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Wheat - Cost of production (p d)

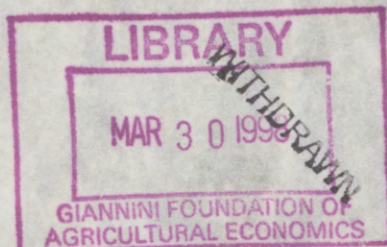


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Dept. of land economy,
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Economics of Wheat & Barley Production
in Great Britain, 1996/97

CAROL ASBY



UNIVERSITY OF CAMBRIDGE

Economics of Wheat and Barley Production in Great Britain, 1996/97

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Special Studies in Agricultural Economics

University departments of Agricultural Economics in England and Wales have for many years undertaken economic studies of crop and livestock enterprises, receiving financial and technical support from the Ministry of Agriculture, Fisheries and Food. Since April 1978 this work has been supported in Wales by the Welsh Office following the transfer of responsibilities for agriculture to the Secretary of State for Wales.

The departments in different regions conduct joint studies of those enterprises in which they have a particular interest. This community of interest is recognised by issuing reports prepared and published by individual departments in a common series entitled *Special Studies in Agricultural Economics*. Titles of recent publications in this series are given in Appendix D.

This study also includes results for Scotland which were collected with financial support from the Scottish Office Agriculture. The addresses of all departments involved in the collection of data are given in Appendix E.

The basic information on which this report is based was originally collected on behalf of, and largely financed by, the Ministry of Agriculture, Fisheries and Food, the Welsh Office and the Scottish Office and is Crown Copyright.

Foreword

Because of the pivotal importance of cereals in British agriculture and the reform of the CAP, their economic performance, is being monitored by surveys of the harvest years 1993 to 1998. The survey reported here covers the economic results from production of the 1996 crop and its subsequent sale. As the third of four partial, intermediate surveys between full surveys for the 1993 and 1998 harvest years, it covers results to the stage of gross margin, in Great Britain, for winter and spring wheat and winter and spring barley.

The survey was of a large, randomly selected sample of cereal units and the data obtained from personal visits by well qualified investigational officers. Therefore it provides, for a variety of situations, the best available basic data for planning and control. Though inevitably not as up-to-date as users would wish, this detailed and thoughtful report has been produced within six months of the completion of the marketing of the crop. Those involved in all stages of collection, processing, analysis and writing are to be commended on this degree of timeliness.

The report contains much more than tables of aggregated data. Results and comparisons are given and interpreted for units classified according to location, size, degree of specialisation and economic performance. Also included are careful analyses of such topics as the causes of varying performance, of marketing practices and of the use of agro-chemicals. So the report will be of value to those with interests in the environmental effects and procurement of cereal production as well as those who are more concerned with its profitability and the effects of government policies. Some of the analyses add precision to widely understood relationships while others, such as those on economies of size, throw some doubt on the conventional wisdom.

Wheat and barley harvested in 1996 were produced in an economic climate which was less favourable than in the preceding season. Though the level of compensation payments was substantially maintained, prices received were reduced both by weaker world markets and the appreciation of sterling. The economic conditions were nevertheless more favourable than can be expected in the next century. This survey shows a wide variation in performance between producers, especially in respect of yields. It thus throws some light on the challenges facing producers with higher costs per tonne if they are to survive more direct exposure to foreign competition in the future.

Carol Asby, who has been involved in all stages of this series of surveys, makes her debut as sole author of a report. Readers, I believe, will find that this publication maintains the high standards of rigour and readability established in similar reports from Cambridge on the national cereals enterprise over the past twenty five years.

Ian Sturgess
Director
January 1998

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At Cambridge thanks are particularly due to Joe Barker for computing, checking and general assistance throughout the survey and to Faisal Sabbah for his computing advice and programming skills. I am grateful to Alan Renwick for advice and suggestions and to the Director, Ian Sturgess, for his continual support and useful and constructive comments. The co-operation of the cereal growers in Great Britain who provided the information for this research project is gratefully acknowledged.

Table of Contents

	Page no.
Special Studies in Agricultural Economics	iii
Foreword	iv
Acknowledgements	v
Summary	1
Chapter 1: Special Studies of Cereals	
1.1 Overview	5
1.1.1 The 1993 Cereal Study	5
1.2 The 1996 Gross Margin Study of Wheat and Barley	6
1.2.1 Methodology	6
1.2.2 Structure of Cereal Production and Sampling	6
Chapter 2: Variable Costs and Returns of Wheat and Barley Production: by Country	
2.1 Presentation of Results	9
2.2 Gross Margin Results for Great Britain	11
2.2.1 Four Year Analysis of Gross Margin Components for Great Britain, 1993 to 1996	12
2.3 Gross Margin Results for England, Wales and Scotland	19
2.3.1 Winter Wheat	21
2.3.2 Winter Barley	23
2.3.3 Spring Barley	25
2.3.4 Combined Wheat and Barley Enterprises	26
Chapter 3: Costs and Returns of Wheat and Barley Production, by Size of Enterprise and Dispersion of Gross Margin	
3.1 Introduction	29
3.2 Comparison by Size of Cereal Enterprise	29
3.2.1 Cereal-Intensive Counties	30
3.2.2 Cereal-Extensive Counties	32
3.2.3 Composition of Rotational Area	34
3.3 Dispersion in Gross Margin	36

Table of Contents (continued)

Chapter 4: Materials: Costs and Use

4.1 Introduction	39
4.2 Seed	39
4.2.1 Varieties	39
4.2.2 A Comparison of Physical Data and Costs by Enterprise Size for Winter Wheat Seed	41
4.3 Fertiliser	41
4.3.1 Fertiliser Use by Crop and Country	42
4.3.2 Cereal-Intensive Counties	43
4.4 Crop Protection	45
4.5 Effect of Degree of Specialisation on Materials Use for Winter Wheat	47

Chapter 5: Marketing and Disposal of Grain and Straw

5.1 Introduction	49
5.2 Disposal by Quality	49
5.2.1 Comparison of Grain Disposal between 1994, 1995 and 1996 Harvest Years	50
5.3 Disposal by Price	52
5.4 Disposal by Month	53
5.5 Specialisation of Production	55
5.6 Disposal of Wheat and Barley Straw	57

Chapter 6: Further Reform of the CAP

6.1 Introduction	61
6.2 Review of Cereal Production	61
6.3 Agenda 2000	63

Appendices

A EU regions: Map and Costs and Returns for Wheat and Barley	67
B Cereal-Intensive and Cereal-Extensive Counties of England	71
C Conventions for Cost and Margin Calculations	72
D Reports on Special Studies in Agricultural Economics	73
E Provincial Centres of Agricultural Economics	75

List of Tables

Table 1.1 Cereals in Great Britain: Distribution Between Holdings by Size of Cereal Area	7
Table 1.2 Sample Size Sought and Obtained	8
Table 2.1 Great Britain: Costs and Returns for Winter and Spring Wheat and Barley, 1995 Harvest Year (weighted)	11
Table 2.2 Winter Wheat: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)	13
Table 2.3 Winter Barley: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)	14
Table 2.4 Spring Barley: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)	15
Table 2.5 Arable Area Payments for Cereals 1993, 1994, 1995 and 1996 Harvest Years	19
Table 2.6 Average Farm Size, Rotational Area and Cereal Area for England, Wales and Scotland, 1996 (survey sample)	21
Table 2.7 Winter Wheat: Costs and Returns by Country, 1996 Harvest Year (weighted)	23
Table 2.8 Winter Barley: Costs and Returns by Country, 1996 Harvest Year (weighted)	24
Table 2.9 Spring Barley: Costs and Returns by Country, 1996 Harvest Year (weighted)	25
Table 2.10 Combined Wheat and Barley Enterprises: Costs and Returns by Country, 1996 Harvest Year (weighted)	26
Table 2.11 Combined Wheat and Barley Enterprises: Yields and Gross Margin Components by Country, 1994 to 1996 (weighted), in Terms of 1996 Purchasing Power	27
Table 3.1 Proportions of Wheat and Barley in Enterprises in Cereal-Intensive and Cereal-Extensive Counties, by Size Group	29
Table 3.2 Costs and Returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-aside, 1996 Harvest Year, Cereal-Intensive Counties of England	31
Table 3.3 Costs and Returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-aside, 1996 Harvest Year, Cereal-Extensive Counties of England	33
Table 3.4 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Wheat, 1996 Harvest Year	36
Table 3.5 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Barley, 1996 Harvest Year	37
Table 3.6 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Spring Barley, 1996 Harvest Year	38

Table 4.1 A Comparison of Physical Data and Costs by Enterprise Size for Winter Wheat Seed, Cereal-Intensive Counties	41
Table 4.2 Fertiliser Use by Crop and Country, 1996 Harvest Year	42
Table 4.3 Percentage Differences between Data from the Wheat and barley Gross Margin Study and the British Survey of Fertiliser Use	43
Table 4.4 Fertiliser Costs and Rates of Application for Winter Wheat, Cereal-Intensive Counties, 1993,1994, 1995 and 1996 Harvest Years	43
Table 4.5 Comparison of Fertiliser Costs and Rates of Application for Winter Wheat, Cereal-Intensive Counties, 1995 and 1996 Harvest Years, by Size Group	45
Table 4.6 Crop Protection Costs per Hectare for Winter Wheat, Winter Barley and Spring Barley, by Country	46
Table 4.7 Indices of Plant Protection Cost per Hectare, Prices and Usage for Winter Wheat, Great Britain, 1985, 1993 and 1996 Harvest Years (1985=100)	47
Table 4.8 Materials Use for Winter Wheat, by Specialisation of Production, Cereal-Intensive Counties of England, 1996 Harvest Year,	48
Table 5.1 Disposal of Grain by Quality, Proportion and Price, 1996 Harvest Year, Weighted	50
Table 5.2 Range of Prices for Grain Sales, 1996 Harvest Year, Weighted	52
Table 5.3 Comparison of Output and Variable Costs of Winter Barley for Malting and Feed; Output and Variable Costs of Spring Barley for Malting	57
Table 5.4 Comparison of Straw Disposal, 1993 to 1996 Harvest Years	58
Table 6.1 World Grain Supply and Demand, 1985/86 to 1996/97	61
Table 6.2 Costs and Returns for Winter Wheat Production: Actual (1996) and Hypothetical based on Agenda 2000 Proposals in Great Britain	64
Table A.1 EU Region - England North: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year (weighted)	68
Table A.2 EU Region - England East: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year (weighted)	69
Table A.3 EU Region - England West: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year (weighted)	70

Figures

Figure 2.1 UK Estimated Areas of Winter- and Spring-Sown Wheat and Barley, 1996	9
Figure 2.2 Comparison of Areas of Winter Wheat and Winter and Spring Barley, England and Scotland, 1996	10
Figure 2.3 Levels of Gross Margin Components, Great Britain, 1993 to 1996 in Money of 1996 Purchasing Power	16
Figure 2.4 Comparisons in Yield and Price (in Money of 1996 Purchasing Power), Great Britain, 1993 to 1996	17
Figure 2.5 Percentage Composition of Output Components for Winter Wheat, Winter Barley and Spring Barley, 1993 to 1996	18
Figure 2.6 Crop Yields by Country, 1993 to 1996	20
Figure 2.7 Comparison of Material Costs for Winter Wheat for England and Scotland, 1993 to 1996, in terms of 1996 Purchasing Power	22
Figure 3.1 Comparisons of Margins for Wheat and Barley Enterprises, Cereal-Intensive Area of England	32
Figure 3.2 Comparisons of Margins for Wheat and Barley Enterprises, Cereal-Extensive Area of England, by Size of Cereal Unit	34
Figure 3.3 Average Composition of Rotational Area by Cereal + Set-Aside Size Group	35
Figure 4.1 Top Seed Varieties, Winter Wheat, Winter Barley and Spring Barley, 1996 Harvest Year	40
Figure 4.2 Fertiliser Cost and Rate of Application for Winter Wheat, Cereal-Intensive Counties, 1993, 1994, 1995 and 1996 Harvest Years	44
Figure 4.3 Composition of Crop Protection for England and Wales and Scotland	46
Figure 5.1 Comparison of the Proportions of Grain Disposal, 1994, 1995 and 1996 Harvest Years	51
Figure 5.2 Comparison of Price Ranges by Quality of Grain for Wheat and Barley, 1996 Harvest Year (excluding top and bottom five per cent of prices)	53
Figure 5.3 Monthly Proportion of Grain Remaining on Farm with Monthly Average Prices	54
Figure 5.4 Total UK Area of Wheat Planted, with the Proportion Planted with Milling Varieties, 1993 to 1996	55
Figure 5.5 Total UK Area of Barley Planted, with the Proportion Planted with Malting Varieties, 1993 to 1996	56
Figure 5.6 Methods of Straw Disposal and Proportions for Winter Wheat, Winter Barley and Spring Barley, by Region, 1996 Harvest Year	59
Figure 6.1 Cereal Area and Production in Great Britain, 1972 to 1996	62
Figure A.1 The EU Super Regions in Great Britain	67

Summary

The sections in the report to which the summary points refer are shown in parentheses after each point.

Sampling, Objectives and Methodology

1. The purpose of this survey was to supply output and variable cost data for winter- and spring-sown crops of wheat and barley, in order to continue to monitor the changes at the gross margin level resulting from the CAP reform implemented in 1993. (1.2.1)
2. Of the original 400 cereal growers, randomly selected, who took part in the 1993 study, nearly 60 per cent have now participated for three years. Replacements for those who left the survey were selected from randomly drawn lists. (1.2.2)
3. In Great Britain in 1996, 43.5 per cent of holdings producing cereals grew less than 20 hectares of cereals but accounted for only eight per cent of the total cereals area; 18 per cent of holdings producing cereals grew over 80 hectares and accounted for 58 per cent of the total cereals area. Over 50 per cent of the total cereals area is in the EU eastern region of England. (1.2.2)
4. The sample was drawn to have the number of farms in a size group proportional to the area of cereals in that group, according to the agricultural census. To correct any differences between the sample size sought and obtained, weighting factors were applied in the calculation of overall means. (1.2.2)

Economic Results by Crop and Country

5. Spring wheat was only one per cent of the wheat and barley area in the UK and only grown on 12 farms in the survey. The results should be treated with caution because of the small sample. (2.1)
6. Different national patterns for wheat and barley were apparent. Over 60 per cent grown in Scotland is spring barley whereas in England over 90 per cent of the wheat and barley crop is winter-sown. (2.1)
7. Winter wheat again had the highest average gross margin per hectare (£856), followed by winter barley (£793), spring barley (£764) and spring wheat (£622). (2.2)

8. With the exception of spring wheat, gross margins were down on those of 1995. Although yields increased overall in Great Britain, grain prices fell and significant increases were observed in fertiliser costs for winter wheat and spring barley, and in crop protection for winter barley. (2.2)
9. Nationally, Scotland's high yields of 1995 were not quite matched in 1996 for winter wheat or winter barley but there were further increases in yields in both England and Wales. Yields increased in all three countries for spring barley. (2.3)
10. For the first time in this series of surveys Wales achieved the highest gross margin for winter wheat (£917) followed by England (£856) and Scotland (£851). However, only 13 farms in the Wales sample grew the crop whereas there were 277 observations for England, and so the results must be treated with caution. (2.3.1)
11. For winter barley Scotland had the highest yield and highest total output but this was offset by high variable costs giving England the highest gross margin (£795) followed by Scotland (£783) and Wales (£746). (2.3.2)
12. For spring barley Scotland achieved the highest gross margin (£767) followed by England (£742) and Wales (£723). (2.3.3)
13. For combined wheat and barley enterprises, England had the highest gross margin followed by Wales and then Scotland. The rather unusual ranking reflects the dominance of more profitable winter wheat in England and the greater proportion of spring barley, which produced the lowest gross margin in 1996, grown in Scotland. (2.3.4)

Further Analysis by Size of Enterprise and Dispersion of Gross Margin

14. Analysis by size of cereal enterprise was carried out for wheat and barley in "cereal-intensive" counties where cereals account for more than 40 per cent of the crops, and in "cereal-extensive areas. For the intensive counties, in general the analysis demonstrates an increase in performance for larger enterprises (i.e. those over 80 hectares) for both wheat and barley and diseconomies of small size rather than consistent significant economies of size. (3.1 to 3.2.2)
15. When ranked by the margin over materials, the gross margin for winter wheat in the upper quartile group was £13 per tonne higher than that in the lower quartile group; for winter and spring barley the gross margins were £17 and £14 per tonne higher respectively in the upper quartile group. The most important factor contributing to this

result was the yield of grain which was from 34 to 45 per cent higher for farms in the upper quartile group compared with the lower quartile group. (3.3)

16. Fertiliser costs for winter wheat were significantly higher for farms in the upper quartile group compared with the lower quartile group. (3.3)

Materials

17. Established seed varieties were most popular for wheat and barley but less dominant than recorded in previous surveys. Farmers appear to be less conservative in trying new varieties. (4.2.1)
18. The rise in price observed in 1995 continued but the rate of application of nitrogen decreased. (4.3)
19. Larger size enterprises (above 200 hectares) in the cereal-intensive counties used significantly more fertiliser but paid significantly less for it than the smaller size enterprises. (4.3.2)
20. An increase in herbicide and fungicide use since 1993 is indicated but a decrease in insecticide application. (4.4)

Marketing and Disposal of Grain and Straw

21. The price of grain fell dramatically, to well below intervention levels, with dire consequences for some growers. Unlike other years there was no price revival towards the end of the marketing season. (5.1)
22. Although the proportion of winter wheat grain for milling was similar to the previous year (22 per cent), less was sold for feed and seed. At six per cent the fraction retained on farm for feed was double that in 1995/96. For winter barley, the proportions used for feed and seed (over 70 per cent) were similar to those in 1995 but less grain went for malting. Spring barley shows a different pattern of marketing with 40 per cent sold as malting quality, and only slightly more (48%) used for feed (18% sold and 30% kept on-farm). (5.2)
23. As reported in other years, there is again considerable overlap between the bottom end of the range for milling wheat and the upper end of the range for feed wheat. However, the premium for milling wheat, which has consistently fallen since 1993, was 10 per cent over feed wheat, an increase of one percentage point from the previous year.

For both winter and spring barley the overlap between the price ranges for different qualities was not so great. Sales for the 1996 harvest show a continued increase in the malting premium to an average of 29 per cent for winter barley and 33 per cent for spring barley. (5.3)

24. As the area of set-aside has decreased in recent years, the area planted to wheat has increased. However, the proportion planted with varieties likely to attract a milling premium has declined. This is due to the low milling premium and new technology which allows millers to use lower quality wheats in their grists.
There has also been an increase in UK barley area. However, this has not resulted in an increased planting of malting varieties; the area planted to varieties recommended by the IOB has remained fairly constant (5.5)
25. Regional differences are apparent in the importance of straw to the farm business. For the average wheat and barley enterprise in England straw accounts for only four per cent of total output, whereas in Wales it is 14 per cent of output. On livestock farms it is an extremely valuable commodity. (5.6)

Further Reform of the CAP

26. Exchange rates and world market prices have had unforeseen results and for a time obscured the longer term effects of changes in the CAP. As a result farmers have had a difficult time anticipating future events and planning their businesses accordingly. (6.1)
27. In the EU total production was about 30 million tonnes above consumption. It is apparent that, under present conditions, further reductions of set-aside can only mean a return to grain mountains by the end of the century. (6.2)
28. Low cereal prices are likely to necessitate further reductions in both fixed and variable costs at farm level (with the inevitable effects on rural employment and associated agricultural industries), and an increase in attempts to produce off-farm income. (6.3)
29. It seems inevitable, particularly in view of the need to contain CAP spending and the likely restraints of the next WTO round, that the next CAP reforms, after Agenda 2000, will include further reductions of support prices, the removal of production controls and the conversion of area payments to transitional payments. (6.3)

Chapter 1: Special Studies of Cereals

1.1 Overview

In 1971 a series of economic studies of cereals in the UK began, which have covered a period of major change to the cereal production support system and the accession of the UK to the European Union. In the 1970s the effects of inflation, new technology and changes to the price support policy resulted in surplus cereal production over and above amounts necessary for food security and presented the tax-payer with an unacceptable burden. The report on the fifth study in 1985/86¹ predicted a contraction of the cereal sector and stern challenges for the industry. It preceded the reform of the CAP, implemented in 1993, which provided the third and current cereal support regime. Set-aside was introduced to reduce compulsorily the cereal area and cereal support prices were brought down nearer to world prices in an attempt to increase the domestic consumption of grain through cheaper prices. Producers were compensated with payments made on an area rather than volume of production basis.

1.1.1 The 1993 Cereal Study

The sixth study on the harvest year 1993/94² monitored the first year of the reforms enabling a comparison to be made with the returns under the previous regime, observed in 1985. The 1993 study surveyed variable and fixed costs and returns for winter and spring sown crops of wheat and barley, and also recorded variable costs and returns for oats, rye and triticale. With the expectation of lower prices and adjustments in material inputs, now that support mechanisms were not tied solely to price and yield, a further series of four annual studies recording variable costs and returns for wheat and barley was planned to monitor farmers' reactions. Another full survey, to include fixed costs, will take place in 1998/99.

By the 1995/96 gross margin study³ the effects of cuts in intervention prices were ineffective in reducing cereal prices because of high world prices and, in Britain, successive devaluations of the green pound had further shielded farmers. World stocks fell to an unacceptably low level. A good return encouraged attempts to increase production and material inputs showed no sign of decreasing. However, a good global harvest in 1996, abolition of set-aside in the USA and reductions in the rate of set-aside in the EU have completely altered the situation, as farmers are only too well aware.

¹ Davidson, JG, UK Cereals, 1985/86: Part 2

² Davidson, JG and Asby, CE, UK Cereals, 1993/94

³ Asby, CE and Sturgess, IM, Economics of Wheat and Barley Production in Great Britain, 1995/96

1.2 The 1996 Gross Margin Study of Wheat and Barley

1.2.1 Methodology

The gross margin study was designed to collect output and variable costs from winter and spring varieties of wheat and barley in Great Britain. Replacements for those who did not want to continue participating in the 1996 study were selected from randomly drawn lists. The information was collected and recorded on a standard questionnaire by personal interview with each co-operating farmer. One visit was normally made after harvest when details of variable inputs and grain sales completed to date for each wheat and barley crop were collected. Details of later sales of grain were obtained during a further visit or by telephone. As recorded in the 1994 report⁴ a major benefit of annual recording with a majority of continuing co-operators was that in many cases information was to hand and data collection easily and quickly carried out.

1.2.2 Structure of Cereal Production and Sampling

The trend for cereal production continues to be increasingly concentrated on larger units in Great Britain. However, the reduction in set-aside area has probably had an effect on the size of cereal enterprises. Table 1.1 gives a comparison of percentage holdings and areas in 1994 with those in 1996. It shows that in 1996 43.5 per cent of holdings producing cereals grew less than 20 hectares, compared with 46 per cent in 1994. The percentage of the total area in this smallest size group fell from 9.6 per cent in 1994 to 8.4 per cent in 1996. At the other end of the scale the proportion of total area in the group containing the largest cereal enterprises (above 200 ha) rose from 18.3 per cent in 1994 to 21.5 per cent in 1996; the percentage of holdings in this group also increased from 2.6 per cent to 3.4 per cent. In England the majority of the larger cereal producers are situated in the EU Eastern region; this region contains nearly 50 per cent of the total Great Britain cereals area.

