.98	4.23	6.03	4.02	5.71
Overheads	3.78	4.35	6.54	4.93	4.14
Total Costs	92.20	77.54	99.87	81.83	80.59
Surplus	20.90	16.93	4.50	22.68	25.29
Per lb l.w.g. (p)					
Feed	8.22	7.87	8.48	7.25	6.60
Total Costs	10.54	10.38	11.38	9.29	8.55
Surplus	2.39	2.27	0.51	2.57	2.68
Feed cost per ton (£)	36.82	35.60	31.71	34.38	33.81
Ave price of pigs sold (£)	7.32	6.71	7.51	6.99	7.09
Litters per sow p.a.	1.75	1.62	1.77	1.75	1.85
Pigs reared per sow p.a.	14.76	13.64	14.16	14.85	15.40
Live births per litter	9.80	9.50	9.37	9.74	9.46
Pigs weaned per litter	8.43	8.43	8.00	8.48	8.31
Ave lwt. of pigs sold	55.97	54.46	66.75	58.37	63.38
Feed conversion rate	5.04	4.79	5.64	4.78	4.38
lbs lwt. prodn per sow	867	779	932	870	942

APPENDIX M

Cropping and Stocking[1] on 46 Outdoor Pig Farms 1968/9.

Crops and Grass	No. of farms with enterprise	Total (Acres)		%		'Average Farm' (Acres)	
CEREALS							
Wheat	27	3,996		19.4		86.9	
Barley	39	6,949		33.7		151.1	
Oats	6	422		2.0		9.2	
Total	39		11,367		55.1		247.2
OTHER CASH CROPS							
Potatoes	8	372		1.8		8.1	
Beans	7	356		1.7		7.7	
Peas	3	194		0.9		4.2	
Oil Seed Rape	4	247		1.2		5.4	
Vegetables	6	121		0.6		2.6	
Other	5	106		0.5		2.3	
Total	16		1,396		6.7		30.3
FODDER CROPS							
Kale	9	366		1.8		8.0	
Roots	3	87		0.4		1.9	
Other	1	26		0.1		0.6	
Total	11		479		2.3		10.5
GRASS							
Temporary[2]	41	5,110		24.8		111.1	
Permanent	28	2,033		9.8		44.2	
Total	46		7,143		34.6		155.3
FALLOW	8		261		1.3		5.7
TOTAL	46		20,646		100.0		449.0
Livestock		(Numbers)		(Numbers/100 acres)		(Numbers)	
DAIRY CATTLE							
Cows and Bulls	11	1,429		6.9		31.1	
Dairy Followers	14	1,402		6.8		30.5	
Total	18		2,831		13.7		61.6
BEEF CATTLE							
Cows and Bulls	4	22		0.1		0.5	
Other	9	830		4.0		18.0	
Total	11		852		4.1		18.5
EWES	7		1,550		7.5		33.7
SOWS	46		6,205		30.1		134.9

1 Excluding intensive livestock enterprises.

2 Includes grass grown for seed.

APPENDIX N

GLOSSORY OF TERMS USED

Gross Output

The value of all pigs sold and transferred out, less the value of all pigs bought and transferred in, plus the value of all pigs in the closing valuation, less the value of all pigs in the opening valuation, plus any sundry receipts.

Average Number of Sows
Average Herd Size

The number of sows and gilts on hand at the beginning of the period plus the number on hand at the end of each month, all divided by seven in the case of six-monthly recording periods or thirteen in the case of yearly recording periods.

Feed Cost

The value of all feed bought in during the period, plus the value of all home produced feed used, plus the value of all feed in the opening valuation, less the value of all feed in the closing valuation, plus the cost of milling and mixing, including depreciation of milling and mixing machinery.

Feed

The tons of all feed bought in, plus the tons of feed in the opening valuation, plus the tons of all home produced feed used, less the tons of feed in the closing valuation all divided into total feed cost (as defined above).

Feed Conversion Rate (F.c.r.)
Feed Conversion Efficiency
Pounds per pound liveweight gain

The total tons of all feed used during the period (as above) multiplied by 2240 and divided by the total pounds (lbs.) liveweight produced during the period (see below).

Pounds (lbs.) liveweight production

The pounds liveweight sold and transferred out, plus the pounds liveweight in the closing valuation, less the pounds liveweight in the opening valuation.

Feed Cost per pound liveweight production

Total feed cost multiplied by 100 and divided by the pounds liveweight production.

Feed cost per sow

Total feed cost divided by the average number of sows.

Pounds liveweight produced per sow

Total liveweight produced divided by the average number of sows.

Average liveweight of pigs sold

Total liveweight of all pigs sold and transferred out divided by the total number of all pigs sold and transferred out, but not including the weight and number of culled breeding stock.

Average price of pigs sold

Total value of weaners and stores sold and transferred out divided by the number of weaners and stores sold and transferred out.

