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Wheat - Cost of production (p. 1)



UNIVERSITY OF CAMBRIDGE

Dept. of land economics.  
Agricultural economics unit

Economics of Wheat & Barley Production  
in Great Britain, 1995/96

CAROL ASBY and IAN STURGESS

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**Economics of Wheat and Barley Production in Great Britain, 1995/96**

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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

This bulletin reports on the third of six annual surveys of the economics of production and marketing of cereals which are being carried out for the harvest years 1993 to 1998. The first survey, reported in "UK Cereals, 1993/94" covered all costs including fixed costs, and all cereal crops, including rye, oats and triticale. The final survey of the 1998 crop will be similarly comprehensive. The interim surveys are of variable costs and therefore of gross margins only and confined to wheat and barley crops.

It was planned that these surveys would monitor the adjustment to lower cereal prices. In the event, because world prices have been unexpectedly high, reduced intervention prices have not brought down actual prices received as was expected and as was implicit in the prefixed compensation payments. To this extent the results of the past two surveys have been less informative than was intended on the effects on resource allocation of a change in policy which has partly decoupled government support from production.

The surveys have nevertheless been useful in providing benchmark data of an accuracy which cannot be matched by other sources using non-random samples and less rigorous procedures of interrogation and scrutiny. The analyses also throw light on a number of issues which are of both managerial and political interest. These include the range of performance (as reflected in gross margin) by crop, region, degree of specialisation, unit size and product quality. There are also some interesting findings on marketing patterns, concentration in production of cereals for human use and the contribution of straw to profitability.

This report was to have been the last in a succession written or jointly written by Geoff Davidson. (These, which span three decades, have been always useful, often influential and occasionally controversial.) Unfortunately ill health prevented this. Nevertheless, this report, like its predecessors, owes much to his contributions to the development of survey methodology, systems of data processing and validation, and techniques for analysis and presentation. I am sure that many regular readers of these reports will wish to join me in recognizing the value of the input of Geoff Davidson and in wishing him the best for his retirement.

Ian Sturgess  
Director  
January 1997

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## 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. (1.1)
2. Of the original 400 cereal growers, randomly selected, who took part in the 1993 study, 60 per cent have now participated for three years. Replacements for those who left the survey were selected from randomly drawn lists. (1.2)
3. In Great Britain in 1995, 45 per cent of holdings producing cereals grew less than 20 hectares of cereals but accounting for only nine per cent of the total cereals area; 17 per cent of holdings producing cereals grew over 80 hectares and accounted for over 50 per cent of the total cereals area. Over 50 per cent of the total cereals area is in the EU eastern region of England. (1.3)
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. (1.3)

### Economic Results by Crop and Country

5. Winter wheat had the highest average gross margin per hectare (£977), followed by winter barley (£883), spring barley (£837) and spring wheat (£562). (2.2)
6. The popularity of spring wheat declined further in 1995; only 18 farms in the survey grew the crop. The results should be treated with caution because of the small sample. (2.2)
7. For winter wheat and winter and spring barley, in real terms, gross margins have improved significantly over those of 1994. This is mainly due to increased output but helped by the increased arable area payments. (2.3)
8. For winter wheat and winter and spring barley, fertiliser costs per hectare showed a significant increase. For winter wheat and winter barley crop protection costs per hectare also showed a significant increase but this was offset by a decrease in seed costs. (2.3)
9. By country the most important factor in better economic performance is the increased yields obtained in England and Scotland, but especially in Scotland where, since 1993, there has been an average increase in yield of 18.6 per cent for winter wheat, 23.7 per cent for winter barley and 20.4 per cent for spring barley. (2.4)

10. Among the countries of Great Britain, Scotland had the highest average gross margin for winter wheat, winter barley and spring barley. As for the national crops, the crop output had more effect on the gross margin increases than the increased area payment in all three countries. The rise in total output outweighed the increases in variable costs. (2.4)
11. For combined wheat and barley enterprises, Scotland again had the highest gross margin followed by England and then Wales, the same ranking as in 1994. (2.5)
12. World events led to high cereal prices and a depreciations of sterling boosted area payments in Great Britain. Sustainability of the level of profitability enjoyed in 1995 is unlikely. (2.6)