⁴ Davidson, JG, Wheat and Barley Production in Great Britain, 1994/95: Year Two of CAP Reform

Table 1.1 Cereals in Great Britain: Distribution Between Holdings by Size of Cereal Area

Cereal area		<20ha		20 to <80ha		80 to <200ha		200ha and above		Total	
		1994	1996	1994	1996	1994	1996	1994	1996	1994	1996
EU region	- North										
	% GB area	1.8	1.5	7.8	6.8	6.2	6.5	2.5	3.0	18.3	17.8
	% GB holdings	8.0	7.6	8.1	7.7	2.3	2.7	0.4	0.5	18.8	18.5
	- East										
	% GB area	2.7	2.3	15.0	13.1	18.7	19.0	12.8	14.7	49.2	49.1
	% GB holdings	12.4	11.3	15.0	14.5	6.7	7.5	1.8	2.3	35.9	35.6
	- West										
	% GB area	2.5	2.3	7.8	7.4	5.5	5.8	2.1	2.6	17.9	18.1
	% GB holdings	11.9	11.7	8.4	8.6	2.0	2.4	0.3	0.4	22.6	23.1
England	% GB area	7.0	6.1	30.6	27.3	30.4	31.3	17.4	20.2	85.4	84.9
	% GB holdings	32.3	30.6	31.5	30.8	11.0	12.5	2.5	3.2	77.3	77.1
Scotland	% GB area	1.9	1.7	6.3	5.9	4.1	4.7	0.9	1.3	13.2	13.6
	% GB holdings	9.5	8.9	6.5	6.7	1.5	2.0	0.1	0.2	17.6	17.8
Wales	% GB area	0.7	0.6	0.7	0.7	0.0	0.2	0.0	0.0	1.4	1.5
	% GB holdings	4.2	4.0	0.9	0.9	0.0	0.1	0.0	0.0	5.1	5.0
Great Britain	% GB area	9.6	8.4	37.6	33.8	34.5	36.3	18.3	21.5	100.0	100.0
	% GB holdings	46.0	43.5	38.9	38.5	12.5	14.6	2.6	3.4	100.0	100.0

Source: MAFF 1996 June Census data

Ninety two per cent of the farmers who co-operated in the 1995 survey have participated in the survey for 1996. To replace those who did not continue it was necessary to recruit a further 33 farmers. As in previous years by far the most common reason for refusing to participate was that a farmer felt he was too busy. A few farmers contacted had no interest and inevitably in a couple of cases there were personal factors involved such as a death or the decision to retire. A total of 396 farmers took part in the 1996 survey and an analysis of the sample size sought and obtained by country, region and size group is given in Table 1.2.

The intention was to have the number of farms in a size group proportional to the area of cereals in that group, according to the agricultural census. Although new recruitments have been made from random lists for the same size group as the farms they are replacing, disparities between the sample size sought and sample size obtained have occurred. There are a number of reasons for this, for example the change of the cereal enterprise area on a farm and farms amalgamating. It would have been imprudent to jeopardise the goodwill of co-operating farmers by refusing to let them continue to participate because they had moved size groups. Table 1.2

highlights the continuing difficulty in recruiting at the ends of the size group scale, ie holdings with less than 20 ha of cereals and holdings with 200 or more ha of cereals.

To correct the differences apparent in Table 1.2, weighting factors have been applied to size groups to increase or decrease, appropriately, the importance of the sample obtained in the calculation of overall means. Where weighting factors have been used this fact is noted in the title of the table.

Table 1.2 Sample Size Sought and Obtained

Size Group (area of cereals)	(5- <10ha)	(10- <20ha)	(20- <40ha)	(40- <80ha)	(80- <120ha)
EU Super Region					
-North sought	6	6	7	14	10
-North obtained	6	5	6	17	7
-East sought	9	10	13	26	26
-East obtained	5	6	14	37	33
-West sought	10	9	8	13	8
-West obtained	6	8	13	20	9
-England sought	25	25	28	53	44
-England obtained	17	19	33	74	49
-Scotland sought	2	5	9	18	12
-Scotland obtained	3	5	7	19	7
-Wales sought	4	7	7	7	2
-Wales obtained	4	7	14	3	2
Size Group (area of cereals)	(120- <200ha)	(200- <300ha)	(300+ ha)	Total	
EU Super Region					
-North sought	10	4	5	62	
-North obtained	16	6	3	66	
-East sought	35	24	26	169	
-East obtained	30	20	21	166	
-West sought	10	6	5	69	
-West obtained	14	1	2	73	
-England sought	55	34	36	300	
-England obtained	60	27	26	305	
-Scotland sought	9	3	2	60	
-Scotland obtained	8	6	4	59	
-Wales sought	2	1	0	30	
-Wales obtained	1	1	0	32	

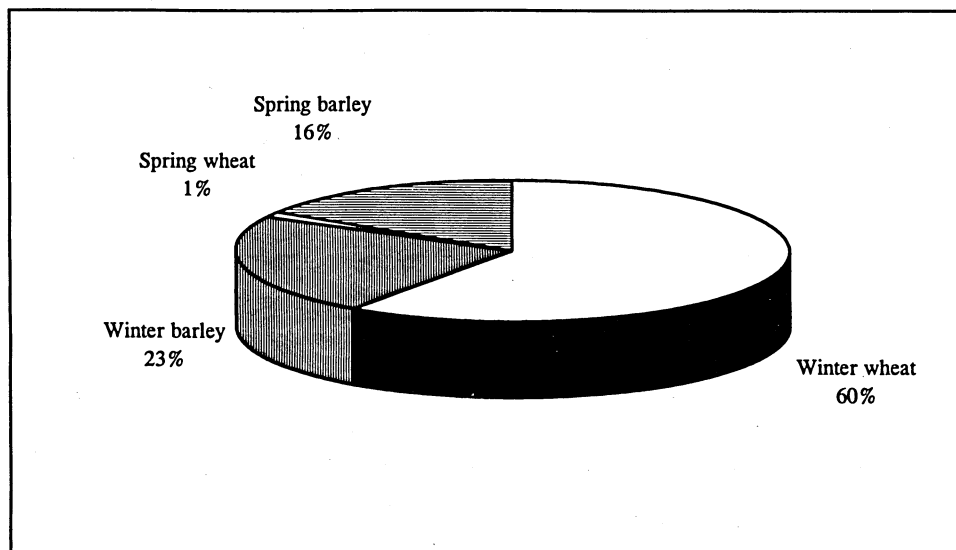
Chapter 2: Variable Costs and Returns of Wheat and Barley Production: by Country

2.1 Presentation of Results

This chapter presents costs and returns to the gross margin level for the 396 farms that participated in the survey. The results are given on a per hectare basis with standard errors of the mean (s.e.) provided to give an indication of the precision of the mean value¹.

Figure 2.1 gives the proportions of wheat and barley grown in the UK in 1996. It shows clearly the dominance of winter wheat followed by winter and spring barley. Winter-sown crops account for over 80 per cent of the total wheat and barley grown. Spring wheat occupied only one per cent of the total area and this is reflected in the survey where it was grown on only 12 farms, all in England. The survey results for spring wheat in Great Britain are given in Table 2.1 (Great Britain) but because of the small number of observations, results for the crop must be treated with caution; the large standard errors indicate wide ranges and less precise estimates.

Figure 2.1 UK Estimated Areas of Winter- and Spring-Sown Wheat and Barley, 1996



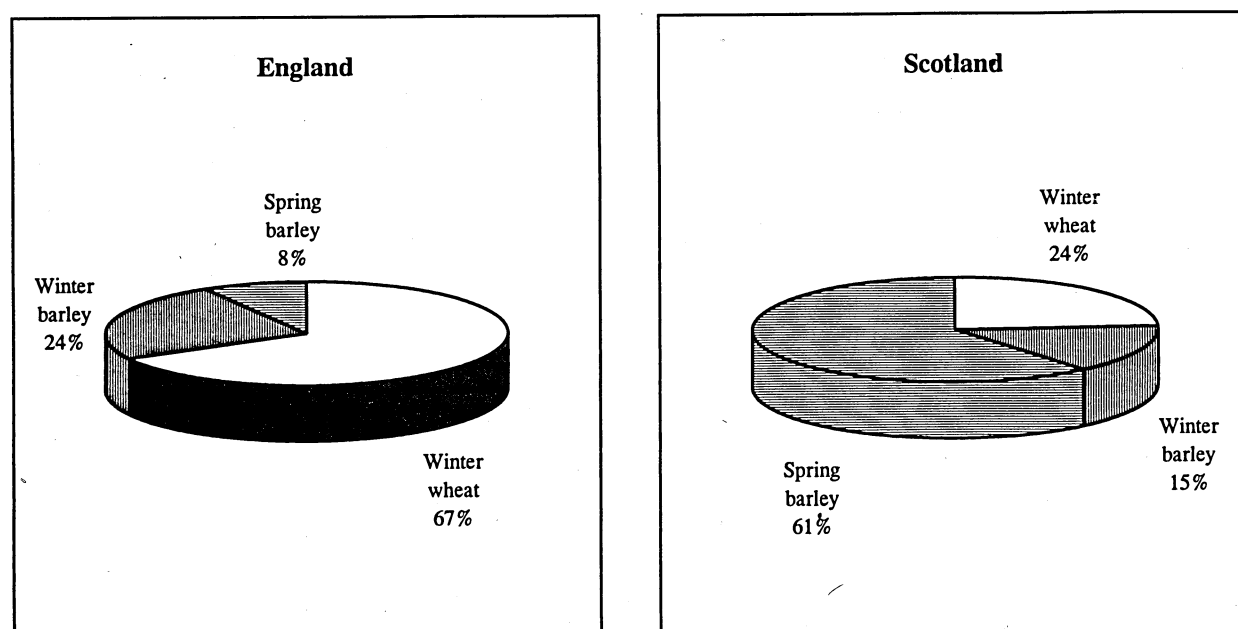
Sources: HGCA; MAFF

The UK crop areas shown in Figure 2.1 hide very different national patterns for wheat and barley production. Figure 2.2 shows the variation between England and Scotland for the proportion of the three main cereals of the total wheat and barley area. It highlights the high proportion of spring barley grown in Scotland, which leaves less than 40 per cent of the total

¹ The standard error of the mean indicates the precision of the mean value, and is often used to calculate the confidence interval of the mean. For a variable that has a normal distribution one would expect, with 95% confidence, that the mean of the whole population occurs in the range defined by: 'mean+1.96 s.e.' and 'mean-1.96 s.e.'.

in winter-sown wheat or barley. By contrast in England over 90 per cent of wheat and barley is winter-sown and two thirds is winter wheat alone. In Wales the crops are more evenly spread with 30 per cent winter wheat, 34 per cent winter barley and 36 per cent spring barley, giving a predominance of over 60 per cent for winter-sown crops. The size of the national sub-sample for individual crops reflect these differences in mix of crops. For some small samples, high standard errors indicate the means are only imprecise estimates of true population means.

Figure 2.2 Comparison of Areas of Winter Wheat and Winter and Spring Barley, England and Scotland, 1996



Sources: HGCA; MAFF

Where smaller groups taken from the main sample have been compared, analysis of variance has been used to test whether differences between the means are statistically significant at the ten per cent level². For historical comparisons, where costs and revenues have been compared over several years, values have been adjusted using the retail prices index to terms of money of 1996 purchasing power. To avoid unnecessary repetition in the main body of the report, some tables which present the survey results by EU regions in England have been included in Appendix A. Where results have been weighted, as described in the previous chapter, this is stated in the title.

² The finding that the means are significantly different at the 10 per cent level indicates that, given the variability within the sample and the sample size, there is a better than 10 per cent chance that variations did not arise from sampling "error".

2.2 Gross Margin Results for Great Britain

Table 2.1 Great Britain: Costs and Returns for Winter and Spring Wheat and Barley, 1996 Harvest Year (weighted)

	Winter Wheat		Spring Wheat		Winter Barley		Spring Barley	
	s.e.		s.e.		s.e.		s.e.	
No. farms	322		12		270		161	
Yield tonnes per ha	8.44	(0.59)	5.13	(0.67)	7.04	(0.44)	5.93	(0.50)
Price £ per tonne	102.62	(2.06)	109.66	(3.65)	104.49	(1.70)	115.62	(2.26)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	865.59	(6.01)	566.27	(77.98)	732.18	(4.49)	688.80	(5.53)
Output-straw	34.09	(1.07)	46.44	(14.92)	73.24	(1.37)	62.58	(1.49)
Arable area payment	259.98	(3.28)	231.53	(24.77)	254.07	(2.65)	238.26	(3.22)
Total output	1159.66	(6.93)	844.24	(95.56)	1059.49	(5.39)	989.65	(6.57)
Material costs								
Seed	50.55	(1.43)	59.19	(6.52)	51.62	(1.19)	60.61	(1.62)
Fertiliser	103.07	(2.05)	72.45	(9.67)	89.80	(1.57)	74.96	(1.83)
Crop protection	100.41	(2.02)	55.35	(9.28)	86.89	(1.55)	48.67	(1.44)
Total	262.69	(3.29)	186.99	(19.67)	228.30	(2.50)	184.24	(2.84)
Margin over materials	896.96	(6.10)	657.25	(82.50)	831.19	(4.78)	805.40	(5.93)
Other variable costs								
Casual labour	2.31	(0.32)	0.00	(0.00)	2.06	(0.24)	1.53	(0.27)
Contract	24.05	(0.89)	22.23	(10.80)	23.50	(0.75)	23.88	(0.95)
Fuel for grain drying	4.97	(0.45)	5.24	(1.41)	3.15	(0.30)	2.89	(0.38)
Miscellaneous	9.27	(0.61)	7.75	(2.07)	9.62	(0.51)	13.17	(0.77)
Total	40.60	(1.21)	35.22	(11.94)	38.33	(0.98)	41.46	(1.30)
Total variable costs	303.29	(3.51)	222.21	(23.89)	266.63	(2.69)	225.70	(3.13)
Gross Margin	856.36	(5.98)	622.03	(78.44)	792.86	(4.68)	763.94	(5.78)

Table 2.1 gives the variable costs and returns for Great Britain by crop. Despite securing the lowest price among crops and incurring the highest variable costs, winter wheat, because of its markedly higher yield, returned the highest gross margin and margin over materials per hectare. The difference in costs arose mainly in respect of fertiliser costs and crop protection. Thus agro-chemical costs per hectare for winter wheat at £203 were £27 (+15%) more than for winter barley and £80 (+65%) more than for spring barley. All three margins, despite increases in yields, have fallen from the levels observed in 1995 mainly because of lower grain prices throughout the marketing year 1996/97. Only the gross margin for spring wheat improved on the previous year; the average price per tonne on the survey farms was only slightly less than that recorded in 1995 and was outweighed by an improved yield.

2.2.1 Four Year Analysis of Gross Margin Components for Great Britain, 1993 to 1996

Tables 2.2 to 2.4 compare variable costs and returns for the harvest years 1993 to 1996, for winter wheat, winter barley and spring barley. The financial data for 1993 to 1995 are expressed in terms of 1996 purchasing power to give a more meaningful comparison. The fall in wheat and barley prices in the marketing year 1996/97 was instrumental in significantly reducing the margins over materials and gross margins for that year. The contribution of straw sales to the total output also fell for the harvest year 1996 to levels near the low point of 1993 for winter wheat and barley, and even below this for spring barley.

Figure 2.3 shows changes in the levels of the major components of the gross margin. The pattern is similar for the three crops with the margin over materials and the gross margin following the direction of total output. Among variable costs there were significant increases in 1996 for fertiliser on winter wheat, crop protection on winter barley and seed and fertiliser for spring barley. Costs of grain drying for all three crops also increased significantly from 1995 but not up to the levels of 1993 and 1994.

For winter wheat the increases are somewhat offset by a fall in crop protection costs between the 1995 and 1996 harvest years. From the Agricultural Price Indices, published by MAFF, the overall cost, in real terms, of all groups of plant protection products has increased from 1995 to 1996, with the greatest rises in insecticides and herbicides, so the fall in crop protection for winter wheat needs some explanation. The APIs are based on manufacturers' list prices and so do not reflect discounts growers may obtain from suppliers. Also there could be a number of other factors that contribute to this situation, such as lower fungicide use as a result of the dry weather, a higher percentage of first wheats resulting from the reduction in set-aside and the increased use of independent consultants. More detailed analysis of these issues will be carried out in the next chapter.

Total variable costs per hectare have not shown a consistent trend over the four years, and only between 1995 and 1996 for the two barleys were differences statistically significant. For all three crops the apparent pattern was a small fall in total variable costs in real terms between the 1993 and 1994 harvest years followed by small rises in the two following years: a

4.4 per cent increase overall for winter wheat, 7.6 per cent for winter barley and 3.7 per cent for spring barley. By contrast yields increased by 13.4 per cent for winter wheat, 14.9 per cent for winter barley and 24.6 per cent for spring barley.

Table 2.2 Winter Wheat: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)

	1993 harvest real terms	1994 harvest real terms	1995 harvest real terms	1996 harvest current	Statistically significant differences at the 10% level		
					93-94	94-95	95-96
Group no.	1	2	3	4			
No. farms	297	319	329	322			
Yield tonnes per ha	7.44	7.75	8.02	8.44	2>1	3>2	4>3
Price £ per tonne	114.23	114.83	121.40	102.62		3>2	3>4
Returns			£/ha				
Output-grain	849.64	889.46	974.07	865.59	2>1	3>2	3>4
Output-straw	35.59	44.78	52.97	34.09	2>1		3>4
Arable area payment	146.41	199.88	270.81	259.98	2>1	3>2	3>4
Total output	1031.64	1134.12	1297.86	1159.66	2>1	3>2	3>4
Material costs							
Seed	55.65	56.48	50.56	50.55		2>3	
Fertiliser	81.39	84.31	97.11	103.07		3>2	4>3
Crop protection	107.45	104.38	107.20	100.41		3>2	
Total	244.49	245.17	254.86	262.69		3>2	4>3
Margin over materials	787.15	888.95	1043.00	896.96	2>1	3>2	3>4
Other variable costs							
Casual labour	2.13	1.98	2.03	2.31			
Contract	24.30	22.84	23.40	24.05			
Fuel for grain drying	10.89	8.66	3.33	4.97	1>2	2>3	4>3
Miscellaneous	8.60	8.68	9.38	9.27			
Total	45.92	42.16	38.14	40.6			
Total variable costs	290.41	287.32	293.00	303.29			
Gross Margin	741.22	847.25	1004.86	856.36	2>1	3>2	3>4

Table 2.3 Winter Barley: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)

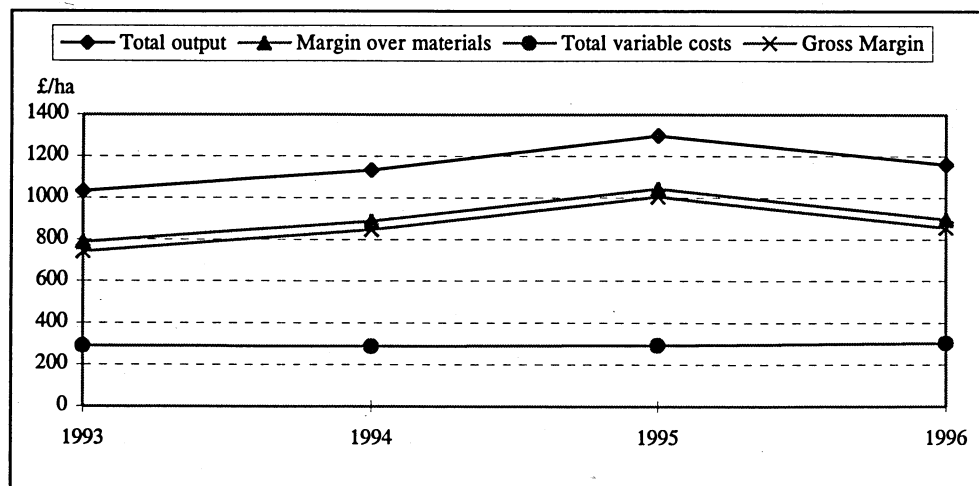
	1993 harvest real terms	1994 harvest real terms	1995 harvest real terms	1996 harvest current	Statistically significant differences at the 10% level		
					93-94	94-95	95-96
Group no.	1	2	3	4			
No. farms	249	261	262	270			
Yield tonnes per ha	6.13	6.24	6.72	7.04	3 > 2		
Price £ per tonne	115.47	114.57	118.84	104.49	3 > 2	3 > 4	
Returns				£/ha			
Output-grain	707.95	715.24	798.99	732.18	3 > 2	3 > 4	
Output-straw	71.52	84.75	95.47	73.24	2 > 1	3 > 2	3 > 4
Arable area payment	146.82	193.38	258.45	254.07	2 > 1	3 > 2	3 > 4
Total output	926.30	993.38	1152.92	1059.49	2 > 1	3 > 2	
Material costs							
Seed	51.30	52.53	49.23	51.62	2 > 3		
Fertiliser	73.88	75.03	83.82	89.80	3 > 2		
Crop protection	80.79	77.06	79.55	86.89	3 > 2	4 > 3	
Total	205.97	204.63	212.60	228.30	3 > 2	4 > 3	
Margin over materials	720.32	788.75	940.32	831.19	2 > 1	3 > 2	3 > 4
Other variable costs							
Casual labour	2.18	1.85	1.95	2.06			
Contract	24.70	19.64	19.85	23.50			
Fuel for grain drying	6.18	5.63	1.79	3.15	2 > 3	4 > 3	
Miscellaneous	8.87	8.31	8.50	9.62			
Total	41.93	35.43	32.10	38.33			
Total variable costs	247.90	240.05	244.70	266.63			4 > 3
Gross Margin	678.40	753.32	908.21	792.86	2 > 1	3 > 2	3 > 4

Table 2.4 Spring Barley: Comparison of Costs and Returns, 1993 to 1996 Harvest Years, in Money of 1996 Purchasing Power (weighted)

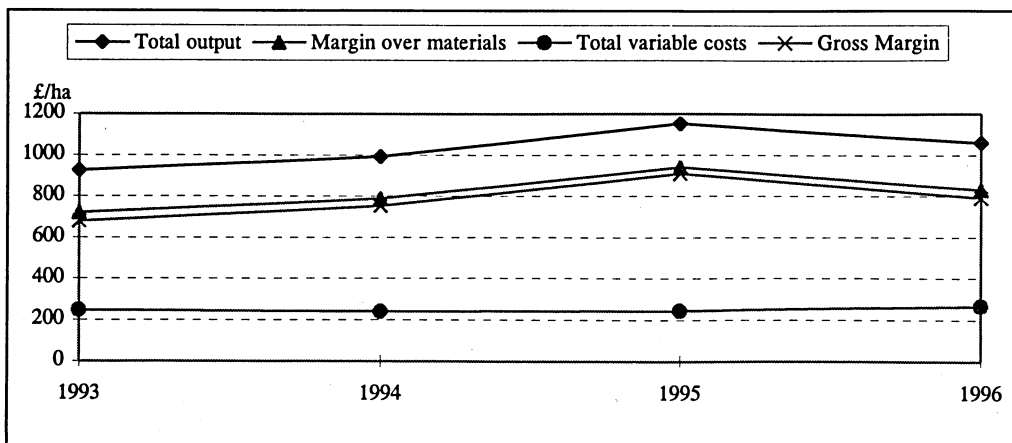
	1993 harvest real terms	1994 harvest real terms	1995 harvest real terms	1996 harvest current	Statistically significant differences at the 10% level		
					93-94	94-95	95-96
Group no.	1	2	3				
No. farms	242	158	183	161			
Yield tonnes per ha	4.76	5.03	5.41	5.93		3 > 2	4 > 3
Price £ per tonne	122.11	126.74	136.26	115.62	2 > 1	3 > 2	3 > 4
Returns			£/ha				
Output-grain	586.00	637.67	737.11	688.80	2 > 1	3 > 2	
Output-straw	76.52	86.45	84.48	62.58	2 > 1		3 > 4
Arable area payment	133.38	176.00	253.70	238.26	2 > 1	3 > 2	
Total output	795.90	900.11	1075.29	989.65	2 > 1	3 > 2	
Material costs							
Seed	61.13	56.23	58.55	60.61			4 > 3
Fertiliser	62.12	61.11	68.91	74.96		3 > 2	4 > 3
Crop protection	44.93	44.05	48.09	48.67			
Total	168.18	161.39	175.54	184.24		3 > 2	4 > 3
Margin over materials	627.72	738.73	899.75	805.40	2 > 1	3 > 2	3 > 4
Other variable costs							
Casual labour	1.55	1.40	1.07	1.53			
Contract	26.54	18.72	23.47	23.88			
Fuel for grain drying	5.35	4.50	2.05	2.89		2 > 3	4 > 3
Miscellaneous	15.96	9.00	11.95	13.17			
Total	49.40	33.62	38.54	41.46			
Total variable costs	217.57	195.01	214.07	225.70			4 > 3
Gross Margin	578.33	705.12	861.21	763.94	2 > 1	3 > 2	3 > 4

Figure 2.3 Levels of Gross Margin Components, Great Britain, 1993 to 1996 in Money of 1996 Purchasing Power

Winter Wheat



Winter Barley



Spring Barley

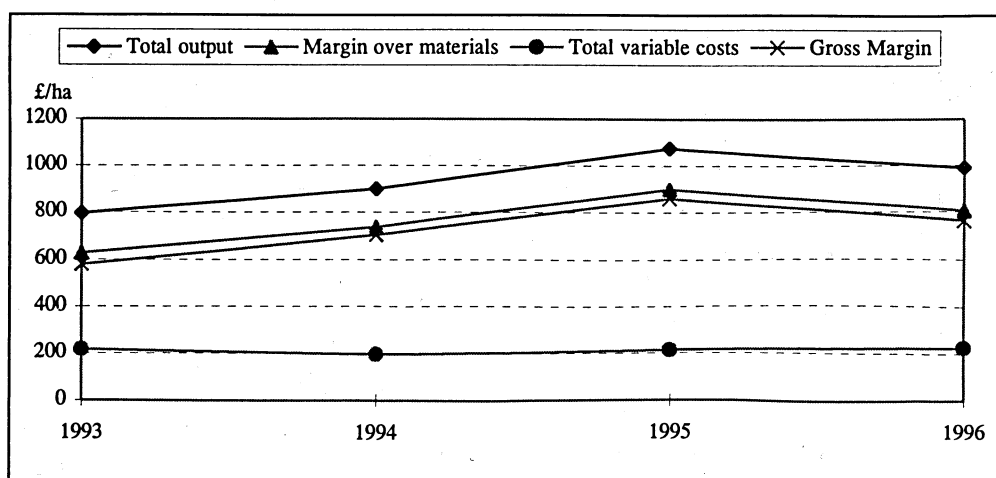
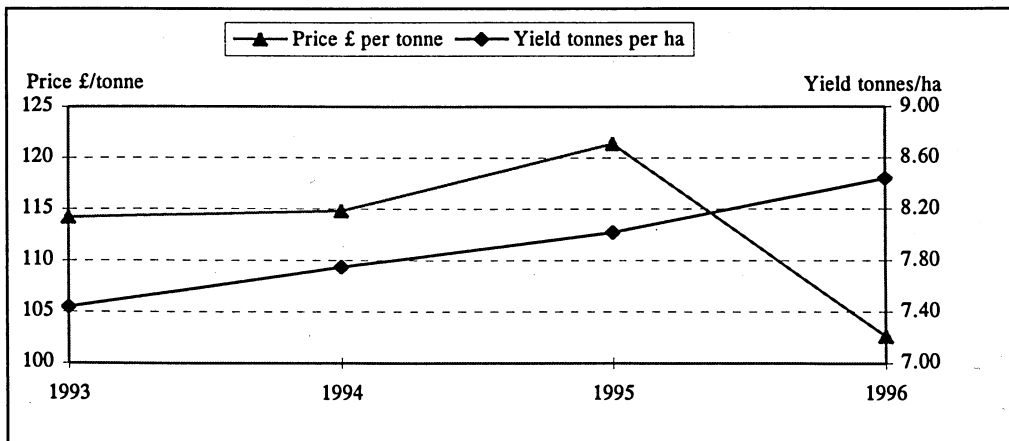


Figure 2.4 shows the patterns of yield and price over the four year period for the three crops. The significant fall in wheat and barley prices in 1996/97 to levels well below those in 1993/94 (in real terms) is only too apparent. This had the effect of reducing the output for grain significantly for winter wheat and winter barley despite a further increase in yields.