Pigs weaned

Number of pigs born less number died before weaning or sale or transfer out.

Labour Cost

An hourly charge per worker is obtained by adding together the gross wage paid, employer's share of National Insurance contributions, other pensions and insurance premiums paid, annual value of cottage and perquisites and dividing the total by the total number of hours worked on all enterprises. This hourly figure is then multiplied by the total number of hours worked on the pig enterprise.

Sundry Costs, Sundries
Other Direct Costs

Generally to include veterinary and medicine charges, haulage, farm transport, services, fuel and water and miscellaneous costs. May include labour if not already listed. May not include vet and med. charges.

Variable Costs
Total Direct Costs

Feed and labour costs plus Other Direct Costs.

Gross Margin

Gross output less variable costs or total direct costs.

Overhead Costs
Overheads
Total Overhead Costs

The annual cost of housing, depreciation on equipment, grazing, maintenance and repairs and other overheads, but exclusive of charges for managerial expenses or interest on capital.

Surplus

Gross output less all costs but inclusive of interest charges and managerial fees.

APPENDIX 0

Other Publications on Outdoor Pigs

Bellis, D.B., (1965) 'Rearing Pigs Outside' Agriculture, June, pp.266-269.

Blair, R., and Reid, I.M. (1965) 'Outdoor Pig Rearing by the 'Roadnight' System in N.E. Scotland'. Agriculture, November, pp.530-533.

M.A.F.F. (1967) 'Outdoor Pig Breeding' N.A.A.S. Technical Bulletin S.E. Region No. 67/9, pp.4.

Cox, N.D., (1967) 'An Outdoor Pig Enterprise' Agriculture, February, pp.67-71.

Boddington, M.A.B. and Sykes, J.D., (1969) 'Outdoor Pig Keeping', Agriculture, February, pp.60-65.

Turff, R., (1969) 'Too busy to fight' Farmers Weekly, August 1, pp.50-51.

Boddington, M.A.B., and Sykes, J.D', (1969) Outdoor Pig Production in Summer, Departments of Agricultural Economics, Wye College (University of London) and University of Reading (mimeo), pp.23.

Boddington, M.A.B., (1970), 'Outdoor Pig Production' Pig Farming 18, 2, February, pp.30-31.

Boddington, M.A.B., (1970) 'Starting an Outdoor Pig Herd' Pig Farming 18, 3, March, pp.50-51.

Boddington, M.A.B., (1970) 'Outdoors or Indoors' Pig Farming 18, 4, April, pp.66-67.

Boddington, M.A.B. (1970 Outdoor Pig Production in Southern England, 1968-69: A Preliminary Report School of Rural Economics and Related Studies, Wye College (University of London) in conjunction with the Department of Agricultural Economics, University of Reading, (mimeo), pp.27.

Farmers Weekly (1971) 'Grass and Fodder, 5' Break Crops F.W. Extra, April, pp.30-34.

APPENDIX P

Other Publications in this Series

No. 1	Lowland Sheep: Production Policies and Practices Editor: W.J.K. Thomas University of Exeter October 1970	50p (10s.)
No. 2	Cucumber Production in the Lea Valley Profitability on a Sample of Nurseries By A.H. Gill University of Reading November 1970	30p (6s.)
No. 3	Oilseed Rape: A study of its production based on economic surveys of the 1967, 1968 and 1969 harvests. By J.A.L. Dench University of Reading December 1970	50p (10s).

APPENDIX Q

Address of University Departments

BRISTOL	Agricultural Economics Research Unit, University of Bristol, 79 Woodland Road, Bristol - BS8 1UT
CAMBRIDGE	Agricultural Economics Unit, Department of Land Economy, University of Cambridge, Silver Street, Cambridge - CB3 9EP
EXETER	Agricultural Economics Unit, Department of Economics, University of Exeter, Lafrowda, St. German's Road, Exeter - EX4 6TL
LEEDS	Agricultural Economics Department, University of Leeds, 34 University Road, Leeds - LS2 9JT
LONDON	School of Rural Economics & Related Studies Wye College (University of London), Near Ashford, Kent.
MANCHESTER	Department of Agricultural Economics, The University, Manchester - M13 9PL
NEWCASTLE	Department of Agricultural Economics, The University of Newcastle-upon-Tyne, Newcastle-upon-Tyne - NE1 7RU
NOTTINGHAM	Department of Agriculture and Horticulture, University of Nottingham, School of Agriculture, Sutton Bonington, Loughborough - LE12 5RD
READING	Department of Agricultural Economics, University of Reading, Building No. 4, Earley Gate, Whiteknights Road, Reading - RG6 2AR
WALES	Department of Agricultural Economics, University College of Wales, Institute of Rural Science, Penglais, Aberystwyth, Cardiganshire.