#### **Further Analysis by Size, Gross Margin Dispersion and Management Practices**

13. Analysis by size of cereal enterprise demonstrates diseconomies of small size rather than consistent significant economies of size. (3.2)
14. When ranked by the margin over materials, the gross margin for winter wheat in the upper quartile group was 64 per cent higher than that in the lower quartile group; for winter and spring barley the gross margins were 80 and 96 per cent higher respectively in the upper quartile group. The most important factor contributing to this result was the yield of grain which was from 46 to 57 per cent higher for farms in the the upper quartile group compared with the lower quartile group. (3.3)
15. Fertiliser costs for winter wheat were significantly higher for farms in the upper quartile group compared with the lower quartile group but these were offset by lower seed and crop protection costs. (3.3)
16. Established seed varieties dominated for wheat and barley with only two to three varieties accounting for about 60 per cent of the area for each crop. (3.4)
17. For winter wheat a significant increase in the price of fertiliser was apparent over the previous year. There was also an increase in the rate of application. These two factors produced a significantly higher cost per hectare for fertiliser in 1995 compared with 1994. (3.4)
18. When the proportion of cereals and set-aside in the crops and grass area is beyond about 80 per cent, the economic performance of winter wheat decreases, largely due to poorer yields. (3.4)

#### **Marketing and Disposal of Grain and Straw**

19. The premium for milling wheat has continued to fall, to nine per cent in 1995. Feed and milling wheat prices show considerable overlap between the upper end of the feed price and the lower end of the milling price. In contrast the premium for malting barley has continued to increase to an average of 24 per cent for winter barley and 32 per cent for spring barley. (4.2)
20. Grain prices were not so volatile as in 1994; high world prices sustained a steady price increase and made intervention redundant. (4.3)

21. Only 26 per cent of winter barley growers sold grain for malting whereas spring barley for malting and winter wheat for milling were less specialised. (4.4)
22. Although the UK wheat and barley areas have increased in 1995, the areas planted with milling and malting varieties has decreased. There appears to be little economic benefit at the gross margin level in producing grain of higher quality. (4.4)
23. The value of most straw has more than doubled in price, in real terms, in the last ten years. (4.5)

### **The CAP Reforms**

24. In 1995 the impact of the reforms has been overtaken by wider issues of exchange rates and world market prices. (5.1)
25. The increase in the planted area of wheat and barley has been shown to be at the expense of break crops. This will be of concern if export and specialist market opportunities are lost and the recent strong world cereals market proves transient. (5.1)
26. Environmentally related CAP reforms are likely to assume greater importance in any future discussions on further reform, with the possibility of decoupling environmental and social measures from market forces. Eastern enlargement of the EU to CEEC countries is likely to force the timing of such discussion. (5.2 5.3)

## **Chapter 1: Introduction**

### **1.1 Context**

The CAP reform implemented in 1993 centred on cereals. It aimed to reduce the level of cereal surpluses by taking land out of production, bringing the support price for cereals closer to world prices and compensating producers for the lower prices and non-productive land on an area basis. As cereal producers adapted to these major reforms it was anticipated that the use of materials, particularly chemical inputs, might decline now that compensation was no longer tied to yield. The effect of changes to the level of fixed costs was likely to be evident over a longer period of time. Therefore, to monitor any such changes, the full survey of cereal production, undertaken in 1993, was extended in reduced form to record the output and variable costs of the main cereal crops, wheat and barley, on an annual basis until 1997. The 1993 study also included oats, rye and triticale, and recorded fixed costs. In 1998 there will be another full survey, similar to that of 1993, to enable a direct comparison to be made of the entire cost structure and level of returns from cereal growing between the outset and completion of the 1992 reform of the CAP. This report presents the gross margin results for the 1995 harvest year for wheat and barley, the third year of CAP reform.

### **1.2 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. Over 85 per cent of farmers who had taken part in the 1994 survey agreed to continue, and nearly 60 per cent of cooperators have now participated for three years since 1993. Replacements for those who had left the survey 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 more usually by telephone. As recorded in the 1994 report (Davidson, JG, 1996), 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.

### **1.3 Structure of Cereal Production and Sampling**

The trend for cereal production to be increasingly concentrated on larger units in Great Britain is continuing. In 1995 forty-five per cent of the total Great Britain holdings producing cereals grew less than 20ha; in 1994 forty-six per cent of holdings were in this group. At the other end of the scale 17 per cent of holdings producing cereals grew over 80ha in 1995, compared with 15

per cent in 1994. The latter group accounted for over 50 per cent of the total cereals area in Great Britain in 1995, whereas the 45 per cent of smaller holdings accounted for only nine per cent of the total cereals area (Table 1.1). In England the majority of the larger cereal producers are situated in the EU Eastern region; this region contains 50 per cent of the total Great Britain cereals area. This has implications for economies of size which were discussed in the reports for 1993 and 1994 and are again apparent in the 1995 survey.