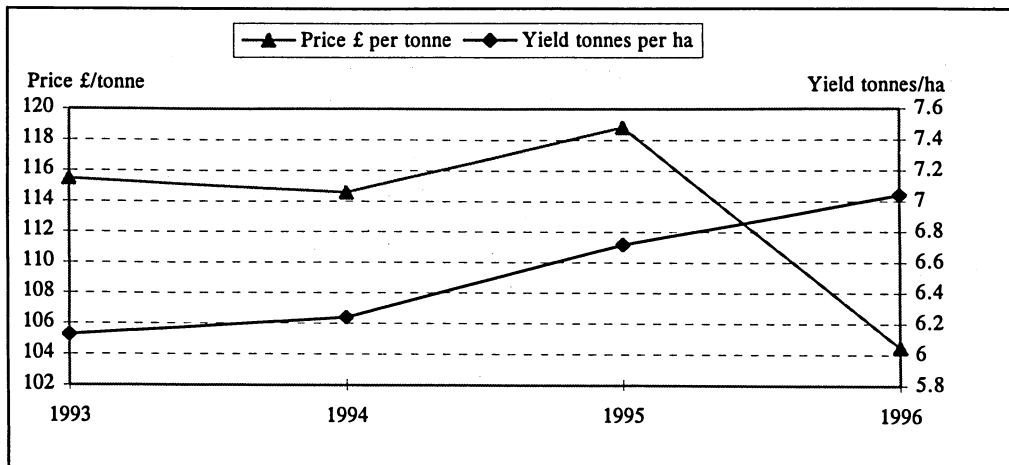
Yields reached a record high in 1996 although late season and intermittent rainfall made them variable in different regions. The early season drought did not have the disastrous effect some anticipated and continuing plant breeding developments also contributed to the increase.

Figure 2.4 Comparisons in Yield and Price (in Money of 1996 Purchasing Power), Great Britain, 1993 to 1996

Winter Wheat



Winter Barley



Spring Barley

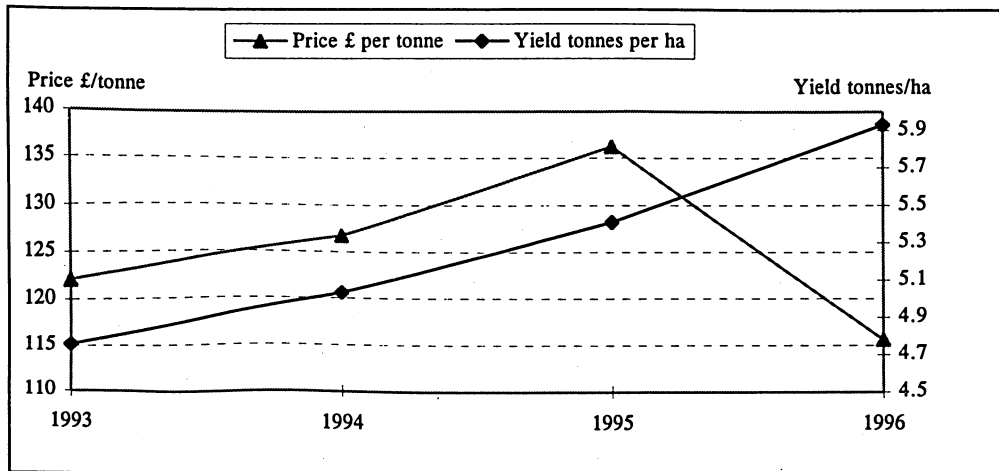
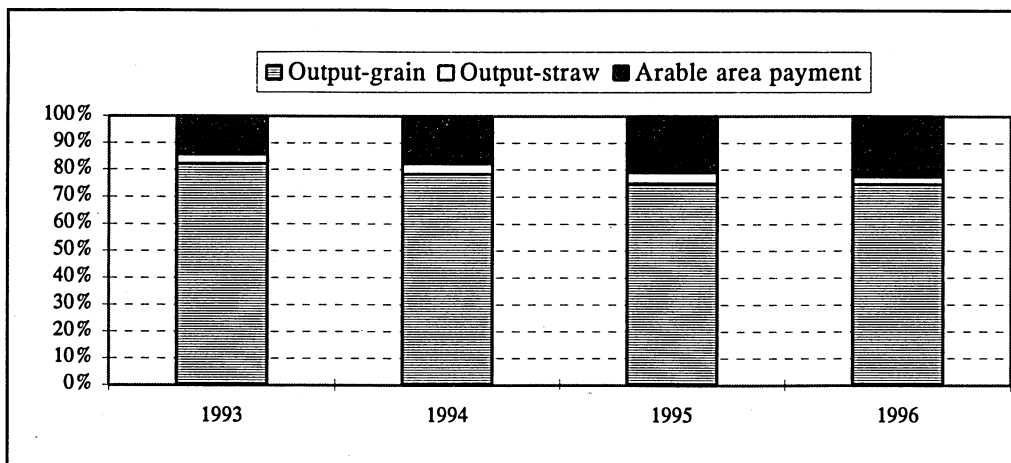
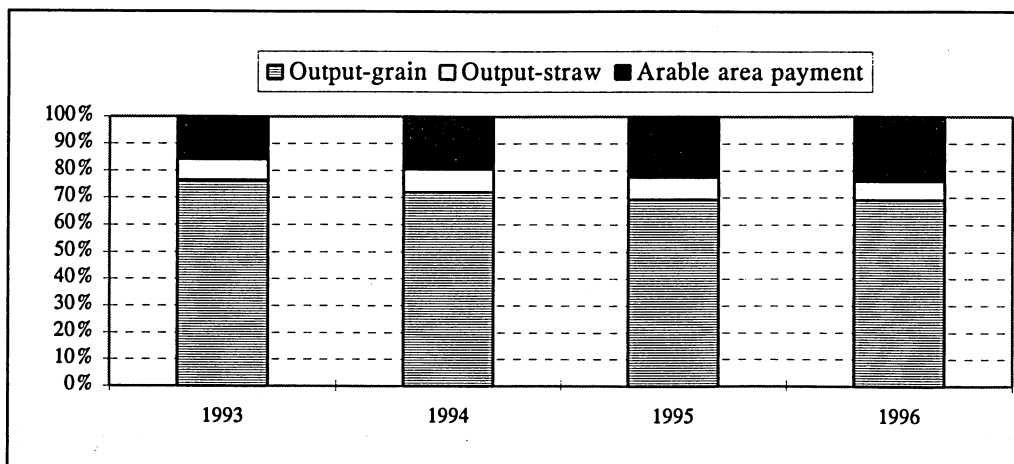


Figure 2.5 Percentage Composition of Output Components for Winter Wheat, Winter Barley and Spring Barley, 1993 to 1996

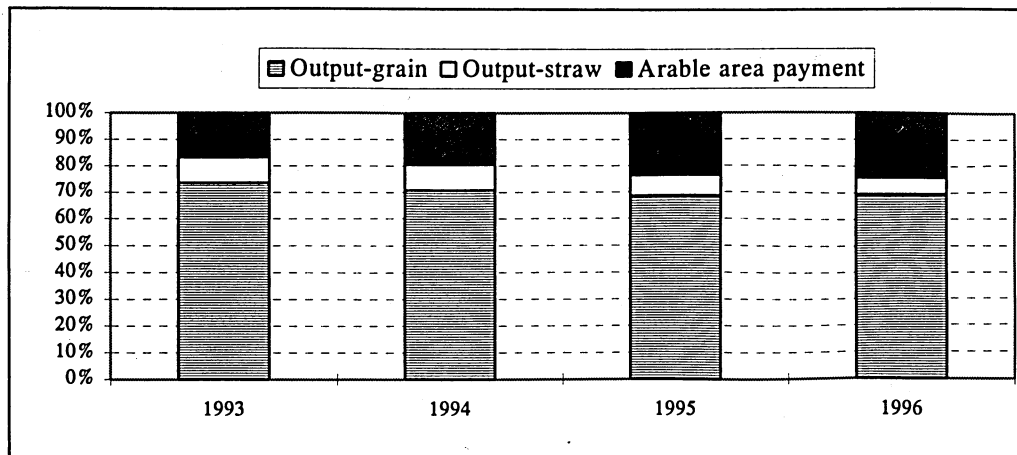
Winter Wheat



Winter Barley



Spring Barley



For the purposes of this survey, output comprises straw sales and area payment as well as the amount received for grain sales. Figure 2.5 shows the change in these components as a percentage of total output over the four year period. In 1996 the arable area payment fell slightly in absolute terms for the first time since 1993 (Table 2.5), but because prices also fell its relative importance to the total output, and hence to the gross margin, is still at about the same level observed in 1995. Expressed in money of 1996 purchasing power, the arable area payment as a percentage of the gross margin increased from about 20 per cent to 30 per cent over the four year period. Straw can be seen to have a smaller percentage of the output in 1996 for all three crops.

2.3 Gross Margin Results for England, Wales and Scotland

The results for England, Scotland and Wales in the three main cereals require some preliminary comment. For some groups, particularly winter wheat in Wales, there are small numbers of observations and so care must be taken in drawing conclusions from the data. Wales is a livestock-intensive area so straw is of more importance, and a higher proportion of cereals are grown for feed. Arable area payments have less effect on cereal margins in Wales because (particularly for LFAs) they are lower than for England and Scotland, and in any case many Welsh farmers prefer to qualify for the livestock premium payment, by counting at least part of their cereal area as forage. Table 2.5 shows the level of area payments since 1993.

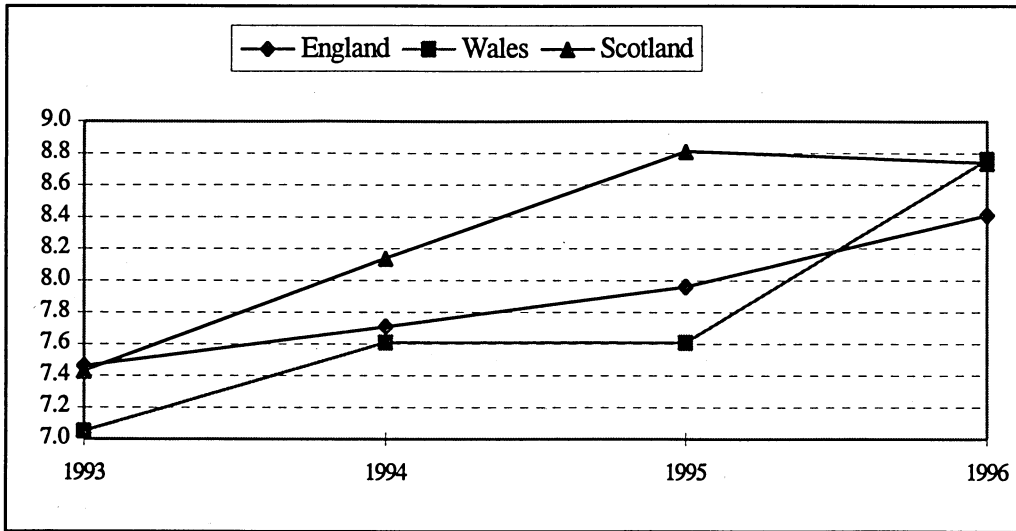
Table 2.5 Arable Area Payments for Cereals 1993, 1994, 1995 and 1996 Harvest Years

	Area Payment £ per hectare			
	1993	1994	1995	1996
England	140.64	193.53	269.17	266.87
Scotland (LFA)	114.07	156.97	238.10	236.06
Scotland (non-LFA)	131.39	180.51	259.12	256.91
Wales (LFA) ^a	110.28	108.35	230.78	228.81
Wales (non-LFA) ^a	110.28	168.72	236.26	234.25

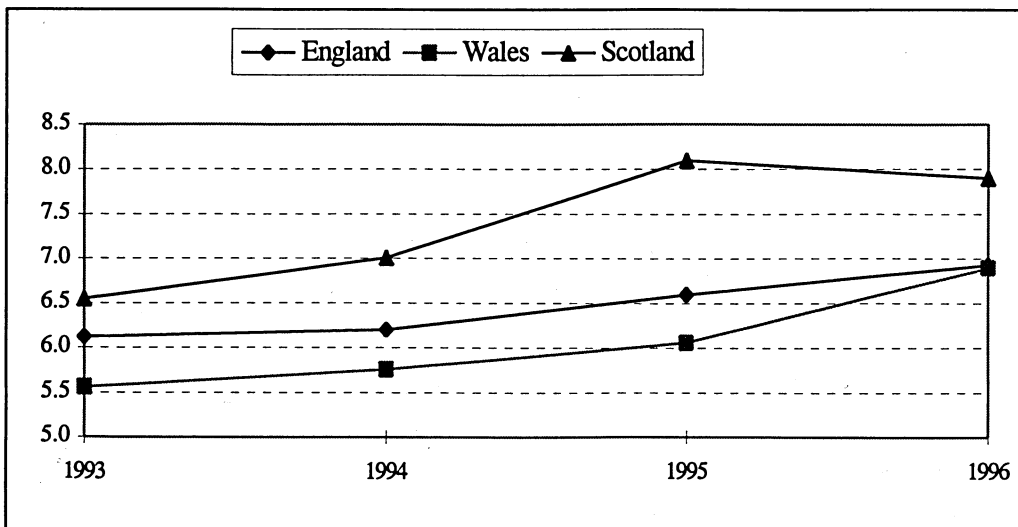
^a There was no distinction between LFAs and non-LFAs in Wales before 1994

Figure 2.6 Crop Yields by Country, 1993 to 1996

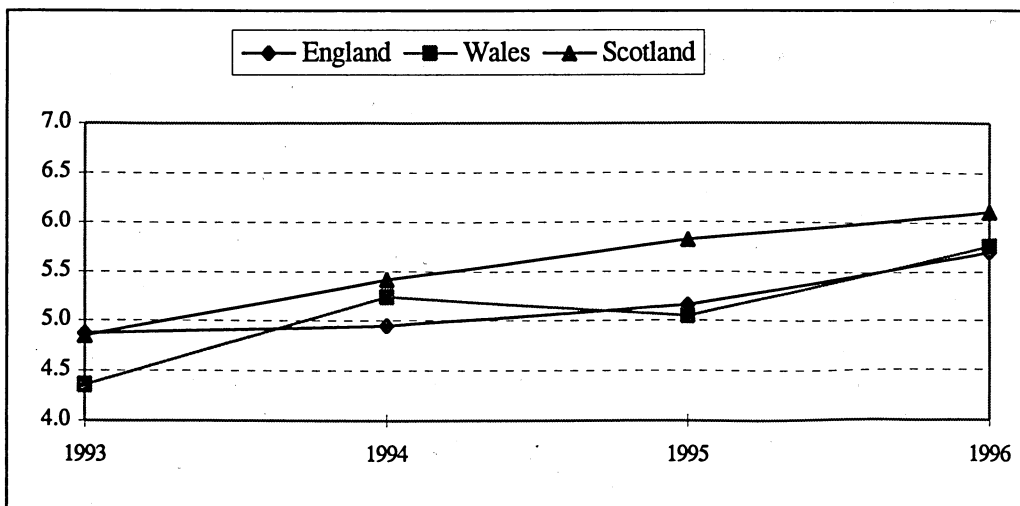
Winter Wheat



Winter Barley



Spring Barley



Average yields obtained from the survey farms have consistently been higher than those published by MAFF/HGCA for England and Wales, and Scotland. However, the 1996 data show less disparity between the two, particularly for winter barley in Scotland. Figure 2.6 shows the change in yield from the surveyed farms for winter wheat, and winter and spring barley by country over the period, 1993 to 1996. For both winter-sown crops Scotland's high yields of 1995 were not quite matched in 1996 but there were further increases in yields in both England and Wales.

2.3.1 Winter Wheat

Table 2.7 presents by country the financial data to gross margin level for winter wheat. For the first time in this series of surveys Wales achieved the highest gross margin for winter wheat followed by England and Scotland. However, only 13 farms in the Wales sample grew the crop whereas there were 277 observations for England; the low standard errors for the England results show the greater precision of the mean values obtained compared with those for Wales and Scotland.

The average yield for Wales was just higher than Scotland's, both at about 8.7 tonnes to the hectare, with England at 0.3 of a tonne per hectare lower. Table 2.6 highlights the differences in average farm size and area of cereals grown in the three countries in the survey. On average the farm size in Wales is smaller than in England and there are less facilities for storing grain. As a result over half of their wheat was sold soon after harvest when prices were relatively high, compared to the English farms which still had about half their grain left at the end of the year.

Table 2.6 Average Farm Size, Rotational Area and Cereal Area for England, Wales and Scotland, 1996 (survey sample)

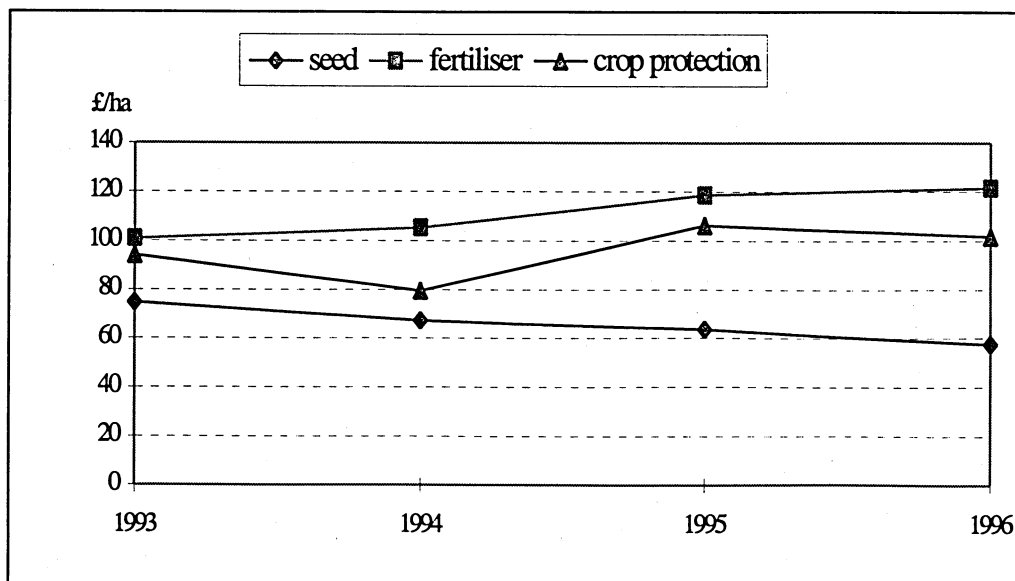
	Average farm size (ha)	Average rotational area (ha)	Average cereal area (ha)
England	236.52	197.65	121.81
Wales	132.67	78.48	40.40
Scotland	289.47	186.62	106.70

As noticed in previous surveys Scotland is a country where input costs are high. For 1996 their average variable production cost per tonne was over £38 compared with under £36 per tonne for England and Wales. All their variable costs were higher than in England and Wales except for crop protection and casual labour. Figure 2.7 shows that crop protection costs for England have been consistently higher than fertiliser costs, and also higher than crop

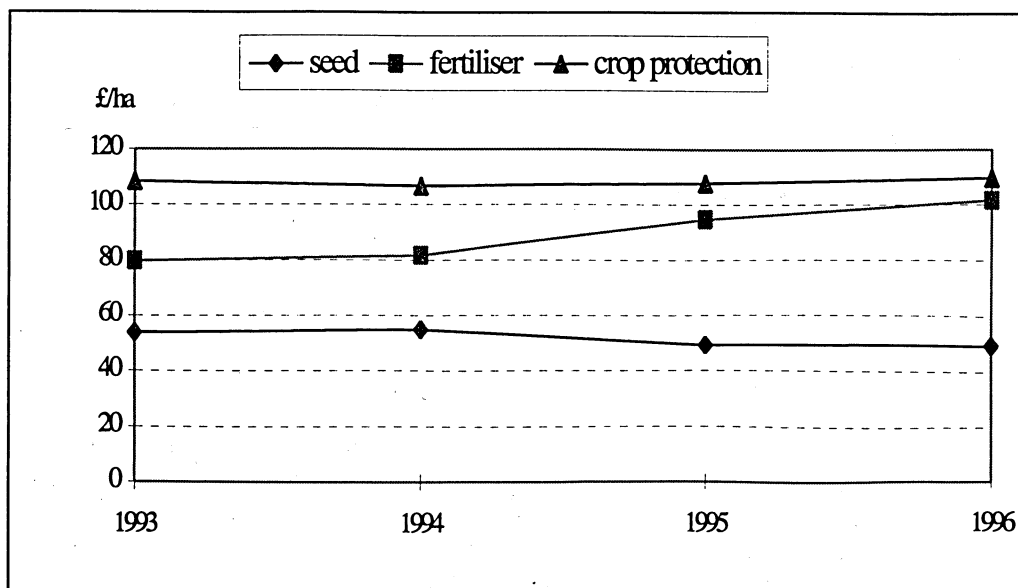
protection costs in Scotland throughout the period 1993 to 1996. In Scotland crop protection costs have been consistently below those for fertiliser. For both countries fertiliser costs showed a significant rise in real terms over the period while seed costs fell slightly overall. Total variable costs for Scotland exceeded those in Wales by £25 per hectare and in England by £37 per hectare.

Figure 2.7 Comparison of Material Costs for Winter Wheat for England and Scotland, 1993 to 1996, in terms of 1996 Purchasing Power

Scotland



England



The results for England are disaggregated in Appendix A where they are presented by EU Super Region: England North, England East and England West. The North region showed similarities to Scotland in high yields and high inputs. They produced a gross margin £41 per hectare higher than England East and £56 per hectare higher than England West. Weather played a large part during 1996; the wetter North produced higher yields whereas crops in England East were limited through lack of rain. The North and Scotland also have longer daylight hours, which boost yields, than other regions.

Table 2.7 Winter Wheat: Costs and Returns by Country, 1996 Harvest Year (weighted)

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	277		13		32	
Yield tonnes per ha	8.41	(0.67)	8.76	(3.92)	8.74	(2.46)
Price £ per tonne	102.52	(2.32)	104.96	(13.46)	103.28	(8.47)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	861.41	(6.76)	928.37	(40.89)	901.53	(24.99)
Output-straw	31.08	(1.16)	129.64	(13.41)	40.79	(5.09)
Arable area payment	263.46	(3.72)	170.88	(16.89)	245.31	(13.04)
Total output	1155.95	(7.80)	1228.89	(46.23)	1187.63	(28.65)
Material costs						
Seed	49.72	(1.60)	51.51	(9.28)	57.68	(6.18)
Fertiliser	101.63	(2.29)	99.44	(13.42)	121.56	(9.16)
Crop protection	109.68	(2.42)	112.63	(13.92)	101.68	(8.43)
Total	261.03	(3.70)	263.58	(21.45)	280.92	(13.90)
Margin over materials	894.92	(6.87)	965.31	(40.95)	906.71	(25.05)
Other variable costs						
Casual labour	2.26	(0.36)	5.44	(3.07)	1.75	(1.17)
Contract	23.57	(0.98)	31.51	(4.59)	31.01	(4.70)
Fuel for grain drying	4.43	(0.49)	3.05	(2.60)	10.42	(2.47)
Miscellaneous	8.75	(0.68)	8.10	(3.45)	12.95	(3.17)
Total	39.01	(1.33)	48.10	(7.01)	56.13	(6.30)
Total variable costs	300.04	(3.93)	311.68	(22.57)	337.05	(15.26)
Gross Margin	855.91	(6.74)	917.21	(40.35)	850.58	(24.24)

2.3.2 Winter Barley

The financial results for winter barley, by country, are presented in Table 2.8. Again the samples for Wales and Scotland are not large. Scotland has the highest yield and highest total output but this is offset by high variable costs, as in the case of winter wheat, giving England the highest gross margin. Wales has the lowest cost of production per tonne at this level, with

a yield similar to that in England but with low output and low costs because a greater proportion of winter barley in Wales is grown for feed.

Table 2.8 Winter Barley: Costs and Returns by Country, 1996 Harvest Year (weighted)

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	222		20		28	
Yield tonnes per ha	6.93	(0.49)	6.90	(2.21)	7.90	(2.19)
Price £ per tonne	105.23	(1.94)	96.71	(8.18)	101.51	(7.80)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	725.77	(5.09)	667.26	(21.71)	801.27	(21.91)
Output-straw	69.79	(1.52)	123.86	(8.85)	73.20	(6.56)
Arable area payment	259.00	(3.04)	199.21	(12.05)	238.33	(12.08)
Total output	1054.56	(6.12)	990.33	(26.36)	1112.80	(25.87)
Material costs						
Seed	50.13	(1.33)	47.43	(5.68)	64.90	(6.17)
Fertiliser	86.71	(1.75)	90.22	(7.84)	117.29	(8.39)
Crop protection	87.78	(1.77)	64.47	(6.68)	85.33	(7.20)
Total	224.62	(2.83)	202.12	(11.77)	267.52	(12.66)
Margin over materials	829.94	(5.43)	788.21	(23.58)	845.28	(22.55)
Other variable costs						
Casual labour	1.81	(0.26)	5.12	(1.93)	2.25	(1.06)
Contract	22.33	(0.84)	24.38	(2.89)	32.03	(3.66)
Fuel for grain drying	2.54	(0.30)	2.89	(1.56)	8.96	(2.54)
Miscellaneous	8.59	(0.54)	9.66	(2.37)	18.60	(3.41)
Total	35.27	(1.08)	42.05	(4.49)	61.84	(5.71)
Total variable costs	259.89	(3.03)	244.17	(12.59)	329.36	(13.89)
Gross Margin	794.67	(5.32)	746.16	(23.15)	783.44	(21.82)

The England results for winter barley by region, given in Appendix A, show a similar pattern to those for winter wheat. England North achieved the highest gross margin, despite high fertiliser and seed costs, with an average yield of 7.64 tonnes to the hectare, 0.83 tonnes/ha higher than England East and 1.08 tonnes/ha higher than England West. Again crop protection costs for this crop were lower in the North than in the East and West. Like Wales, England West is a livestock-intensive area and straw is seen to be of more importance.

2.3.3 Spring Barley

When comparing Table 2.9 with Table 2.8 the main differences for the spring-sown crop of barley are the lower yield obtained, the higher average price obtained because of the higher proportion grown for malting (with the exception of Wales) and lower variable costs. The combination of these differences in 1996 made spring barley less profitable at the gross margin level than winter barley for each country, although the actual variable costs per tonne for the two crops are similar, about £41 per tonne in Scotland, £38 in England and £35 in Wales.

Table 2.9 Spring Barley: Costs and Returns by Country, 1996 Harvest Year (weighted)

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	85		20		56	
Yield tonnes per ha	5.70	(0.61)	5.76	(1.74)	6.11	(1.25)
Price £ per tonne	114.82	(2.82)	96.81	(7.06)	117.80	(5.60)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	659.79	(6.71)	561.66	(17.04)	720.51	(13.87)
Output-straw	44.23	(1.45)	150.98	(8.90)	59.80	(3.62)
Arable area payment	251.20	(4.11)	208.74	(10.47)	232.00	(7.82)
Total output	955.22	(8.00)	921.38	(21.90)	1012.31	(16.33)
Material costs						
Seed	55.85	(1.92)	49.76	(5.02)	65.85	(4.09)
Fertiliser	68.26	(2.11)	68.41	(5.97)	80.52	(4.67)
Crop protection	57.28	(2.00)	46.67	(5.00)	41.95	(3.31)
Total	181.39	(3.49)	164.84	(9.27)	188.32	(7.03)
Margin over materials	773.83	(7.20)	756.54	(19.84)	823.99	(14.74)
Other variable costs						
Casual labour	0.37	(0.12)	4.23	(1.46)	2.08	(0.76)
Contract	21.28	(1.01)	15.74	(2.63)	31.24	(2.50)
Fuel for grain drying	2.89	(0.52)	1.69	(0.74)	3.74	(0.97)
Miscellaneous	7.62	(0.69)	11.61	(2.57)	20.11	(2.12)
Total	32.16	(1.33)	33.27	(4.02)	57.17	(3.51)
Total variable costs	213.55	(3.73)	198.11	(10.10)	245.49	(7.86)
Gross Margin	741.67	(7.08)	723.27	(19.43)	766.82	(14.31)

Scotland had the highest yield and price per tonne for spring barley which led to an average gross margin £25/ha higher than in England and £44/ha higher than in Wales. They also had

the highest variable costs (though not for crop protection) with the result that both England and Wales achieved lower variable costs per tonne. As observed with the winter varieties, straw was again more important in Wales at 16 per cent of the total output compared to five per cent of output in England and six per cent in Scotland. The much lower price per tonne obtained in Wales reflects the fact that most spring barley was grown for feed.

2.3.4 Combined Wheat and Barley Enterprises

When wheat and barley enterprises on each farm are combined and analysed by country, the different national ratios of wheat to barley grown affect the results considerably. They highlight the dominance of more profitable winter wheat in England and the greater proportion of spring barley, which produced the lowest gross margin, grown in Scotland.

Table 2.10 Combined Wheat and Barley Enterprises: Costs and Returns by Country, 1996 Harvest Year (weighted)

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	307		32		59	
Yield tonnes per ha	7.84	0.69	7.03	1.72	6.83	1.39
Price £ per tonne	103.21	2.51	99.39	6.32	110.85	5.56
Returns	£/ha		£/ha		£/ha	
Output-grain	808.05	7.09	705.82	17.43	755.07	14.77
Output-straw	44.98	1.44	148.12	7.01	56.80	3.77
Arable area payment	259.80	3.98	184.39	8.71	231.65	8.1
Total output	1112.83	8.25	1038.33	20.71	1043.52	17.26
Material costs	246.54	3.89	203.68	9.31	215.00	7.89
Margin over materials	866.29	7.28	834.65	18.49	828.52	15.35
Total variable costs	286.23	4.13	245.60	9.98	270.94	8.76
Gross Margin	826.6	7.15	792.73	18.14	772.58	14.87
Production cost: £ per tonne	36.51		34.94		39.67	

Table 2.10 shows that England achieved the highest average yield and Scotland the highest average price per tonne (the result of the large proportion of malting barley grown). Although England have the highest variable costs, the gross margin is £54 per hectare above Scotland and £34 above Wales. Bearing in mind the growing patterns shown previously in Figure 2.2, it is clear that despite lower input costs for barley, the premia obtained for growing malting

varieties do not compensate for the greater yields obtained from winter wheat. Although the proportion of barley to wheat grown in Wales is more similar to that in Scotland than England, the price per tonne indicates that in Wales most is grown for feed. Together with a higher output for straw and lower average area payment, the results for Wales again indicate the high importance of livestock in the region.

From a study of the yields and major components in real terms of the gross margin over a period of three years (Table 2.11), it may be seen that lower prices in 1996 have reduced output for all three countries. Scotland, the only country with a fall in yield as well, has shown the steepest decline in average gross margin in 1996 to a level below the equivalent in 1994. The total variable costs rose for Wales and Scotland from 1994 to 1995 but have fallen for both countries in 1996. England's variable costs fell slightly from 1994 to 1995 but have risen in 1996.

Over the three years the individual proportions of wheat and barley of the total wheat and barley area grown in England on the survey farms, have been within a percentage point at around 68 per cent for wheat and 32 per cent for barley. Similarly for Wales they have been consistent at about 23 per cent for wheat and 77 per cent for barley. Scotland shows broadly similar proportions to Wales, but there has been a steady decrease of five percentage points for wheat area over the period (25% in 1994 to 20% in 1996) with a corresponding increase for barley (75% in 1994 to 80% in 1996).

Table 2.11 Combined Wheat and Barley Enterprises: Yields and Gross Margin Components by Country, 1994 to 1996 (weighted), in Terms of 1996 Purchasing Power

	1994	1995	1996
England			
Yield	6.88	7.32	7.84
Total output	1039.55	1225.20	1112.83
Total variable costs	267.18	265.08	286.23
Gross Margin	772.37	960.12	826.60
Wales			
Yield	5.77	6.62	7.03
Total output	884.83	1182.22	1038.33
Total variable costs	258.01	273.48	245.60
Gross Margin	626.82	908.74	792.73
Scotland			
Yield	6.26	7.39	6.83
Total output	1048.02	1269.22	1043.52
Total variable costs	252.18	291.88	270.94
Gross Margin	795.83	977.34	772.58

Chapter 3: Costs and Returns of Wheat and Barley Production, by Size of Enterprise and Dispersion of Gross Margin

3.1 Introduction

The relationship between size and efficiency has been of continuing interest to policy makers over a number of years. While a uniform increase in performance as size of enterprise increases has not been observed in recent years for cereals, analysis has shown that, in general, larger units (ie those over 80ha) are more efficient. This chapter investigates this issue by looking at wheat and barley crops individually in the cereal-intensive and cereal-extensive counties of England. It also looks at the wide ranges of profitability, that are concealed by merely quoting averages, by comparing costs and returns for survey farms in the top 25 per cent with those in the bottom 25 per cent, when ranked by margin over materials. For comparisons of performance, as opposed to the presentation of aggregate results, results have not been weighted.

3.2 Comparison by Size of Cereal Enterprise

The last chapter highlighted the different regional patterns of wheat and barley production. To allow for these differences when looking at the effects of size of enterprise, the data have been disaggregated into cereal-intensive and cereal-extensive areas of England by county. In this context cereal-intensive counties are counties in which cereals account for more than 40 per cent of the crops grown (see Appendix B for lists of counties in each group). Previous reports have commented on the different mix of cereals in the size groups and the predominance of more profitable winter wheat in the larger groups. Table 3.1 highlights that although this is undoubtedly true for the cereal-extensive counties there is not so much difference for the farms in the cereal-intensive region.

Table 3.1 Proportions of Wheat and Barley in Enterprises in Cereal-Intensive and Cereal-Extensive Counties, by Size Group

	Area of cereals + set-aside				
	<40ha	40- <80ha	80- <120ha	120- <200ha	200+ ha
percentage of cereal in size group					
Cereal-intensive counties					
Winter wheat	70	72	76	74	77
Winter barley	23	24	20	21	18
Spring barley	7	4	4	5	5
Cereal-extensive counties					
Winter wheat	32	62	72	73	75
Winter barley	44	35	22	23	19
Spring barley	24	3	6	4	6

To look at possible contributing factors, other than the crop mix, results are grouped by area of cereals plus set-aside into five groups and analysed by crop type. The financial data are presented in Tables 3.2 and 3.3.

3.2.1 Cereal-Intensive Counties

The results for wheat show no significant difference overall in total output between the size groups. However, there was a significant difference in the returns for grain between the group of largest units and the two groups containing the smallest units. This is due to the largest units obtaining a significantly higher price for their grain, and to yields which showed a steady increase as size increased (although the differences were not statistically significant). Inputs showed no clear relation with size of enterprise; the group of largest units had the highest fertiliser and crop protection costs, and the lowest material costs were found in the middle size group. The only clear effect of size is apparent in the cost of contract charges (the major component of other variable costs) where, not surprisingly, the smaller enterprises make more use of contractors..

The results for barley show a similar pattern to wheat as far as yield and output are concerned. Again the largest units had the highest fertiliser and crop protection costs, though the lowest costs were found in the group of smallest units. As with wheat size appears to be inversely related to the costs of contract labour and also to a lesser degree to the returns for straw. Both contract costs and returns from straw decrease as the enterprise size increases, although in the case of straw the relationship is not statistically significant.

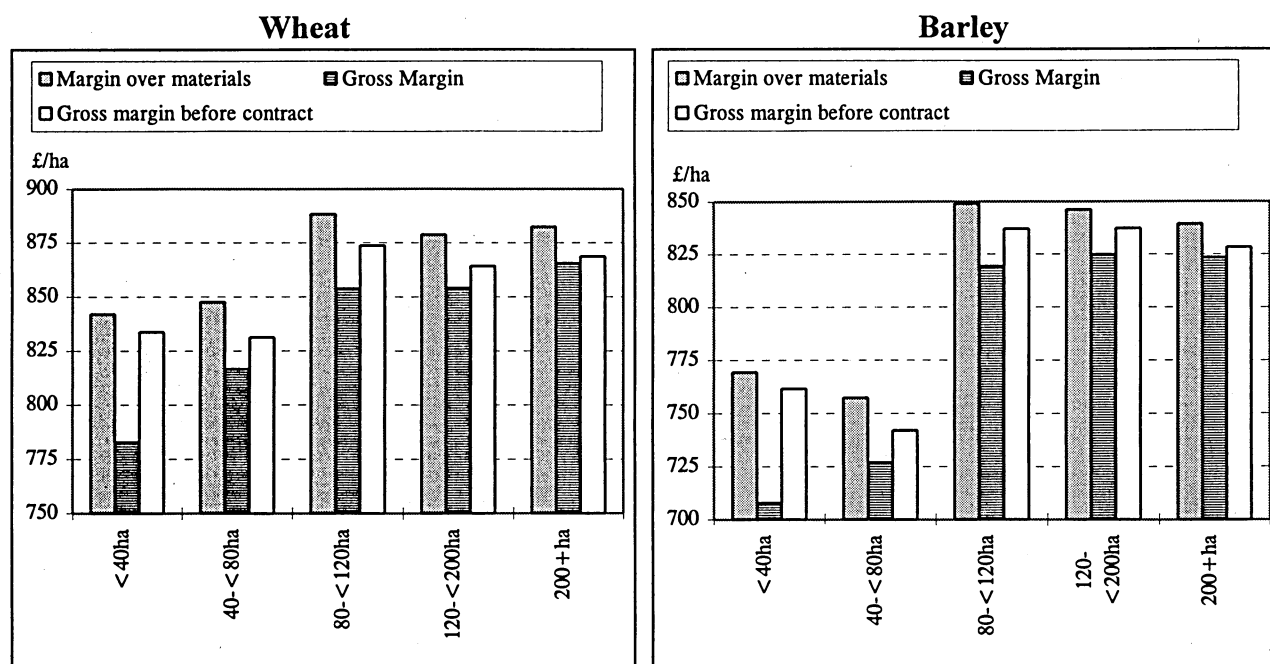
Although a consistent effect of size does not emerge from the analysis at the gross margin level, Figure 3.1 indicates that there is a difference between farms below 80 hectares and those above for wheat and particularly barley, when margin over materials and gross margins, before and after contract costs, are used as measures of efficiency. This confirms the findings of previous surveys for example in 1985 and 1993. By looking at the crops individually it can be seen that the two lower size groups perform less well for both crops.

The differences between the gross margins before and after contract costs highlight the decrease in the use of contractors as enterprises increase in size. Because of the effect of contract costs at the gross margin level, taking only the gross margin as a measure of efficiency can be misleading, particularly for the two smaller size groups.

Table 3.2 Costs and returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-Aside, 1996 Harvest Year, Cereal-Intensive Counties of England

Group	Area of cereals + set-aside					Statistically significant differences at the 10% level
	<40ha	40- <80ha	80- <120ha	120- <200ha	200+ ha	
	1	2	3	4	5	
WHEAT						
No. observations	17	34	25	35	45	
Yield tonnes per ha	7.94	8.18	8.31	8.20	8.36	
Price £ per tonne	101.67	100.89	103.49	102.45	105.49	5 > 214
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	809.72	824.59	858.81	839.46	879.72	5 > 12
Output-straw	17.36	22.03	13.69	24.54	12.86	4 > 5
Arable area payment	266.51	264.12	264.80	265.16	260.51	
Total output	1093.59	1110.74	1137.30	1129.16	1153.09	
Material costs						
Seed	49.12	52.25	50.38	47.67	49.74	2 > 4
Fertiliser	97.43	97.63	96.61	93.29	105.82	5 > 4
Crop protection	105.08	113.31	102.06	109.43	115.14	5 > 3
Total	251.63	263.19	249.05	250.38	270.69	5 > 34
Other variable costs	59.10	30.87	34.43	24.73	16.97	1 > 423 123 > 5
Total variable costs	310.73	294.06	283.48	275.11	287.66	1 > 4
Margin over materials	841.96	847.55	888.25	878.78	882.40	
Gross Margin	782.86	816.68	853.81	854.05	865.43	54 > 1
Gross margin before contract	833.70	831.19	873.65	864.11	868.68	
Variable costs £/tonne	39.75	36.92	34.85	33.79	34.85	1 > 453
BARLEY						
No. observations	10	28	16	25	34	
Yield tonnes per ha	6.51	6.56	6.85	6.89	6.89	
Price £ per tonne	98.77	100.37	108.16	106.17	112.37	5 > 12 3 > 2
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	639.98	654.06	735.82	731.51	767.85	5 > 12 34 > 2
Output-straw	68.36	54.94	58.52	51.74	43.21	
Arable area payment	237.24	253.87	266.84	262.57	257.75	3 > 1
Total output	945.58	962.88	1061.17	1045.82	1068.82	53 > 12 4 > 2
Material costs						
Seed	53.53	49.81	52.02	47.40	48.84	
Fertiliser	58.22	75.50	75.71	74.07	87.69	5 > 1423 324 > 1
Crop protection	64.28	80.13	84.40	78.19	92.95	5 > 1423 3 > 1
Total	176.04	205.44	212.12	199.66	229.47	5 > 142 32 > 1
Other variable costs	61.74	30.44	29.72	21.35	15.78	1 > 5432 2 > 5
Total variable costs	237.77	235.88	241.85	221.00	245.26	
Margin over materials	769.55	757.43	849.05	846.17	839.35	543 > 2
Gross Margin	707.81	727.00	819.33	824.82	823.56	453 > 12
Gross margin before contract	761.65	741.92	837.00	837.27	828.35	435 > 2
Variable costs £/tonne	40.39	39.08	36.68	32.28	36.51	2 > 4

Figure 3.1 Comparisons of Margins for Wheat and Barley Enterprises, Cereal-Intensive Area of England



3.2.2 Cereal-Extensive Counties

Table 3.3 compares wheat and barley costs and returns for groups of units of differing total area in the cereal-extensive counties. This shows the same steady increase in yield for wheat, as size increases, that was noticeable in the results for the cereal-intensive counties but again there are rarely significant differences between adjacent size groups that would indicate a consistent relation between size and efficiency. There is a significant difference between the three largest-size groups and the smallest-size group for yield and also for total output. The largest-size group has the lowest fertiliser cost but the highest crop protection cost. Overall there is only a difference of £19 per hectare between the highest and lowest material costs across all groups.