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

Cereal area	less than 20 ha		20 up to 80ha		80 up to 200ha		more than 200ha	
	per cent	per cent	per cent	per cent	per cent	per cent	per cent	per cent
	total GB holdings	total GB cereals	total GB holdings	total GB cereals	total GB holdings	total GB cereals	total GB holdings	total GB cereals
EU region - North	7.9	1.6	7.8	7.2	2.4	6.3	0.4	2.7
- East	11.8	2.5	14.8	14.0	7.1	18.9	2.1	13.8
- West	11.8	2.4	8.5	7.6	2.1	5.6	0.4	2.3
England	31.5	6.5	31.1	28.8	11.6	30.8	2.8	18.9
Scotland	9.1	1.8	6.8	6.2	1.8	4.4	0.2	1.2
Wales	4.0	0.6	0.9	0.7	0.1	0.2	0.0	0.0
Great Britain	44.6	8.9	38.8	35.7	13.5	35.4	3.0	20.1

Source: MAFF 1995 June Census data

Eighty five per cent of the farmers who co-operated in the 1994 survey have participated in the survey for 1995. To replace those who did not continue it was necessary to recruit a further 56 farmers. This necessitated contacting sixty-eight cereal growers; the success rate was 82 per cent, the same as in 1994. By far the most common reason for refusing to participate was that a farmer felt he was too busy. A few 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 401 farmers took part in the 1995 survey and an analysis of the sample size sought and obtained by country, region and size group is given in Table 1.2.

**Table 1.2 Sample Size Sought and Obtained**

Size Group (area of cereals)	(5- <10ha)	(10- <20ha)	(20- <40ha)	(40- <80ha)	(80- <120ha)
<b>EU Super Region</b>					
-North sought	6	6	7	14	10
-North obtained	5	5	7	12	12
-East sought	9	10	13	26	26
-East obtained	5	7	13	34	25
-West sought	10	9	8	13	8
-West obtained	4	8	13	14	12
-England sought	25	25	28	53	44
-England obtained	14	20	33	60	49
-Scotland sought	2	5	9	18	12
-Scotland obtained	4	4	7	14	12
-Wales sought	4	7	7	7	2
-Wales obtained	6	8	8	4	2
Size Group (area of cereals)	(120- <200ha)	(200- <300ha)	(300+ ha)	Total	
<b>EU Super Region</b>					
-North sought	10	4	5	62	
-North obtained	13	6	6	66	
-East sought	35	24	26	169	
-East obtained	43	20	27	174	
-West sought	10	6	5	69	
-West obtained	9	3	7	70	
-England sought	55	34	36	300	
-England obtained	65	29	40	310	
-Scotland sought	9	3	2	60	
-Scotland obtained	10	6	4	61	
-Wales sought	2	1	0	30	
-Wales obtained	1	1	0	30	

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. With the trend towards cereal production on larger holdings continuing it has again proven difficult to recruit in the smaller size groups (particularly in England).

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.



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

### 2.1 Presentation of Results

The survey was designed to collect details of output, material costs and other variable costs (for example contract and casual labour) to give a gross margin figure for wheat and barley production for 401 randomly selected farms in England, Wales and Scotland. The information provided an insight into the economic performance of winter- and spring-sown crops of wheat and barley in Great Britain as a whole, and in individual countries, using the gross margin as the main measure of profitability. In the next chapter, where groups have been large enough, further analyses have been undertaken, including comparisons between the top 25 per cent and bottom 25 per cent of units, between cereal-intensive counties and cereal-extensive counties (cereal-intensive counties being areas where cereals account for more than 40 per cent of crops and grass area, as listed in Appendix B) and by size group. To avoid unnecessary repetition in the main body of the report, some tables which present the survey results by EU region have been included in Appendix A.

In the tables which provide results for the full sample of wheat and barley growers the mean of each variable is followed by the standard error of the mean (s.e.). This statistic indicates the precision of the mean value by enabling the calculation of the interval above and below the sample mean in which the true population mean lies. Theory shows one can expect, with 95 per cent confidence, that the range is between the sample mean minus 1.95 s.e., and the sample mean plus 1.95 s.e. For example in Table 2.1 the average cost per hectare for fertiliser on winter wheat is £94.41 and the s.e. is £1.93 per hectare. This indicates that the average fertiliser cost per hectare for the whole population of winter wheat growers lies in the range £90.65 per hectare ( $94.41 - 1.95(1.93)$ ) to £98.17 per hectare ( $94.41 + 1.95(1.93)$ ). For spring wheat, where the average fertiliser cost is £49.22 per hectare and the s.e. is £3.80 per hectare, the range would be £41.81 per hectare to £56.63 per hectare. The much higher s.e. for spring wheat and the resulting larger range reflects the much smaller sample of spring wheat growers and correspondingly less precise estimates.