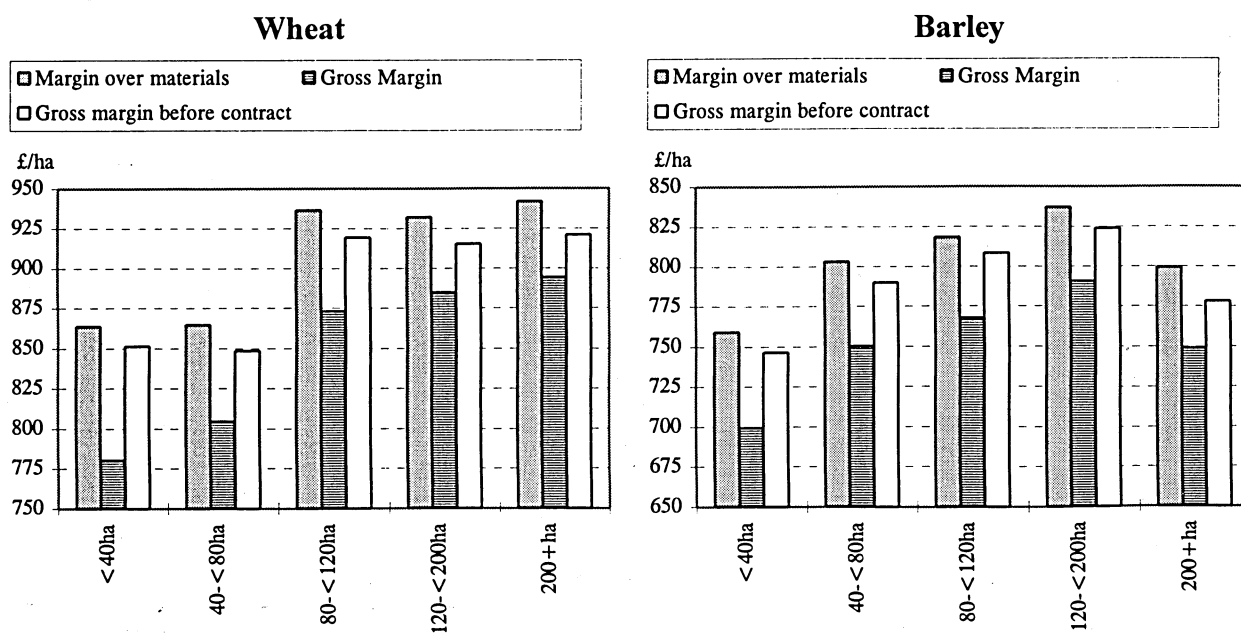
Table 3.3 Costs and Returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-Aside, 1996 Harvest Year, Cereal-Extensive Counties of England

Group	Area of cereals + set-aside					Statistically significant differences at the 10% level
	<40ha	40- <80ha	80- <120ha	120- <200ha	200+ ha	
	1	2	3	4	5	
WHEAT						
No. observations	23	26	19	36	18	
Yield tonnes per ha	7.67	8.11	8.29	8.81	8.92	543 > 1 54 > 2
Price £ per tonne	99.57	99.47	104.92	101.51	100.00	3 > 215
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	763.72	807.59	870.63	892.85	891.50	453 > 1 45 > 2
Output-straw	101.29	55.82	58.80	40.44	37.39	1 > 5423 3 > 54
Arable area payment	247.05	265.10	261.69	265.68	266.86	5423 > 1
Total output	1112.07	1128.51	1191.11	1198.97	1195.76	453 > 1 4 > 2
Material costs						
Seed	53.46	53.33	50.91	48.66	48.33	
Fertiliser	100.73	101.54	105.31	112.22	93.55	4 > 512 3 > 5
Crop protection	93.99	108.91	98.35	105.99	111.85	5 > 1
Total	248.19	263.78	254.57	266.87	253.74	
Other variable costs	83.70	60.22	63.52	47.31	47.72	1 > 45
Total variable costs	331.88	324.01	318.08	314.19	301.46	
Margin over materials	863.88	864.73	936.55	932.10	942.02	534 > 12
Gross Margin	780.18	804.51	873.03	884.78	894.30	543 > 1 54 > 2
Gross margin before contract	851.42	848.68	919.42	915.29	921.04	534 > 2 54 > 1
Variable costs £/tonne	43.87	40.58	38.77	36.22	34.36	12 > 5 1 > 4
BARLEY						
No. observations	36	23	16	31	16	
Yield tonnes per ha	6.19	6.84	7.06	7.07	6.47	
Price £ per tonne	95.25	99.90	98.26	105.64	108.72	54 > 132
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	588.66	683.05	694.62	742.19	698.83	4532 > 1 4 > 2
Output-straw	136.91	91.93	82.09	73.12	52.46	1 > 5432
Arable area payment	224.61	263.96	263.39	262.51	263.51	2534 > 1
Total output	950.17	1038.94	1040.10	1077.82	1014.80	432 > 1
Material costs						
Seed	53.39	51.59	49.18	59.94	49.22	
Fertiliser	78.62	90.05	88.42	94.65	77.68	42 > 51
Crop protection	58.87	94.24	84.08	86.06	88.52	2543 > 1
Total	190.87	235.88	221.69	240.64	215.42	4235 > 1 4 > 5
Other variable costs	59.95	52.70	50.48	46.58	50.37	
Total variable costs	250.82	288.59	272.16	287.22	265.79	24 > 1
Margin over materials	759.30	803.06	818.41	837.18	799.38	4 > 1
Gross Margin	699.35	750.36	767.93	790.60	749.01	4 > 1
Gross margin before contract	746.65	789.93	808.25	824.04	778.20	4 > 1
Variable costs £/tonne	41.50	42.49	39.19	41.29	42.60	

The results for barley show a somewhat different pattern. The group of larger units show an average yield that is lower than all the other groups with the exception of the group of smallest units but the significantly higher price obtained means that the average return for grain is the second highest. Overall total output for the three groups of larger units is significantly higher than for the group of smallest units. Material costs for the smallest-size group are significantly below those in the other groups.

Figure 3.2 compares different margins by size group. Wheat shows the same leap in efficiency over 80 hectares observed in Figure 3.1. This is not apparent for barley where all the margins show a steady improvement (although not a significant one) as the groups increase in size until the largest-size group which falls to the level of the second group. The fall in performance for the largest-size group is mainly due to the lower yield obtained. For both wheat and barley there is again a clear effect of a decrease in the cost of contracting as enterprises get larger.

Figure 3.2 Comparisons of Margins for Wheat and Barley Enterprises, Cereal-Extensive Area of England, by Size of Cereal Unit

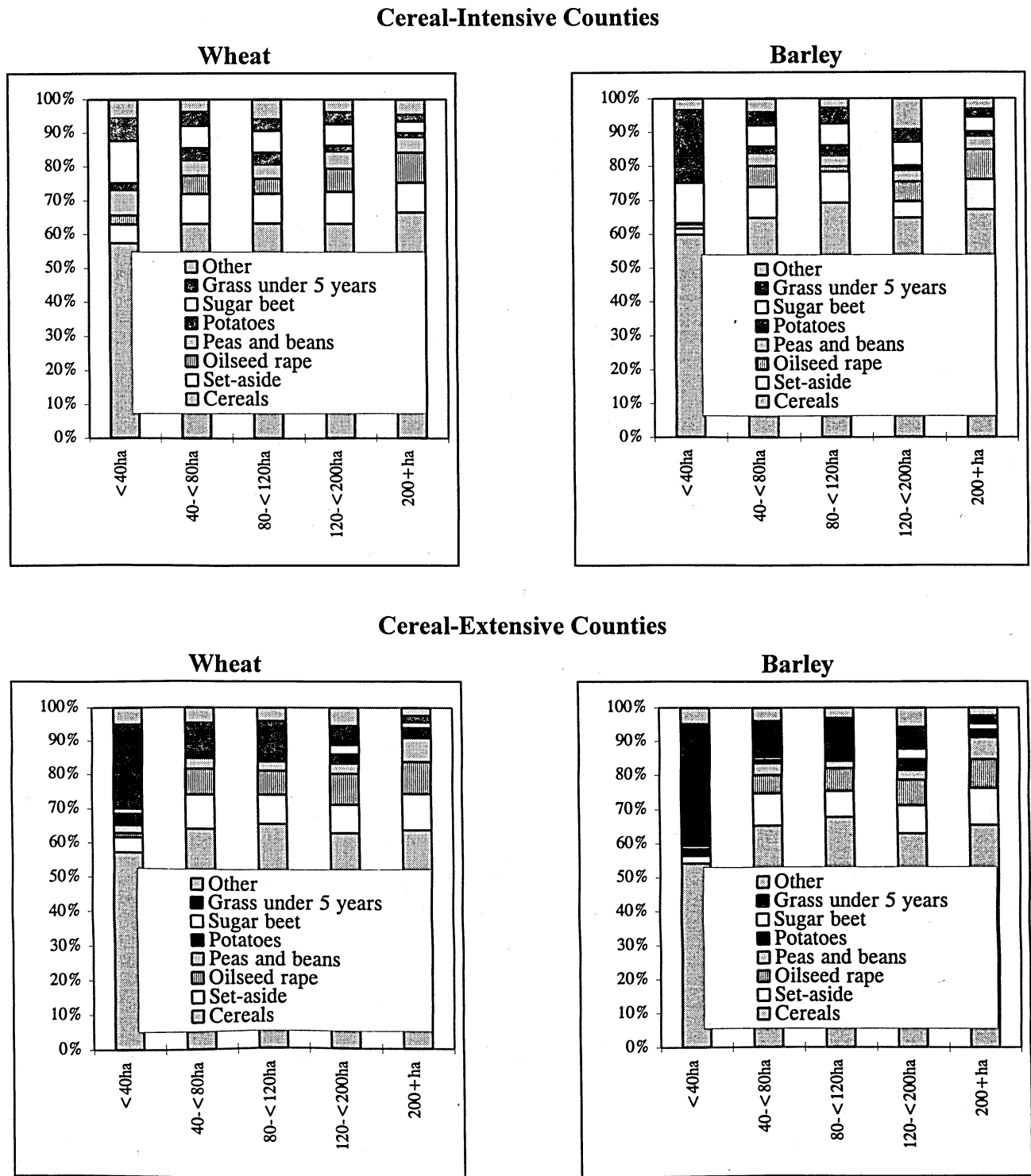


3.2.3 Composition of Rotational Area

Further analysis to investigate the effect of differences in the degree of specialisation in cereals by size groups was carried out for intensive and extensive regions. Figure 3.3 shows the average composition of farms by size group. A noticeable change in composition between the smallest-size groups and the rest can be observed, with less specialisation in cereals on farms with cereal plus set-aside areas of less than 40 hectares. For these farms the average proportion of cereals plus set-aside is between 56 and 63 per cent of the rotational area, whereas in all the other size groups it is over 70 per cent. In the cereal-intensive counties on farms with small cereal units there are high proportions of root crops (sugar beet and potatoes). In the cereal-extensive counties on farms with

small cereal units, there are high proportions of land in rotational grass, reflecting the importance of livestock in these counties. In the second groups (enterprises between 40 and 80 hectares) farms are more similar in composition to the larger groups in their region, yet in most cases their margins were on a par with the smallest groups. It would appear that other factors, not within the scope of this survey, must play a part in the relationship between size and efficiency.

Figure 3.3 Average Composition of Rotational Area by Cereal + Set-Aside Size Group



3.3 Dispersion in Gross Margin

Previous analyses by region and size have shown that units of cereals plus set-aside areas over 80 hectares perform better at the gross margin level than smaller units but beyond this little insight has been gained into the reasons for differences in profitability. To investigate influences other than size a simple comparison of the top 25 per cent of farms, ranked by margin over materials, was made with the lower 25 per cent. The margin over materials was used as the ranking measure to be consistent with similar analyses done in previous reports and to avoid the effect of contract costs (the major component in the other variable costs) which have already been shown to be significantly higher on smaller farms. The results show considerable differences in margins and are given in Tables 3.4, 3.5 and 3.6 for winter wheat, winter barley and spring barley.

Table 3.4 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Wheat, 1996 Harvest Year

	Upper 25%		Lower 25%		significant differences at the 10% level
		s.e.		s.e.	
Group	1		2		
No. farms	80		80		
Crop area	93.31		68.59		1>2
Yield tonnes per ha	9.60	(0.10)	7.16	(0.10)	1>2
Price £ per tonne	105.05	(0.79)	97.96	(0.94)	1>2
Returns	£/ha		£/ha		
Output-grain	1006.53	(10.49)	698.83	(10.19)	1>2
Output-straw	54.14	(6.23)	30.80	(4.39)	1>2
Arable area payment	258.49	(2.69)	257.18	(3.74)	-
Total output	1319.16	(8.39)	986.82	(9.56)	1>2
Material costs					
Seed	50.46	(1.35)	53.93	(1.35)	2>1
Fertiliser	100.36	(3.00)	105.53	(3.22)	-
Crop protection	102.32	(3.49)	108.78	(4.13)	-
Total	253.14	(5.01)	268.24	(5.44)	2>1
Margin over materials	1066.01	(6.66)	718.58	(7.21)	1>2
Other variable costs					
Casual labour	2.43	(0.77)	1.76	(0.54)	-
Contract	26.48	(5.36)	37.49	(6.23)	-
Fuel for grain drying	6.75	(0.77)	3.91	(0.94)	1>2
Miscellaneous	10.61	(0.81)	7.37	(0.65)	1>2
Total	46.27	(5.80)	50.52	(6.32)	-
Total variable costs	299.41	(7.25)	318.75	(9.53)	2>1
Gross Margin	1019.75	(9.35)	668.06	(9.12)	1>2

Table 3.5 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Barley, 1996 Harvest Year

	Upper 25%		Lower 25%		significant differences at the 10% level
		s.e.		s.e.	
Group	1		2		
No. farms	67		67		
Crop area	36.29	(4.12)	28.83	(3.19)	
Yield tonnes per ha	8.03	(0.13)	5.82	(0.12)	1>2
Price £ per tonne	111.64	(2.02)	97.37	(1.07)	1>2
Returns	£/ha		£/ha		
Output-grain	885.38	(12.81)	564.70	(12.10)	1>2
Output-straw	108.43	(12.66)	64.60	(6.72)	1>2
Arable area payment	260.30	(1.35)	228.10	(9.59)	1>2
Total output	1254.11	(12.19)	857.40	(12.78)	1>2
Material costs					
Seed	52.69	(1.80)	57.50	(5.52)	-
Fertiliser	90.18	(2.94)	87.41	(2.89)	-
Crop protection	83.33	(2.95)	83.18	(4.34)	-
Total	226.20	(5.21)	228.09	(7.52)	-
Margin over materials	1027.91	(10.53)	629.31	(9.82)	1>2
Other variable costs					
Casual labour	1.52	(0.67)	3.04	(0.82)	-
Contract	14.63	(3.40)	43.71	(8.24)	2>1
Fuel for grain drying	3.18	(0.53)	1.90	(0.52)	-
Miscellaneous	10.73	(0.97)	7.55	(0.70)	-
Total	30.06	(3.75)	56.20	(8.65)	2>1
Total variable costs	256.26	(6.20)	284.29	(12.17)	2>1
Gross Margin	997.85	(11.44)	573.11	(13.56)	1>2

The significantly higher average area for all three cereals in the upper quartile group indicates that, although the margin does not increase consistently with size, the most profitable units are on average larger than the least profitable. Further investigation shows that material costs show little difference for all three crops; it does not appear that growers apply a higher level of inputs to produce high yields. Other factors were examined such as seed varieties grown, rate of drilling, the use of contractors and the use of independent consultants but no significant difference was apparent between the top and bottom quartiles for any of these. It is simply the variation in yield, in combination with the price received, that separates the most profitable enterprises from the least profitable. Other factors that play a large part in yield such as timing of drilling, soil type and climate are beyond the scope of this survey. Looking at production costs per tonne, at the gross

margin level, there is a difference of £13 per tonne for winter wheat, £17 per tonne for winter barley and £14 per tonne for spring barley between the upper and lower quartile groups.

Table 3.6 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Spring Barley, 1996 Harvest Year

Group	Upper 25%		Lower 25%		significant differences at the 10% level
		s.e.		s.e.	
Group	1		2		
No. farms	40		40		
Crop area	47.36	(7.92)	18.23	(3.45)	1>2
Yield tonnes per ha	6.90	(0.14)	4.75	(0.16)	1>2
Price £ per tonne	129.25	(3.00)	96.55	(1.37)	1>2
Returns	£/ha		£/ha		
Output-grain	890.47	(25.81)	457.76	(16.59)	1>2
Output-straw	70.33	(10.39)	64.78	(6.91)	-
Arable area payment	251.88	(2.69)	209.89	(14.03)	1>2
Total output	1212.67	(22.46)	732.43	(17.74)	1>2
Material costs					
Seed	60.34	(1.84)	60.90	(3.15)	-
Fertiliser	77.49	(4.39)	65.29	(2.73)	1>2
Crop protection	52.27	(4.21)	49.19	(3.29)	-
Total	190.10	(6.08)	175.38	(5.83)	1>2
Margin over materials	1022.57	(20.89)	557.05	(16.13)	1>2
Other variable costs					
Casual labour	1.40	(0.92)	0.72	(0.41)	-
Contract	25.83	(7.76)	39.24	(9.41)	-
Fuel for grain drying	2.72	(0.63)	2.49	(0.89)	-
Miscellaneous	14.06	(4.19)	7.70	(1.29)	-
Total	44.01	(8.72)	50.14	(9.83)	-
Total variable costs	234.11	(10.59)	225.52	(12.84)	-
Gross Margin	978.56	(20.08)	506.90	(17.92)	1>2

Chapter 4: Materials: Costs and Use

4.1 Introduction

In Chapter 2, Tables 2.2 to 2.4 show significantly higher total material costs, in real terms, for 1996 over the previous two years. For winter wheat it is the difference in fertiliser costs that is significant, for winter barley crop protection costs are significantly higher, and for spring barley, both seed and fertiliser costs show a significant increase. This chapter disaggregates the survey data to investigate the costs and usage of materials in more detail for the three main cereals.

4.2 Seed

4.2.1 Varieties

Figure 4.1 indicates the most popular seed varieties sown on survey farms. For winter wheat the use of Riband, although it remains the most popular variety, decreased further to 28 per cent. Brigadier and Hunter continued an upward trend in area drilled. Consort appeared in the top varieties for the first time. Of the winter wheat area surveyed, 75 per cent was sown to only five varieties, although 38 varieties were recorded in total. The National Association of British and Irish Millers (NABIM) classify varieties into four groups according to breadmaking potential. The disappearance of Mercia (a NABIM group 1 variety) from the top varieties and the appearance of Consort (group 3) reflects a national trend of a decrease in popularity of group 1 and 2 varieties. As observed in the 1995 report (op cit) the price premium for growing these lower yielding breadmaking varieties has become less attractive over time. Also, with new technology, it is possible for millers to use varieties with less breadmaking potential in blends.

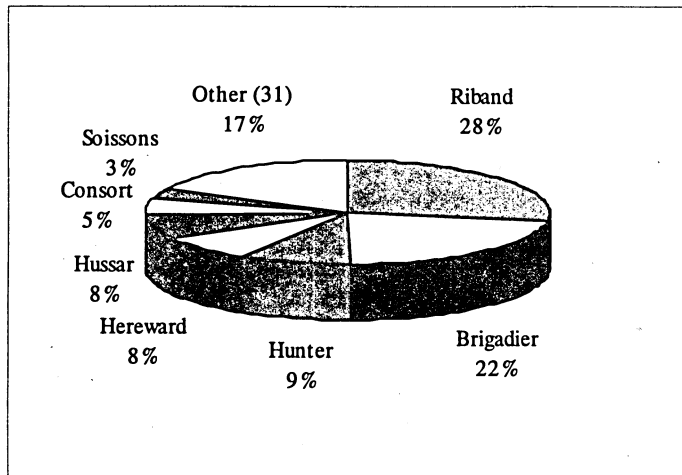
Four varieties out of 40 recorded accounted for 72 per cent of the winter barley area sown. The most popular varieties in 1995, Fighter and Pastoral, retain their position but are in decline. Intro shows an increase of four percentage points in popularity from the previous year. The most favoured malting varieties (as approved by the Institute of Brewers) were Puffin, Halcyon and Pipkin, the same as in 1995.

The most popular varieties of malting spring barley, Chariot, Derkado, Alexis and Prisma were all in decline but still accounted for 57 per cent of the spring barley area. Cooper appeared in the most popular varieties for the first time. In all 26 varieties were recorded, with over a quarter (27 per cent) of the spring barley area sown to 20 different varieties.

For all three crops the most popular varieties were less dominant than recorded in previous surveys. Farmers appear to be less conservative in trying alternative varieties. Minority varieties, defined as those which each took up under five per cent of the total area, occupied about 20 per cent of the total area of wheat and barley, compared to nearly 10 per cent in 1995.

Figure 4.1 Top Seed Varieties, Winter Wheat, Winter Barley and Spring Barley, 1996 Harvest Year

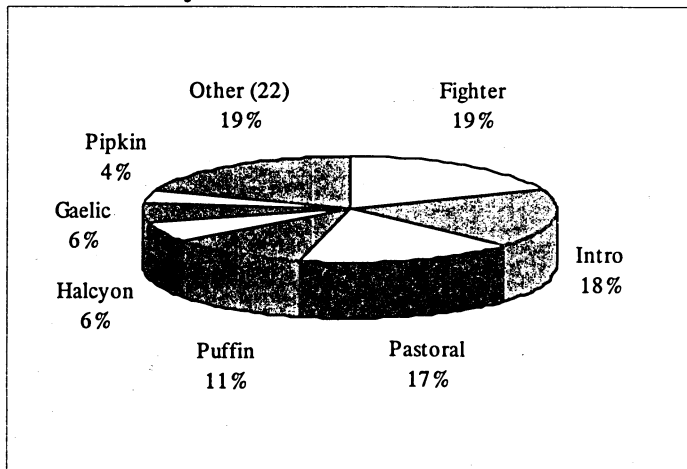
Winter wheat



NABIM Classification
(for varieties shown)

Variety	Group
Hereward	1
Soissons	2
Consort	3
Riband	3
Brigadier	4
Hunter	4
Hussar	4

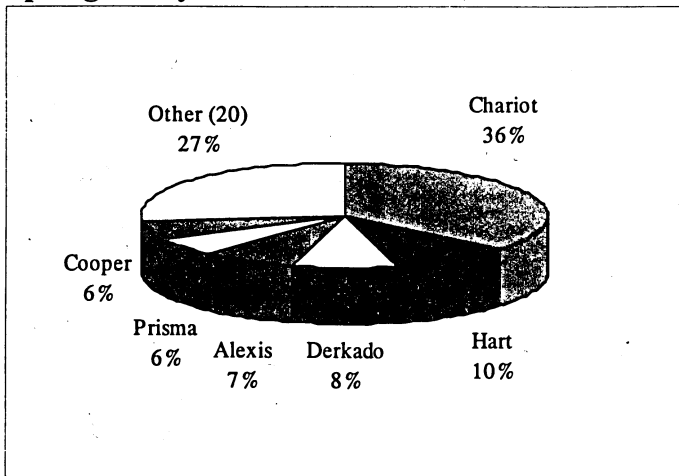
Winter barley



IOB Recommended
(for varieties shown)

- Halcyon
- Pipkin
- Puffin

Spring barley



IOB Recommended
(for varieties shown)

- Alexis
- Chariot
- Derkado
- Prisma

4.2.2 A Comparison of Physical Data and Costs by Enterprise Size for Winter Wheat Seed

Table 4.1 shows that there is little variation between the different unit size groups in the seed rate applied in or in the cost per tonne of seed. The two largest-size groups use significantly more saved seed and although this results in slightly lower seed costs they are not significantly different. Surprisingly the smallest-size group, with the highest proportion of purchased seed, has comparable seed costs to the three largest-size groups.

Table 4.1 A Comparison of Physical Data and Costs by Enterprise Size for Winter Wheat Seed, Cereal-Intensive Counties

	Area of cereals + set-aside					Statistically significant differences at the 10% level
	<40ha	40- <80ha	80- <120ha	120- <200ha	200+ ha	
Group no.	1	2	3	4	5	
No. of farms	17	34	25	35	45	
Seed rate applied (kg/ha)	188.31	190.47	192.28	186.78	192.12	none
Cost seed per tonne (£/tonne)	260.71	274.70	263.19	255.10	261.12	none
Percentage of purchased seed	88.23	85.02	86.16	68.30	70.56	132 > 45

4.3 Fertiliser

The rise in price, observed in 1995, continued, mainly due to increased world demand coupled with lower manufacturing capacity. The lower set-aside rate in 1996 and the high prices obtained in 1995 prompted more cereal plantings and therefore an increased fertiliser demand. The financial data reported in Chapter 2 showed a steady annual increase in the cost per hectare for fertiliser, in real terms, since 1993 although fertiliser costs are still only about one third of the total variable costs. The rate of fertiliser application, however, has decreased from 1995 to 1996. Fertiliser use is mostly dependent on the type of crop grown and the soil structure, but is also affected by the weather and environmental issues and, of course, market prices.

4.3.1 Fertiliser Use by Crop and Country

Table 4.2 gives the rates of application for winter wheat, winter barley and spring barley for Great Britain, for total fertiliser and the individual elements of nitrogen, phosphate and potash. It then compares the differences in application between Scotland and England and Wales. The Table shows rates of use in Scotland that are consistently above those in the rest of Great Britain. This can be attributed to the wetter climate in Scotland and the predominance of higher yielding varieties of cereals, necessitating higher fertiliser use.

Table 4.2 Fertiliser Use by Crop and Country, 1996 Harvest Year

	Winter wheat	Winter barley	Spring barley
Great Britain			
No. observations	322	270	161
Fertiliser applied	kg/ha	kg/ha	kg/ha
Nitrogen	184	138	94
Phosphate	60	59	46
Potash	64	67	54
England and Wales			
No. observations	290	242	105
Fertiliser applied	kg/ha	kg/ha	kg/ha
Nitrogen	182	133	91
Phosphate	57	56	39
Potash	62	65	48
Scotland			
No. observations	32	28	56
Fertiliser applied	kg/ha	kg/ha	kg/ha
Nitrogen	204	180	100
Phosphate	81	79	60
Potash	88	81	64

The British Survey of Fertiliser Practice, carried out by Edinburgh University, reported that for the 1996 harvest nitrogen rates had fallen while phosphate and potash remained at similar levels. Results from the cereal survey broadly agreed with the BSFP data for England and Wales for nitrogen, but showed higher levels for phosphate and potash particularly for the winter-sown crops (Table 4.3). For Scotland cereal survey data were consistently higher, particularly for winter barley.

Table 4.3 Percentage Differences between Data from the Wheat and Barley Gross Margin Study and the British Survey of Fertiliser Use

	Winter wheat	Winter barley	Spring barley
England and Wales			
Nitrogen	+2	+4	+4
Phosphate	-16	-10	-5
Potash	-22	-10	+4
Scotland			
Nitrogen	-7	-11	-8
Phosphate	-9	-16	-7
Potash	-2	-14	-3

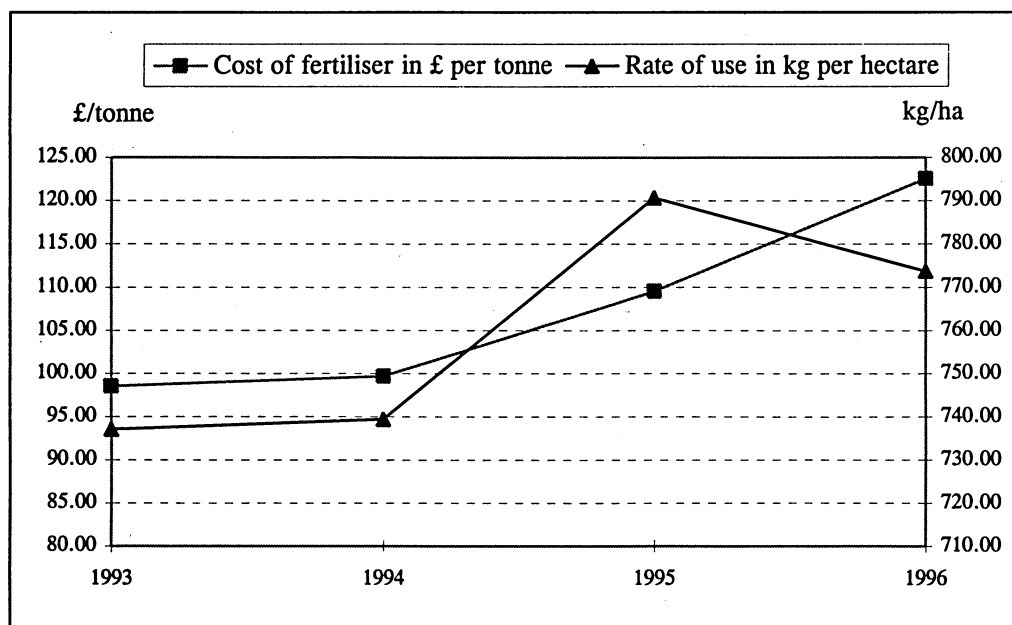
4.3.2 Cereal-Intensive Counties

Nearly 60 per cent of winter wheat on the farms surveyed in Great Britain was produced in the cereal-intensive counties in England. Table 4.4 and Figure 4.2 show that over the four years of the surveys, fertiliser cost per tonne has risen by 24 per cent overall (12 per cent between 1995 and 1996) for farms in these counties. Overall the rate of use has increased by less than five per cent (37 kg per hectare) in the four years since 1993.

Table 4.4 Fertiliser Costs and Rates of Application for Winter Wheat, Cereal-Intensive Counties, 1993, 1994, 1995 and 1996 Harvest Years

	1993	1994	1995	1996
Cost of fertiliser in £ per hectare	72.74	74.39	84.50	93.27
Cost of fertiliser in £ per tonne	98.56	99.72	109.54	122.57
Rate of use in kg per hectare	737	740	791	774

Figure 4.2 Fertiliser Cost and Rate of Application for Winter Wheat, Cereal-Intensive Counties, 1993, 1994, 1995 and 1996 Harvest Years



An analysis by enterprise size group (cereals plus set-aside) was also carried out for farms in the cereal-intensive region. Table 4.5 compares the results with those in 1995. It highlights that for both years the group of larger-size units used significantly more fertiliser but paid significantly less for it than the other groups. Nitrogen use clearly decreased in 1996 in the groups where the area of cereals plus set-aside was above 40ha, with the exception of the second largest-size group. Although the largest-size group again used the highest levels of phosphate and potash these were lower than the previous year, whereas phosphate and potash use increased for all the other groups. Lower nitrogen use might be attributed to the high profile of nitrates from farmland allegedly leeching into the water system but is also likely to be the result of good growing conditions in 1996. A similar decrease was not noticeable for phosphates and potash.

As reported above, from 1995 to 1996 nitrogen use decreased for three of the size groups, and was at a similar level for the other two, but the application of phosphate and potash increased in all groups except the largest. It is interesting to note that, because of this, the reduction in the overall rate of fertiliser use in 1996 was only apparent in the largest-size group (which contains 30 per cent of the survey farms); the second and fourth groups showed little change; and the first and third groups showed an increase in use.

Table 4.5 Comparison of Fertiliser Costs and Rates of Application for Winter Wheat, Cereal-Intensive Counties, 1995 and 1996 Harvest Years, by Size Group

	Area of cereals + set-aside										Statistically significant differences at the 10% level
	<40ha		40-80ha		80-120ha		120-200ha		200+ha		
	1995	1996	1995	1996	1995	1996	1995	1996	1995	1996	
Group no.		1		2		3		4		5	
No. of farms	18	17	29	34	26	25	37	35	47	45	
Yield (tonnes per hectare)	7.31	7.94	7.97	8.18	7.84	8.31	8.18	8.20	8.21	8.36	1 < 5342
Fertiliser applied	kg/ha		kg/ha		kg/ha		kg/ha		kg/ha		
Nitrogen	175	176	195	186	197	182	190	189	214	207	5 > 142
Phosphate	42	47	41	51	53	61	52	53	70	67	5 > 1243
Potash	45	54	46	53	44	49	34	42	74	59	5 > 432
Cost fertiliser per tonne	£/tonne		£/tonne		£/tonne		£/tonne		£/tonne		
	117	124	113	124	111	125	111	125	103	118	5 < 1234
Cost fertiliser per hectare	£/ha		£/ha		£/ha		£/ha		£/ha		
	82.41	97.43	89.21	97.63	85.98	96.61	84.78	93.29	95.14	105.82	5 > 4

4.4 Crop Protection

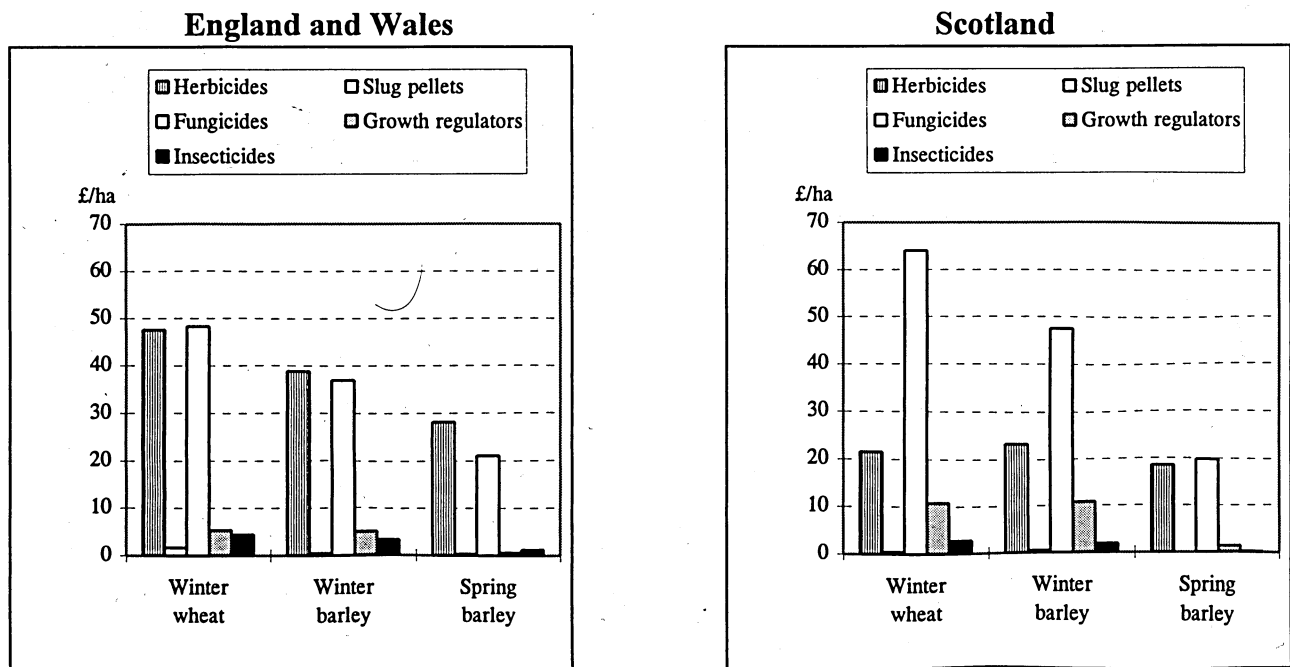
The survey collected financial information about herbicides, slug pellets, fungicides, growth regulators and insecticides. Because of the diversity of types of crop protection materials used, comparison by physical use is beyond the scope of this survey (although an attempt to isolate change in use for winter wheat is made later on) but the costs per hectare in Table 4.6 give an idea of the relative importance of the various categories of crop protection materials by country and crop.

Figure 4.3 highlights the greater importance of herbicide costs in England and Wales compared to Scotland, and the greater importance of fungicide and growth regulator costs on winter-sown crops in Scotland compared to England and Wales. In England and Wales herbicides and fungicides are of similar proportions and insecticides more widely used. The low cost of slug pellets indicates that slugs were not very troublesome in 1996. The variations between England and Wales and Scotland reflect differences in the incidence of weed and disease problems, as well as differences in climate and variety grown.

Table 4.6 Crop Protection Costs per Hectare for Winter Wheat, Winter Barley and Spring Barley, by Country

	Winter wheat	Winter barley	Spring barley
England and Wales			
No. observations	290	242	105
Crop protection applied	£/ha	£/ha	£/ha
Herbicides	47.59	38.85	28.12
Slug pellets	1.71	0.50	0.34
Fungicides	48.29	36.97	21.10
Growth regulators	5.36	5.04	0.61
Insecticides	4.45	3.32	1.23
Scotland			
No. observations	32	28	56
Crop protection applied	£/ha	£/ha	£/ha
Herbicides	21.56	23.33	18.50
Slug pellets	0.49	0.50	0.00
Fungicides	64.02	47.53	19.80
Growth regulators	10.78	10.71	1.27
Insecticides	2.82	1.87	0.16

Figure 4.3 Composition of Crop Protection for England and Wales and Scotland



As with fertilisers, a comparison by size group for winter wheat in the cereal-intensive counties of England was carried out for crop protection materials. However, no significant differences emerged between the groups for any of the crop protection categories.

Table 4.7 takes the costs per hectare for herbicides, fungicides and insecticides from the survey data for the years 1985, 1993 and 1996 and indexes them (1985=100). By using the MAFF Agricultural Price Indices the index of the price of individual crop protection costs for winter wheat was obtained (1985=100) to show the changes in price. From the index of cost per hectare and the index of price an index of use was calculated by division.

Table 4.7 Indices of Plant Protection Cost per Hectare, Prices and Useage for Winter Wheat, Great Britain, 1985, 1993 and 1996 Harvest Years (1985=100)

	1985	1993	1996
Index of cost per hectare			
Herbicides	100	78	93
Fungicides	100	108	120
Insecticides	100	123	77
Index of price *			
Herbicides	100	150	172
Fungicides	100	154	145
Insecticides	100	152	166
Index of use			
Herbicides	100	52	54
Fungicides	100	70	82
Insecticides	100	81	46

* Source: MAFF Agricultural Price Indices

Although the change in use indicated cannot be regarded as precise it does suggest variations in the use of three of the main groups of crop protection materials that have taken place over this period. A decline in use for herbicides, fungicides and insecticides occurred after 1985, insecticides continued to decline between 1993 and 1996 but herbicides and fungicides use showed an increase (although not back to the 1985 levels).

4.5 Effect of Degree of Specialisation on Materials Use for Winter Wheat

For the purpose of this analysis, the degree of specialisation of cereal production was assessed by the proportion of cereals plus set-aside in the total crops and grass area of a farm. Four groups (below 50 per cent, 50 to 65 per cent, 65 to 80 per cent, and above 80 per cent) were compared for winter wheat in the cereal-intensive counties and the results presented in Table 4.8. The Table highlights the fact that in general the most specialist producers are to be found on smaller farms with an average sized winter wheat enterprise. This group had a significantly higher seed rate, high

costs for crop protection but the lowest rate of fertiliser use, and produced the highest average yield and margin over materials of all the groups. The majority of larger winter wheat enterprises, usually on the largest farms, appeared in the second more-specialised group and performed at a similar level. Surprisingly the two groups of more-specialised farms achieved higher average yields and margins over materials with lower proportions of the more profitable winter wheat in their wheat and barley mix.

Table 4.8 Materials Use for Winter Wheat, by Specialisation of Production, Cereal-Intensive Counties of England, 1996 Harvest Year

	Proportion of cereals + set-aside in crops + grass area				Statistically significant differences at the 10% level
	50% -		65% -		
	< 50%	< 65%	< 80%	80%+	
Group no.	1	2	3	4	
No. of farms	24	48	57	32	
Proportion of winter wheat	83%	81%	72%	76%	
Winter wheat area (hectares)	63.12	104.10	134.02	93.95	3 > 14
Total farm area (hectares)	250.59	265.21	308.46	186.18	3 > 4
Yield (tonnes per hectare)	7.48	7.88	8.21	8.26	none
Percentage of purchased seed	70%	77%	78%	83%	none
Seed rate applied (kg per hectare)	178.45	189.83	189.80	198.94	4 > 231 23 > 1
Fertiliser applied (kg per hectare)	615.26	628.75	618.48	611.68	none
	£/ha	£/ha	£/ha	£/ha	
Cost crop protection per hectare	97.90	102.52	112.97	112.99	432 > 1 43 > 2
Margin over materials	800.54	832.63	865.04	867.66	none

It would seem that 1996 was a more profitable year for the specialist cereal growers at the gross margin level. However, previous surveys have identified significant savings in fixed costs, particularly in the level of overhead labour, for farms that employ a more extensive rotation. The next full cereal survey, planned for 1998, will be able to look at these issues more completely.

Chapter 5: Marketing and Disposal of Grain and Straw

5.1 Introduction

The high world prices which made the 1995/96 marketing year so profitable for UK cereal farmers were not repeated in 1996/97. The price of grain fell dramatically, to well below intervention levels, with dire consequences for some growers. Those who sold their grain at harvest, while prices were still in a transitional period, managed to achieve some respectable returns but, as prices continued to fall, others faced the dilemma of whether to hold on to their grain in the hope of a price revival. As a result less milling quality wheat and malting barley was sold by June 1997 than in the previous two years, and a larger amount of feed grain (both wheat and barley) was retained on farms where there were livestock.

Wheat growers may respond to the current economic situation by growing more quality varieties which have the possibility of attracting milling premia. Rank Hovis¹ estimate that there is the potential for UK mills to use about one third of the UK wheat crop but that short supply means that more than half a million tonnes a year of mainly group 2 varieties are imported. The Plant Breeding Institute² support this view promoting many new wheat varieties as having as good yield potential but greater marketing flexibility than traditional feed varieties.

5.2 Disposal by Quality

The survey data were again disaggregated to show the disposal of grain, detailed in Table 5.1. Nearly two thirds of the winter wheat was sold for feed (61%) and about one fifth (22%) for milling. Although the proportion of grain for milling was similar to the previous year, less was sold for feed and seed. At six per cent the fraction retained on farm for feed was double that in 1995/96. For the purposes of analysing the survey data, the marketing year effectively ends at the end of May. Any grain still on-farm is classed as unsold and a value estimated for it in consultation with the farmer. Nearly one third more grain was unsold at June 1997, than in the previous year.

For winter barley, the proportions used for feed and seed were similar to those in 1995 but less grain went for malting. About 73 per cent of the grain was used for feed; 47 per cent was sold for feed and 26 per cent kept for feeding on-farm. The proportion of grain unsold at June was higher than in the 1995 harvest year but only by one percentage point.

Spring barley shows a different pattern of marketing with 40 per cent sold as malting quality, and only slightly more (48%) used for feed (18% sold and 30% kept on-farm). Only one per cent was unsold at June 1997 which was similar to the previous year as was the proportion sold for seed.

¹ Cargill's Fourth Annual Arable Conference, Blandford Forum, Dorset, February 1997

² PBI Seed Trade Meeting, Coventry, 1997

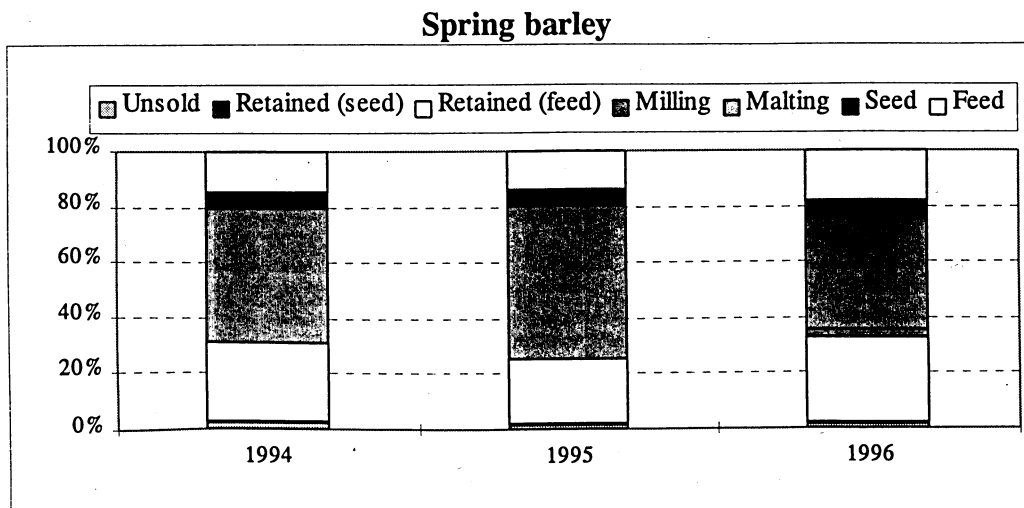
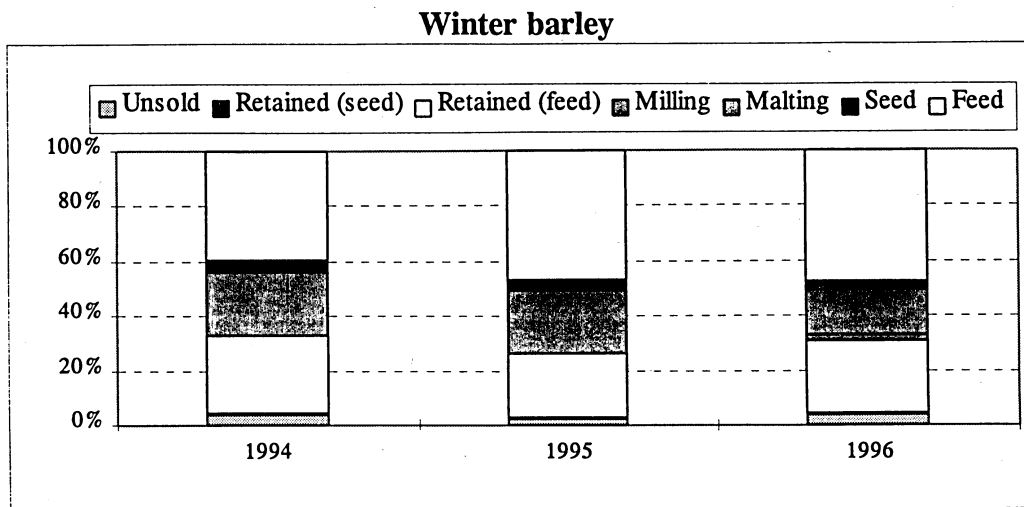
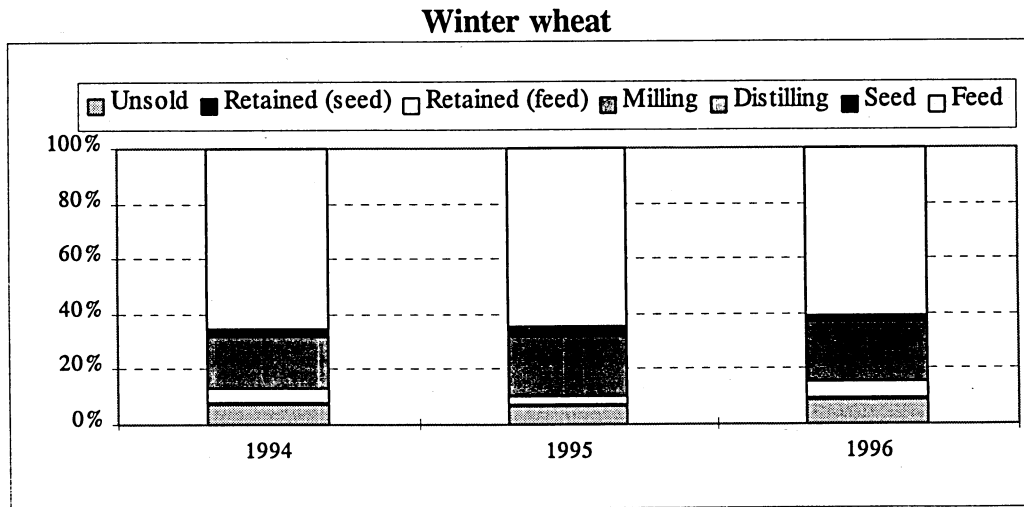
Table 5.1 Disposal of Grain by Quality, Proportion and Price, 1996 Harvest Year, Weighted

	Winter wheat		Winter Barley		Spring Barley	
	per cent	£/tonne	per cent	£/tonne	per cent	£/tonne
Milling	21.5	110.33	2.2	94.71	3.2	112.99
Malting	0.6	98.57	17.1	126.25	39.6	126.66
Seed	1.7	113.96	3.0	118.19	6.5	133.21
Feed	60.9	100.64	47.4	97.67	18.4	95.15
Total sales	84.7	103.06	69.8	105.07	67.7	117.06
	per cent	valuation £/tonne	per cent	valuation £/tonne	per cent	valuation £/tonne
Unsold at 31.5.96	8.5	95.07	3.4	92.27	1.5	96.37
Proportion retained for						
seed	0.7	103.48	0.8	111.90	0.4	122.18
feed	6.2	97.26	26.1	94.83	30.4	94.58
Total retentions	6.9	100.18	26.9	98.14	30.8	100.30

5.2.1 Comparison of Grain Disposal between 1994, 1995 and 1996 Harvest Years

Figure 5.1 shows the pattern of grain disposal in 1996 compared with the previous two years. For winter wheat the pattern of 1994 and 1995 did not continue. From the 1996 harvest less grain was sold, and more was unsold or retained for feed. The proportion sold for milling remained fairly constant. Of winter barley the proportion sold for feed continued to increase but there was a substantial decrease in the proportion of malting quality grain sold. A larger proportion of winter barley was unsold at June 1997. Spring barley also showed a fall in the proportion for malting and a higher fraction retained on the farm for feed, rather than unsold. The fall in the proportions of barleys sold for malting mainly reflects the fact that, nationally, less of the area was planted to these varieties in 1996 (Table 5.3).

Figure 5.1 Comparison of the Proportions of Grain Disposal, 1994, 1995 and 1996 Harvest Years



5.3 Disposal by Price

In Table 5.2 the average price received per farm is examined. The average (already shown in Table 5.1) is given followed by the maximum and minimum in each case indicating the wide variation between prices received by individual farms. As prices at the ends of the ranges often come from only a small number of readings, and sometimes for small volumes, the upper and lower five per cent of all prices have been excluded and the adjusted ranges are given in parentheses. This has not been possible for seed crops because of the small number of readings, but for other types of production the revised ranges are much narrower.