In other tables, 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 level. Where costs and revenues have been compared over several years, values have been adjusted using the retail price index to terms of money of 1995 purchasing power. Where this has been done it is stated in the title.

**Table 2.1 Great Britain: Costs and Returns for Winter and Spring Wheat and Barley, 1995 Harvest Year (weighted)**

	Winter Wheat		Spring Wheat		Winter Barley		Spring Barley	
	s.e.		s.e.		s.e.		s.e.	
No. farms	329		18		262		183	
Yield tonnes per ha	8.02	(0.57)	4.29	(1.12)	6.72	(0.42)	5.41	(0.38)
Price £ per tonne	118.02	(0.03)	111.95	(0.59)	115.54	(0.04)	132.47	(0.06)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	946.99	(6.16)	479.83	(11.83)	776.77	(4.51)	716.61	(4.46)
Output-straw	51.50	(1.32)	15.56	(2.12)	92.82	(1.52)	82.13	(1.44)
Arable area payment	263.28	(3.23)	267.36	(8.89)	251.26	(2.55)	246.65	(2.61)
<b>Total output</b>	<b>1261.77</b>	<b>(7.08)</b>	<b>762.75</b>	<b>(14.95)</b>	<b>1120.86</b>	<b>(5.40)</b>	<b>1045.39</b>	<b>(5.36)</b>
Material costs								
Seed	49.15	(1.38)	65.04	(4.39)	47.86	(1.11)	56.92	(1.25)
Fertiliser	94.41	(1.93)	49.22	(3.80)	81.49	(1.45)	66.99	(1.37)
Crop protection	104.22	(2.04)	55.66	(4.03)	77.34	(1.43)	46.75	(1.13)
<b>Total</b>	<b>247.77</b>	<b>(3.13)</b>	<b>169.91</b>	<b>(7.07)</b>	<b>206.69</b>	<b>(2.32)</b>	<b>170.66</b>	<b>(2.17)</b>
<b>Margin over materials</b>	<b>1014.00</b>	<b>(6.35)</b>	<b>592.84</b>	<b>(13.17)</b>	<b>914.17</b>	<b>(4.88)</b>	<b>874.73</b>	<b>(4.90)</b>
Other variable costs								
Casual labour	1.97	(0.29)	0.68	(0.42)	1.90	(0.21)	1.04	(0.17)
Contract	22.75	(0.84)	24.42	(2.71)	19.30	(0.62)	22.82	(0.78)
Fuel for grain drying	3.24	(0.35)	3.63	(1.04)	1.74	(0.23)	1.99	(0.25)
Miscellaneous	9.12	(0.60)	2.45	(0.82)	8.26	(0.47)	11.62	(0.59)
<b>Total</b>	<b>37.08</b>	<b>(1.13)</b>	<b>31.18</b>	<b>(3.04)</b>	<b>31.21</b>	<b>(0.84)</b>	<b>37.47</b>	<b>(1.02)</b>
<b>Total variable costs</b>	<b>284.85</b>	<b>(3.33)</b>	<b>201.10</b>	<b>(7.69)</b>	<b>237.90</b>	<b>(2.47)</b>	<b>208.12</b>	<b>(2.40)</b>
<b>Gross Margin</b>	<b>976.92</b>	<b>(6.25)</b>	<b>561.65</b>	<b>(12.82)</b>	<b>882.96</b>	<b>(4.81)</b>	<b>837.26</b>	<b>(4.79)</b>

## 2.2 Gross Margin Results for Great Britain

The Great Britain results for wheat and barley, winter and spring sown, in the 1995 harvest year are given in Table 2.1. The gross margins per hectare for winter wheat and winter and spring barley continue the upward trend observed in the last two years. Three year comparisons for the three main cereals, in real terms, are given in Tables 2.2 to 2.4. Among the four crops winter wheat again had the highest gross margin of £977 per hectare. In real

terms this was 19 per cent higher than in 1994, in the main attributable to a combination of high prices and improved yields. Increases in both straw output and the compensatory payments, coupled with higher grain output, more than offset increases in fertiliser and spray costs. Winter barley had the second highest gross margin; with an increased yield of nearly eight per cent on 1994 and an increased price, it has slightly improved its position in relation to winter wheat. In the 1994 harvest year the gross margin per hectare of winter barley was 11 per cent below that for winter wheat; in 1995 it was only 10 per cent lower. Spring barley also showed an increased yield of nearly eight per cent over 1994 and the largest price increase, reflecting the continued demand for malting varieties. However, with practically no change in the straw output, the increase in the gross margin, although proportionally the highest of the three main cereals, was as such about the same in absolute terms as that for winter wheat and winter barley.