Table 5.2 Range of Prices for Grain Sales, 1996 Harvest Year, Weighted

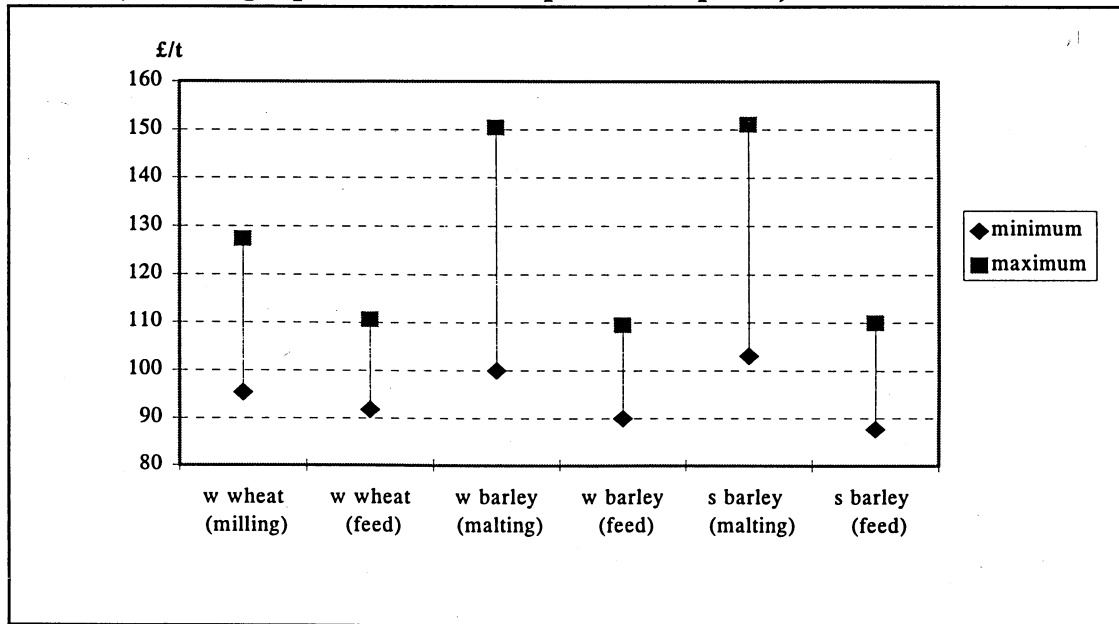
	Weighted average £/tonne	Minimum £/tonne (1)	Maximum £/tonne (1)
Winter wheat			
Milling	110.33	90.22 (95.37)	164.00 (127.33)
Seed	113.96	92.58	129.05
Feed	100.64	30.00 (91.82)	127.02 (110.62)
Winter barley			
Malting	126.25	98.61 (100.01)	160.00 (150.40)
Seed	118.19	106.49	137.03
Feed	97.67	79.84 (90.00)	121.27 (109.50)
Spring barley			
Malting	126.66	91.36 (103.05)	157.00 (151.04)
Seed	133.21	69.67	207.74
Feed	95.15	78.72 (87.67)	111.83 (109.93)

(1) prices in parenthesis have the top and bottom five per cent excluded

As reported in other years, there is again considerable overlap between the bottom end of the range for milling wheat and the upper end of the range for feed wheat. In fact the average feed wheat price is well above the minimum for milling wheat. However, the premium for milling wheat, which has consistently fallen since 1993, was 10 per cent over feed wheat, an increase of one percentage point from the previous year.

For both winter and spring barley the overlap between the price ranges for different qualities was not so great. There is a larger price differential between malting and feed barley which has steadily increased over the last decade. Sales for the 1996 harvest show a continued increase in the malting premium to an average of 29 per cent for winter barley and 33 per cent for spring barley. Figure 5.2 highlights the overlap in price ranges between milling and feed wheat, and malting and feed barley. It also shows the similarity in price range for wheat and barley sold for feed.

Figure 5.2 Comparison of Price Ranges by Quality of Grain for Wheat and Barley, 1996 Harvest Year (excluding top and bottom five per cent of prices)



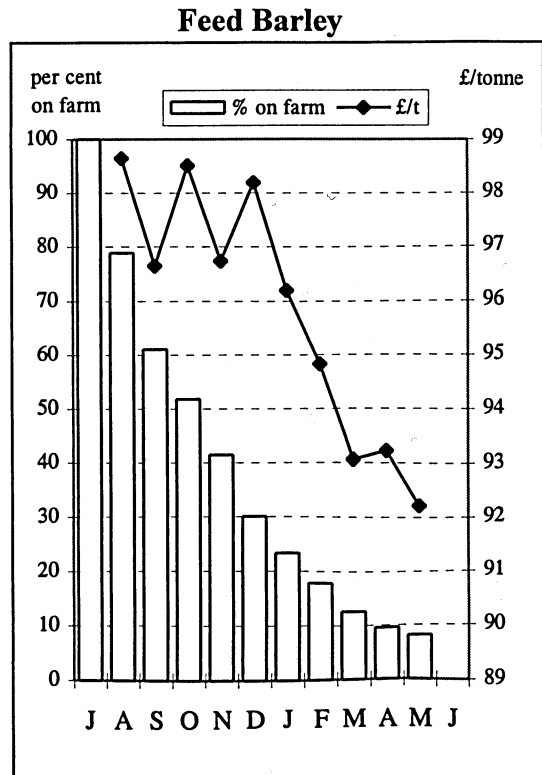
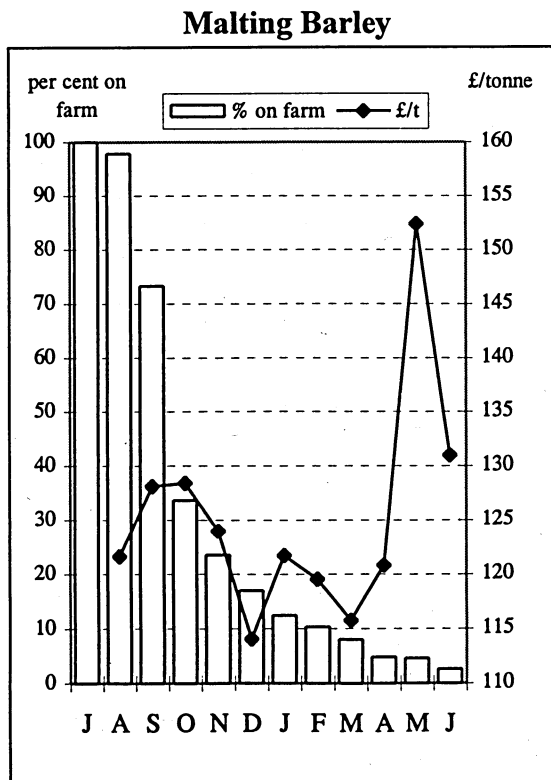
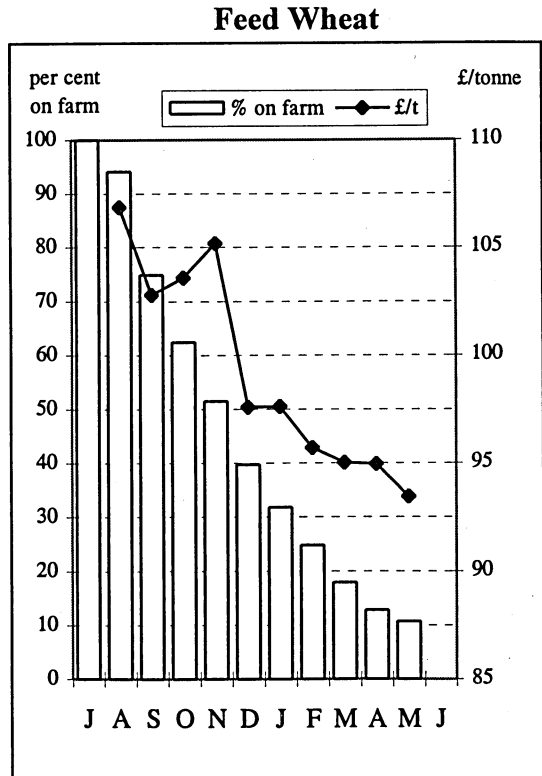
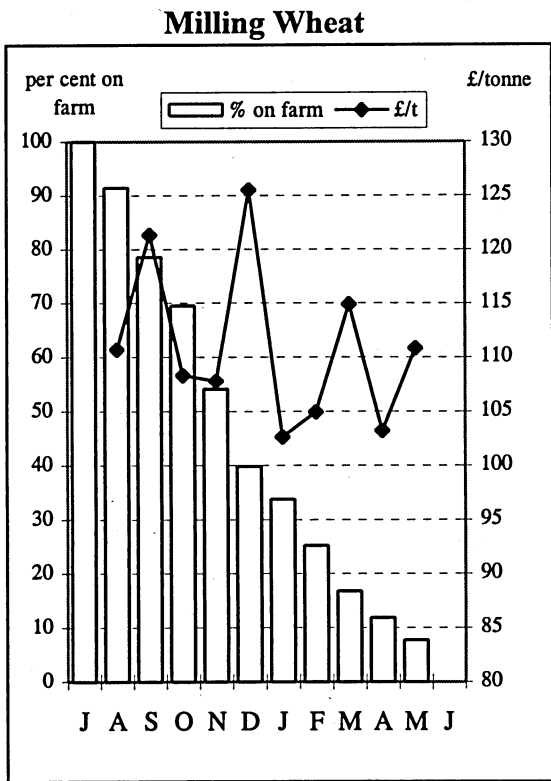
5.4 Disposal by Month

It has been shown in Table 5.2 that average prices quoted conceal quite wide ranges. They also conceal monthly fluctuations which can be quite considerable. Figure 5.3 shows the monthly fluctuations in price along with the average proportion of grain still on the farm as the season progressed. The prices from the survey data are prices negotiated at time of sale and also include grain sold forward. Thus they cannot be directly related to spot market prices as they do not solely consist of the spot price for the month of delivery.

It has been the norm in recent years for wheat prices to increase as the season progresses, and anecdotal evidence suggests that more than a few growers held on to their grain, for at least some of the season, with this expectation. Figure 5.3 shows that this seasonal rise in price did not happen, particularly for feed wheat which, apart from a brief rise in October and November, maintained a steady decline in price from an August high. In 1995 over 10 per cent of feed wheat was sold at harvest; in 1996 only five per cent had left the farm by the end of August. For milling wheat there were a few small price fluctuations; prices rose in November to a high of just over £120 per tonne in December; over 30 per cent of the grain left the farm between October and January.

Malting barley showed a similar pattern of sale to the previous year with about 70 per cent of the grain having left the farm by October. The price showed very little variation, around £120 per tonne, until May when it increased to a high of £150 per tonne. The price for feed barley followed a similar pattern to that for feed wheat; a few small fluctuations during the autumn of 1996 were followed by a steady decline in price. Less feed barley left the farm at harvest than in 1995, but by the end of 1996 only about 30 per cent of feed barley was left on farm, a similar situation to the previous year.

Figure 5.3 Monthly Proportion of Grain Remaining on Farm with Monthly Average Prices³

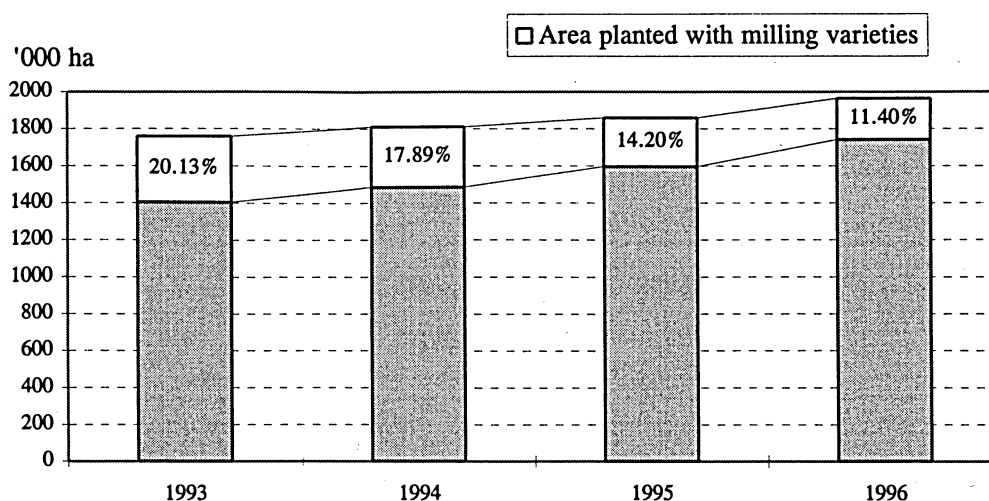


³ Prices are survey prices (ie they include forward prices)

5.5 Specialisation of Production

This section looks at cereal enterprises which specialise in the production of milling or malting varieties. As will be seen wheat and barley are different in this respect. As the area of set-aside has decreased since its introduction in 1993, the area planted to wheat has increased. However, the proportion planted with varieties likely to attract a milling premium has declined. This is for two reasons: the continual erosion of the milling premium that has not made it worthwhile to incur the lower yields and extra costs of growing top quality milling wheats; secondly new technology has enabled millers to use large quantities of lower quality wheat in their grists. Figure 5.4 highlights the change in planted areas in the UK.

Figure 5.4 Total UK Area of Wheat Planted, with the Proportion Planted with Milling Varieties, 1993 to 1996



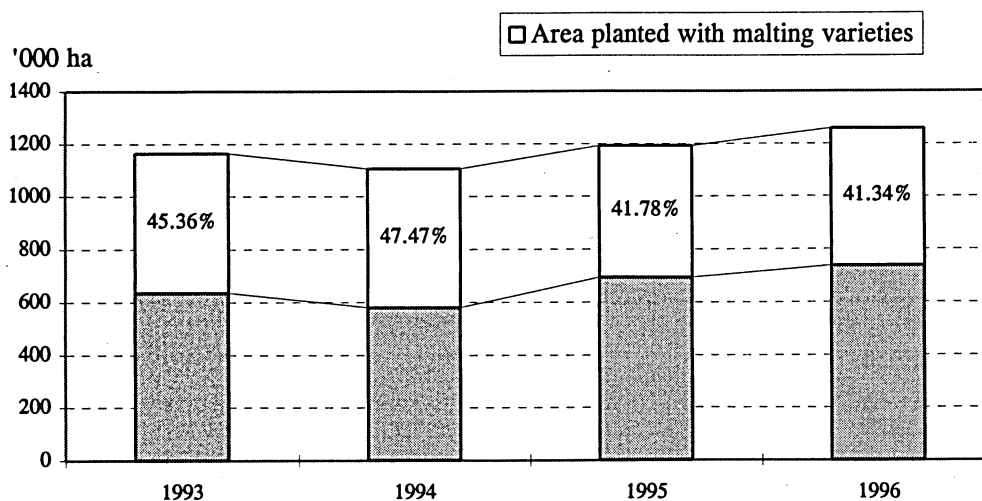
Source: Home Grown Cereals Authority; MAFF

The survey data followed the national trend. In past reports on cereal production, comparisons have been carried out between those growing 100 per cent of their crop for milling and those growing 100 per cent for feed. With the decline in area planted to milling varieties, it is no longer possible to get a robust sample from the survey of farms producing 100 per cent of their grain for milling from the survey.

The situation for barley is different. Figure 5.5 shows an overall increase in UK barley area since 1993. This has not resulted in an increased planting of malting varieties; the area planted to varieties recommended by the IOB has remained fairly constant. However, like specialist-producing wheat growers, the number of specialist malting barley growers, defined as those growing 100 per cent malting barley, declines each year. For winter barley it is still possible to compare costs and returns between those growing 100 per cent malting barley and those with 100 per cent feed barley and Table 5.3 presents the results. Despite the higher yield obtained from feed varieties, the premium obtained for malting grain (an average of about £26 per tonne) more than

offset this. Total output from winter barley for malting (which includes straw returns and area payment) is £88 per hectare higher. When the lower material costs for malting production are also taken into account, there is a difference in gross margin of £106 per hectare. Production costs at the gross margin level are similar for both groups: £35.93 per tonne for winter barley for malting and £35.15 for winter barley for feed.

Figure 5.5 Total UK Area of Barley Planted, with the Proportion Planted with Malting Varieties, 1993 to 1996



Source: Home Grown Cereals Authority; MAFF

In the 1995 report (op cit) specialisation on milling wheat, and winter and spring barley for malting was examined in detail. It was observed that spring barley for malting was widely grown on over half of the farms producing barley. These are located mainly in the East of England and Scotland. The smaller area of spring feed barley production tends to be concentrated on more mixed farms in the West. As a result it is not meaningful to compare differences between production for malting and for feed. However, it is useful to look at the costs and returns for spring barley produced for malting in comparison to those for winter barley produced for malting. These have been included in Table 5.3.

The lower average yield for spring barley resulted in a total output £36 per hectare lower than for the winter barley group. Surprisingly fertiliser costs were slightly higher for the spring sown crop; usually residual elements from autumn dressings reduce these costs. Overall input costs were lower for spring barley for malting. The gross margin, however, showed a difference of £28 per hectare in favour of winter barley for malting, reflecting the higher yield. However, there are elements of production that are not captured by this analysis. One advantage of growing spring sown varieties is the advantage in spreading labour and machinery requirements more evenly over the year.

Table 5.3 Comparison of Output and Variable Costs of Winter Barley for Malting and Feed; Output and Variable Costs of Spring Barley for Malting

Group	Winter barley Sales 100 per cent for malting		Winter barley Sales 100 per cent for feed		Statistically significant differences at the 10% level	Spring barley Sales 100 per cent for malting	
	s.e.		s.e.			s.e.	
No. farms	1		2			55	
	23		69				
Yield tonnes per ha	6.44	(0.18)	7.10	(0.17)	2>1	5.99	(0.16)
Price £ per tonne	123.34	(2.86)	97.28	(0.66)	1>2	125.88	(2.17)
Returns	£/ha		£/ha			£/ha	
Output-grain	797.80	(32.63)	691.79	(17.51)	1>2	754.97	(24.47)
Output-straw	48.04	(8.98)	58.28	(5.29)		54.10	(5.38)
Arable area payment	253.30	(11.56)	260.82	(4.00)		254.34	(1.69)
Total output	1099.15	(39.22)	1010.89	(19.27)	1>2	1063.41	(24.91)
Material costs							
Seed	50.59	(2.05)	47.85	(1.41)		59.08	(1.65)
Fertiliser	68.68	(2.96)	84.89	(2.58)	2>1	75.64	(3.50)
Crop protection	92.73	(5.78)	86.90	(4.11)		50.97	(3.52)
Total	212.00	(8.48)	219.63	(5.65)		185.69	(4.94)
Margin over materials	887.14	(38.69)	791.26	(18.49)	1>2	877.71	(23.52)
Other variable costs							
Casual labour	1.01	(0.74)	2.35	(0.87)		1.62	(0.75)
Contract	8.18	(4.76)	17.75	(4.78)		24.61	(6.55)
Fuel for grain drying	2.02	(0.91)	2.14	(0.63)		2.53	(0.58)
Miscellaneous	8.19	(1.27)	7.71	(0.68)		8.90	(0.90)
Total	19.41	(6.37)	29.95	(4.75)		37.66	(6.62)
Total variable costs	231.41	(10.88)	249.58	(7.41)		223.35	(8.37)
Gross Margin	867.74	(37.55)	761.31	(19.90)	1>2	840.06	(23.37)

5.6 Disposal of Wheat and Barley Straw

The report for the 1995 harvest commented on regional differences in the importance of straw to the farm business. In Chapter 2 it was seen that for the average wheat and barley enterprise in England straw provides only four per cent of the total output, whereas in Wales it accounts for 14 per cent of output. On livestock farms it is an extremely valuable commodity and the livestock intensive areas show different patterns of straw disposal to the more arable areas

The price of straw fell from the levels observed in 1995/96, by about 25 to 30 per cent, but the pattern of straw disposal in 1996/97 for both wheat and barley was reasonably similar to that in

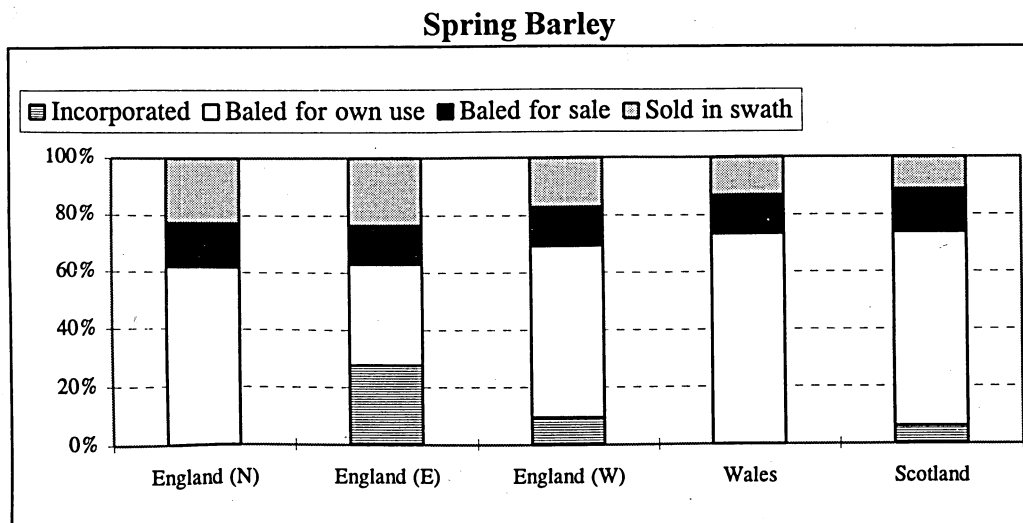
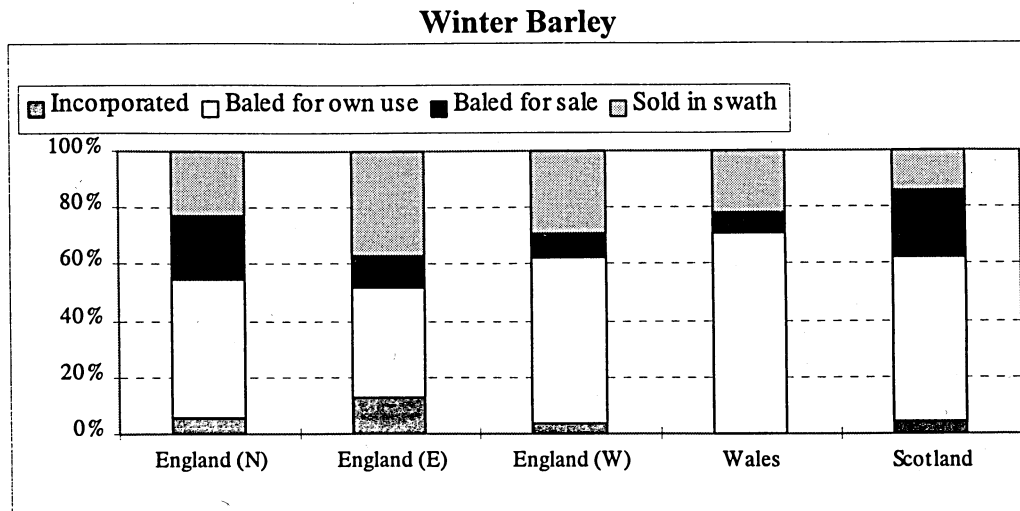
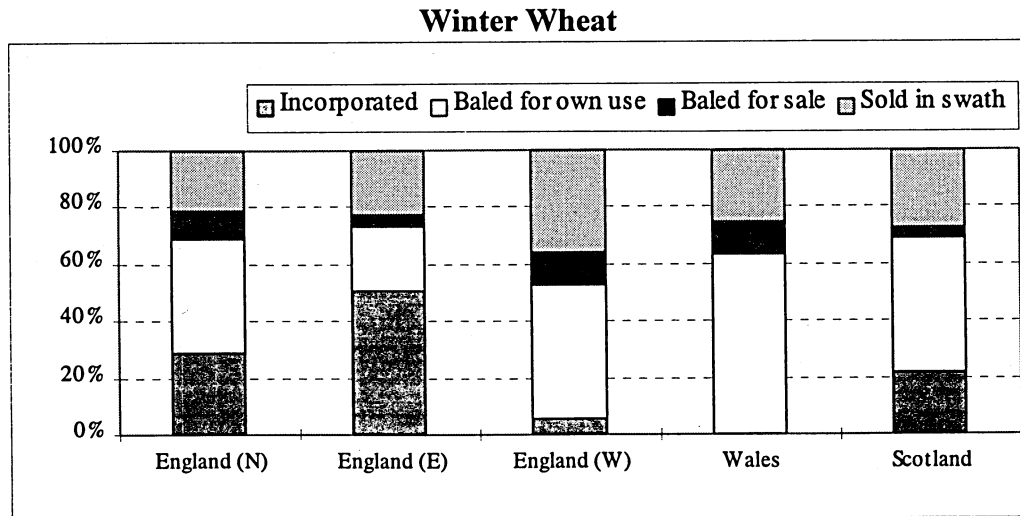
recent years. Table 5.4 highlights some differences: less straw was baled for sale and more wheat and spring barley straw was incorporated compared with the previous three years.

Table 5.4 Comparison of Straw Disposal, 1993 to 1996 Harvest Years

	1993	1994	1995	1996
Winter wheat				
	per cent	per cent	per cent	per cent
Incorporated	32.5	28.9	28.7	34.5
Baled for own use	31.5	33.4	28.4	33.8
Baled for sale	11.5	8.8	11.8	6.5
Sold in swath	24.5	28.9	31.1	25.2
Winter barley				
	per cent	per cent	per cent	per cent
Incorporated	11.4	8.7	6.7	7.4
Baled for own use	52.2	53.6	46.8	49.8
Baled for sale	16.6	13.9	17.8	14.0
Sold in swath	19.8	23.8	28.8	28.8
Spring barley				
	per cent	per cent	per cent	per cent
Incorporated	5.1	6.8	8.8	10.4
Baled for own use	57.3	61.1	51.3	58.3
Baled for sale	20.7	15.7	19.1	14.3
Sold in swath	16.9	16.4	20.8	17.0

Figure 5.6 highlights the regional differences by comparing EU regions in England with Wales and Scotland. Of wheat straw, at one extreme England East incorporated over 50 per cent whereas Wales incorporated no straw at all and baled over 60 per cent for use on-farm. England West shows a similar pattern of disposal to Wales while England North is similar to Scotland. In Wales over 70 per cent of barley straw was baled for farm use and, like wheat, none was incorporated. As might be expected in areas where there are fewer livestock, England East and England North sell the most barley straw.

Figure 5.6 Methods of Straw Disposal and Proportions for Winter Wheat, Winter Barley and Spring Barley, by Region, 1996 Harvest Year



Chapter 6: Further Reform of the CAP

6.1 Introduction

Changes in the fortunes of cereal production have happened abruptly in recent years, rather than as a trend over a period of time. Exchange rates and world market prices have had unforeseen results and for a time obscured the longer term effects of changes in the CAP. As a result farmers have had a difficult time anticipating future events and planning their businesses accordingly. Further changes in the CAP will be required to make it GATT-compatible and sustainable. This chapter reviews the global situation of cereal production and examines possible implications for cereal growers in Great Britain in the light of further proposed reforms.

6.2 Review of Cereal Production

Table 6.1 World Grain Supply and Demand, 1985/86 to 1996/97

	Production mt	Consumption mt	End stock (a) mt	Trade mt
Wheat and wheat flour				
1985/86	495	490	171	85
1986/87	524	516	179	91
1987/88	496	527	148	116
1988/89	495	524	118	104
1989/90	533	533	119	104
1990/91	588	562	145	101
1991/92	542	555	133	111
1992/93	562	550	145	113
1993/94	559	564	141	100
1994/95	522	549	114	97
1995/96	536	549	105	108
1996/97	581	569	117	91
Coarse grains (b)				
1985/86	832	768	209	83
1986/87	822	797	235	83
1987/88	784	808	212	90
1988/89	721	786	147	98
1989/90	791	816	122	105
1990/91	822	809	135	90
1991/92	805	805	135	96
1992/93	865	837	163	92
1993/94	790	831	122	86
1994/95	866	855	134	95
1995/96	795	838	90	105
1996/97	874	856	108	87

(a) Based on aggregate of different local market years

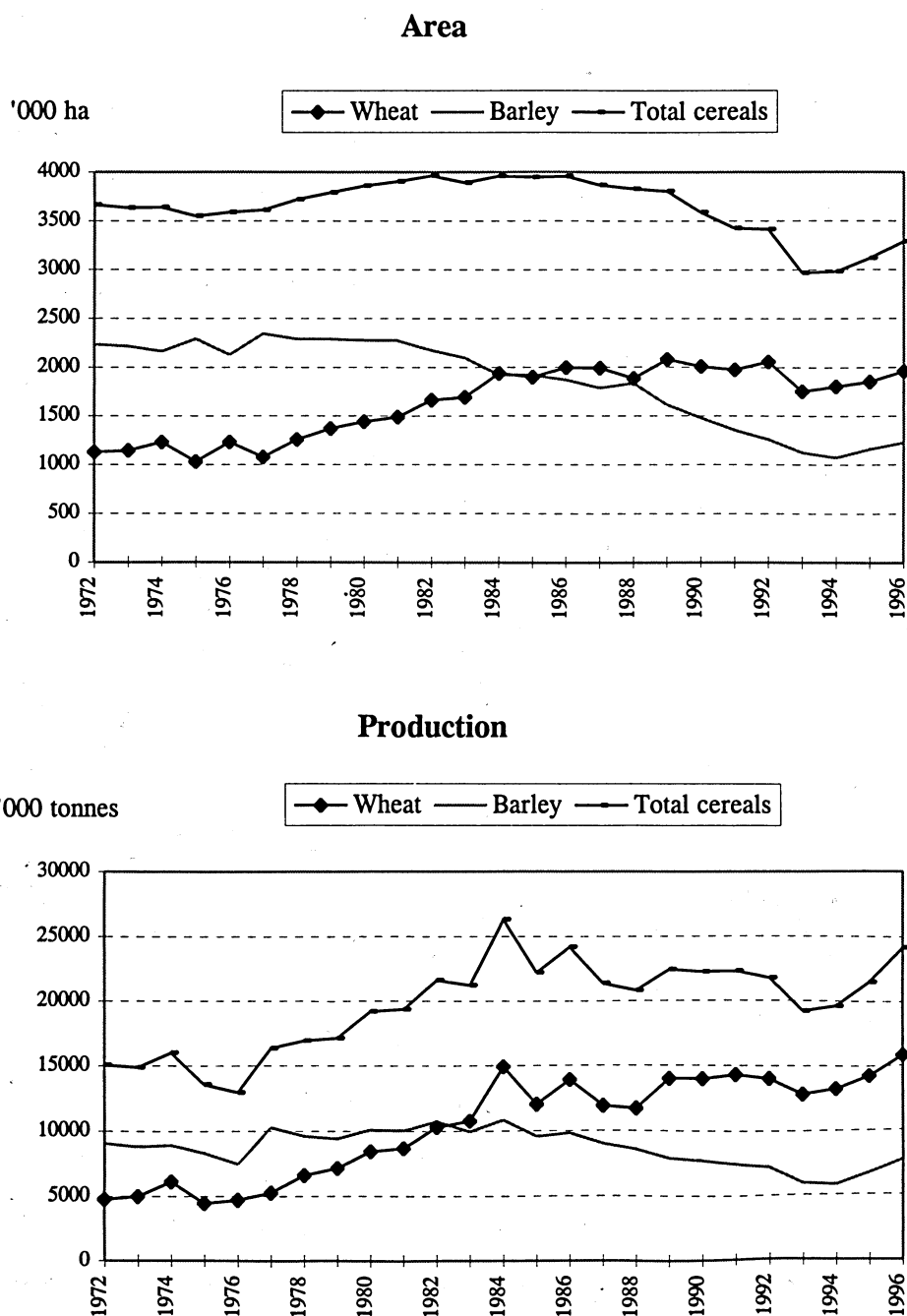
(b) Includes rye, barley, oats, maize, sorghum, millet and mixed grains

Source: USDA/Home Grown Cereals Authority

Table 6.1 shows that, as expected, world stocks have increased from the unsatisfactory level in the 1995 harvest year. For the first time since 1992 world production of wheat exceeded consumption. In the EU excellent harvests boosted grain production to an all time high.

In Great Britain the decrease in set-aside resulted in increases in both wheat and barley plantings which, combined with high yields, caused cereal production to rise to one of the highest levels on record. Figure 6.1 shows the changes in area and production of wheat and barley that have taken place over the last 25 years.

Figure 6.1 Cereal Area and Production in Great Britain, 1972 to 1996



The situation in Great Britain was repeated throughout the EU resulting in total production that was about 30 million tonnes above consumption. The restrictions on export subsidies placed on the EU by the Uruguay Round Agreement, and the expectation of further restrictions as a result of the next WTO round in 1999, have severely limited the prospects of dumping surplus grain on the export market. It is apparent that, under present conditions, further reductions of set-aside can only mean a return to grain mountains by the end of the century.

6.3 Agenda 2000

Further reforms to the CAP will arise from concerns:

- to limit the effects on the budget and surpluses of EU enlargement;
- to allow the Union to take a share of the growing Asian export market;
- to anticipate the pressures for further decoupling of direct payments in the WTO mini-round;
- and to meet longer-standing budgetary environmental and rural problems.

Proposals have been announced under the title Agenda 2000. Those of particular interest to cereal growers are as follows. Compulsory set-aside will be set at nil (though not officially abolished) but there will be provision for voluntary set-aside; a common area aid payment for cereals and oilseeds will be made to growers (though with a supplement of £28 per hectare for protein crops); the basic intervention price will be reduced by 20 per cent; there will be; and there is the possibility of introduction of modulation, i.e. limitation on payment per grower, but at what level and with what degree of national discretion has yet to be specified. This could take place against a background of sterling increasing in strength while it remains outside the ERM, thus adversely affecting green £ rates of conversion. Low cereal prices are likely to necessitate further reductions in both fixed and variable costs at farm level (with the inevitable effects on rural employment and associated agricultural industries), and an increase in attempts to produce off-farm income. The range of margins observed in the survey suggest that there are some farms that will not survive.

Table 6.2 shows a simple effect of changing price received and area payment, while leaving yield and variable costs unchanged, for the top 25 per cent and the bottom 25 per cent of wheat growers as shown in Chapter 3 (Table 3.4). It attempts to indicate the differences that the proposals for Agenda 2000 will make. For this analysis it has been assumed that there will be no set-aside (and so the wheat area has been increased accordingly) and that the average wheat price will be £75 per tonne. This assumes that sterling currency remains strong and the current green rate does not change dramatically. Yields are shown as having no change, although 1996 was a high and they could be less. With the price of grain falling, material costs are not expected to rise greatly, and the expected increase in efficiency of use should offset any rises or inflation. Looking at a similar analysis by quartiles in the 1993

harvest year net margin report (op cit) fixed costs (including overheads) are £360 per hectare for the upper quartile and £382 for the lower quartile. Assuming these costs have not changed substantially and with the range of results obtained for the gross margin it is clear that some units will be achieving negative net margins, particularly in the lower quartile. Obviously if yields are substantially lower or costs increase unexpectedly, the gross margin reductions will be higher. If sterling weakens and the green exchange rate is more favourable for UK farmers, aid payments will increase and gross margins rise. Much is dependent on currency movements and market prices.

The hypothetical figures in Table 6.2 take no account of possible modulation. Many UK farms, with their larger than average cereal enterprises, would be penalised if a ceiling was applied to total area aid by size. Unfortunately, unlike other members of the EU, the UK could be in danger of losing out on two counts: through modulation and because of a strong currency.

Table 6.2 Costs and Returns for Winter Wheat Production: Actual (1996) and Hypothetical Based on Agenda 2000 Proposals

	Upper 25%		Lower 25%	
	1996	hypothetical 2000	1996	hypothetical 2000
Area ha	93.31	102.64	68.59	75.45
Yield tonnes per ha	9.6	9.6	7.16	7.16
Price £ per tonne	105.05	77.18	97.96	72.03
Returns	£/ha	£/ha	£/ha	£/ha
Output-grain	1006.53	740.93	698.83	515.73
Output-straw	54.14	54.14	30.8	30.8
Area aid payment	258.49	301.56	257.18	301.56
Total output	1319.16	1096.63	986.82	848.09
Material costs				
Total	253.14	253.14	268.24	268.24
Margin over materials	1066.01	843.49	718.58	579.85
Other variable costs				
Total	46.27	46.27	50.52	50.52
Total variable costs	299.41	299.41	318.75	318.75
Gross Margin	1019.75	797.22	668.06	529.33

Agenda 2000 also indicates an intention to move from a policy based solely on agricultural issues towards an integrated policy, addressing environmental objectives in particular. It is expected that there will be a mixture of support for disadvantaged farming areas, promotion of rural businesses and maintenance of wildlife habitats. However, many UK environmentalists

are unhappy at the abolition of set-aside if it is not replaced by a reasonable level of agri-environmental spending¹.

It must be remembered that if EU policy did not change set-aside would have to be between 20 and 30 per cent at the beginning of the 21st century to prevent huge intervention stocks accumulating. Enlargement is likely to add to the problem of over production. It seems inevitable, particularly in view of the need to contain CAP spending and the likely restraints of the next WTO round, that the next CAP reforms, after Agenda 2000, will include further reductions of support prices, the removal of production controls and the conversion of area payments to transitional payments. Some producers will consider a planned reduction of government support an acceptable price to pay for greater managerial freedom to exploit export markets. However, some poorer managers would be forced into retirement or other occupations by these changes.

¹ Farmers Weekly, 25th July 1997

APPENDIX A

Figure A.1 The EU Super Regions in Great Britain

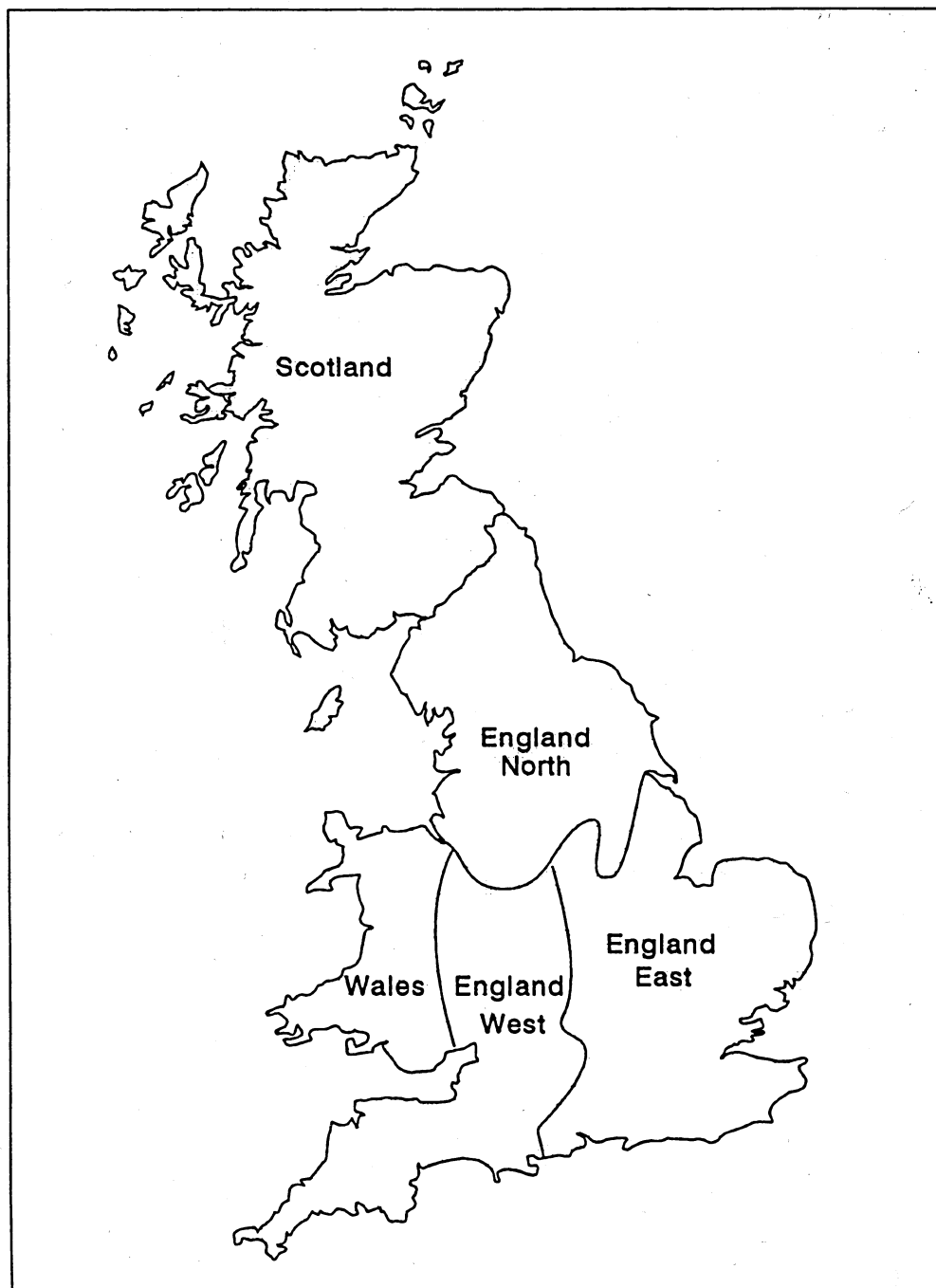


Table A.1 EU Region - England North: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year

	Winter wheat	Winter barley	Spring barley
No. farms	60	59	22
Yield tonnes per ha	8.66	7.50	6.30
Price £ per tonne	101.61	102.13	105.86
Returns	£/ha	£/ha	£/ha
Output-grain	883.99	767.38	673.16
Output-straw	43.02	79.57	69.23
Arable area payment	259.43	257.40	250.94
Total output	1186.44	1104.35	993.33
Material costs			
Seed	53.06	58.53	61.92
Fertiliser	104.45	92.02	61.52
Crop protection	98.17	73.81	45.20
Total	255.68	224.36	168.64
Margin over materials	930.75	879.99	824.69
Other variable costs			
Casual labour	0.92	1.10	2.13
Contract	31.98	23.68	22.34
Fuel for grain drying	6.13	2.31	0.32
Miscellaneous	7.20	9.29	7.60
Total	46.22	36.39	32.39
Total variable costs	301.90	260.75	201.03
Gross Margin	884.53	843.60	792.30

Table A.2 EU Region - England East: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year

	Winter wheat	Winter barley	Spring barley
No. farms	162	104	37
Yield tonnes per ha	8.31	6.76	5.49
Price £ per tonne	102.77	104.55	113.33
Returns	£/ha	£/ha	£/ha
Output-grain	852.66	703.94	625.86
Output-straw	20.89	62.51	35.51
Arable area payment	263.95	257.62	245.15
Total output	1137.50	1024.08	906.53
Material costs			
Seed	49.18	48.16	59.23
Fertiliser	99.77	81.31	58.75
Crop protection	111.69	88.85	59.01
Total	260.64	218.32	177.00
Margin over materials	876.86	805.76	729.53
Other variable costs			
Casual labour	3.01	2.50	0.00
Contract	21.85	18.54	24.40
Fuel for grain drying	3.74	1.80	1.31
Miscellaneous	8.43	8.03	7.78
Total	37.04	30.87	33.50
Total variable costs	297.68	249.19	210.50
Gross Margin	839.82	774.89	696.03

Table A.3 EU Region - England West: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1996 Harvest Year

	Winter wheat	Winter barley	Spring barley
No. farms	54	57	24
Yield tonnes per ha	8.08	6.51	5.17
Price £ per tonne	100.45	100.85	106.28
Returns	£/ha	£/ha	£/ha
Output-grain	798.92	653.52	553.46
Output-straw	68.26	99.54	86.43
Arable area payment	258.69	253.13	246.68
Total output	1125.88	1006.20	886.57
Material costs			
Seed	48.71	48.38	51.64
Fertiliser	100.95	88.95	70.99
Crop protection	107.78	94.38	48.69
Total	257.44	231.71	171.32
Margin over materials	868.44	774.48	715.25
Other variable costs			
Casual labour	0.88	1.63	0.44
Contract	37.66	45.56	30.06
Fuel for grain drying	3.36	3.50	3.31
Miscellaneous	11.69	9.42	9.25
Total	53.59	60.11	43.05
Total variable costs	311.03	291.82	214.37
Gross Margin	814.84	714.38	672.20

APPENDIX B

Cereal-Intensive Counties of England

Bedfordshire	Lincolnshire
Berkshire	Norfolk
Cambridgeshire	Northamptonshire
Cleveland	Nottinghamshire
Essex	Oxford
Hampshire	Rutland
Hertfordshire	Suffolk
Humberside	South Yorkshire
Leicestershire	Tyne and Wear

Cereal-Extensive Counties of England

Avon	Kent
Buckinghamshire	Lancashire
Cheshire	Merseyside
Cornwall	Northumberland
Cumbria	North Yorkshire
Derbyshire	Salop
Devon	Scilly Isles
Dorset	Somerset
Durham	Staffordshire
East Sussex	Surrey
Gloucestershire	Warwickshire
Greater London	West Midlands
Greater Manchester	West Sussex
Hereford and Worcester	West Yorkshire
Isle of Wight	Wiltshire

APPENDIX C

Conventions for Cost and Margin Calculations

Total Output

This is the sum of sales or valuation of grain and straw plus the arable area payment.

Material Costs

The cost of inputs which are an essential part of cereal production, seed, fertiliser and chemical sprays; a cost likely to be incurred by all cereal producers.

Margin over Materials

The value of output less the material costs.

Other Variable Costs

Input costs which are incurred less routinely on sample farms and include contract, casual labour and fuel for grain drying.

Gross Margin

This is the value of output less the material and other variable costs which vary in direct proportion to the size of enterprise.

APPENDIX D

Reports on Special Studies in Agricultural Economics

No 22	The Economics of Egg Production by Deborah Roberts and John Farrar University of Manchester September 1993	£10.00
No 23	Hardy Nursery Stock Production in England and Wales by R Crane, A Errington and P Woodlock University of Reading October 1993	£9.50
No 24	Labour Use on UK Farms: a Pilot Study by Martin Turner and Mark Fogerty University of Exeter March 1994	£8.00
No 25	Pig Production - 1992/93 by A Sheppard University of Exeter March 1994	£8.00
No 26	Field Scale Vegetables: A Survey of Large-scale Vegetable Production on General Cropping Farms 1990-1992 by N Williams Wye College (University of London) December 1994	£15.00
No 27	Study of Potato Production: 1991 and 1992 Crops by Kim Claydon University of Nottingham July 1995	£10.00
No 28	UK Cereals 1993/94: The Impact of the CAP Reform on Production Economics and Marketing by Geoff Davidson and Carol Asby University of Cambridge July 1995	£12.00

No 29	Wheat and Barley Production in Great Britain, 1994/95: Year Two of the CAP Reform by Geoff Davidson University of Cambridge March 1996	£12.00
No 30	Linseed by MR Lewis Askham Bryan College April 1996	£10.00
No 31	Lowland Sheep 1994: Production Economics and Management by Mark Fogerty and Martin Turner University of Exeter April 1996	£10.00
No 32	Hardy Nursery Stock Production in England and Wales by R Crane and C Barahona University of Reading March 1996	£12.50
No 33	The Structure of Pig Production in England and Wales: The Results of the National Survey of Pig Production Systems, 1 February 1996 by Andrew Sheppard University of Exeter June 1996	£8.00
No 34	Economics of Wheat and Barley Production in Great Britain: 1995/96 by Carol Asby and Ian Sturgess University of Cambridge January 1997	£13.00
No 35	Economics of the UK Sugar Beet Industry by Alan Renwick University of Cambridge June 1997	£15.00

These publications are available from the University/College concerned at the address shown at Appendix E.

APPENDIX E

Provincial Centres of Agricultural Economics

- NEWCASTLE**
Department of Agricultural Economics
and Food Marketing
University of Newcastle-upon-Tyne
Newcastle-upon-Tyne
NE1 7RU
Tel. 0191 222 6903
- ASKHAM BRYAN**
Rural Business Research Unit
Askham Bryan College
Askham Bryan
York
YO2 3PR
Tel. 01904 702121
- MANCHESTER**
The Farm Business Unit, CAFRE
School of Economic Studies
University of Manchester
Dover Street Building
Oxford Road
Manchester M13 9PL
Tel. 0161 275 4793
- NOTTINGHAM**
Rural Business Research Unit
Department of Agriculture and Horticulture
University of Nottingham
Sutton Bonington Campus
Loughborough
Leics. LE12 5RD
Tel. 0115 9516057
- CAMBRIDGE**
Agricultural Economics Unit
Department of Land Economy
University of Cambridge
19 Silver Street
Cambridge
CB3 9EP
Tel. 01223 337147
- WYE**
Farm Business Unit
Department of Agricultural Economics
Wye College (University of London)
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Scottish Agricultural College
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Tel. 0131 535 4000

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