The popularity of spring wheat in Great Britain declined still further in 1995, possibly because good weather enabled early harvest of root crops and subsequent problem-free drilling of winter cereals. Only 18 farms of the 401 taking part in the study grew the crop. Of these a large proportion grew a winter wheat variety as a spring crop rather than a true spring wheat variety, and often as a 'patching' mechanism when all or part of the original crop (usually winter wheat) failed. As a result the sample of spring wheat farms is not robust and caution is needed in drawing conclusions. Yield and price both fell compared with 1994, and despite an increase in straw output and compensatory payment, the gross margin fell by 11 per cent on the previous year.

### **2.3 A Comparison between 1993 and 1995 for Great Britain**

For the three main cereals, a comparison of the three years of the survey, 1993 to 1995, in real terms, was carried out including an analysis of variance to determine which components of the gross margin had changed significantly. The results are given in Tables 2.2 to 2.4. In 1994 it was observed that gross margins had improved significantly over the previous year, the most important element being the increase in crop output but helped by the increased arable area payments. In 1995 the gross margins showed another significant increase, again helped by an increase in arable area payment of around £70 per hectare, but with the output of grain contributing most to the increase (Table 2.5). For the first time in this series of surveys, fertiliser costs per hectare showed a significant increase for the three crops, and for winter wheat and winter barley the cost of crop protection materials also significantly increased. Whether this is entirely due to price increases, or whether changes in physical inputs have also occurred will be discussed in Chapter 3.

**Table 2.2 Winter Wheat: Comparison of Costs and Returns, 1993 to 1995 Harvest Years, in Money of 1995 Purchasing Power (weighted)**

	1993 harvest real terms	1994 harvest real terms	1995 harvest current	Per cent change in real terms		Statistically significant differences at the 10% level	
				93-94	94-95	93-94	94-95
Group no.	1	2	3				
No. farms	297	319	329				
Yield tonnes per ha	7.44	7.75	8.02	4	3	2>1	3>2
Price £ per tonne	111.05	111.63	118.02	1	6		3>2
Returns	£/ha	£/ha	£/ha				
Output-grain	826.05	864.70	946.99	5	10	2>1	3>2
Output-straw	34.60	43.53	51.50	26	18	2>1	
Arable area payment	142.35	194.32	263.28	37	35	2>1	3>2
<b>Total output</b>	<b>1002.99</b>	<b>1102.55</b>	<b>1261.77</b>	<b>10</b>	<b>14</b>	<b>2&gt;1</b>	<b>3&gt;2</b>
Material costs							
Seed	54.11	54.90	49.15	1	-10		2>3
Fertiliser	79.13	81.97	94.41	4	15		3>2
Crop protection	104.47	101.48	104.22	-3	3		3>2
<b>Total</b>	<b>237.70</b>	<b>238.34</b>	<b>247.77</b>	<b>0</b>	<b>4</b>		<b>3&gt;2</b>
<b>Margin over materials</b>	<b>765.29</b>	<b>864.20</b>	<b>1014.00</b>	<b>13</b>	<b>17</b>	<b>2&gt;1</b>	<b>3&gt;2</b>
Other variable costs							
Casual labour	2.07	1.93	1.97	-7	2		
Contract	23.62	22.21	22.75	-6	2		
Fuel for grain drying	10.59	8.42	3.24	-20	-62	1>2	2>3
Miscellaneous	8.37	8.44	9.12	1	8		
<b>Total</b>	<b>44.65</b>	<b>40.99</b>	<b>37.08</b>	<b>-8</b>	<b>-10</b>		
<b>Total variable costs</b>	<b>282.35</b>	<b>279.32</b>	<b>284.85</b>	<b>-1</b>	<b>2</b>		
<b>Gross Margin</b>	<b>720.64</b>	<b>823.66</b>	<b>976.92</b>	<b>14</b>	<b>19</b>	<b>2&gt;1</b>	<b>3&gt;2</b>

**Table 2.3 Winter Barley: Comparison of Costs and Returns, 1993 to 1995 Harvest Years, in Money of 1995 Purchasing Power (weighted)**

	1993 harvest real terms	1994 harvest real terms	1995 harvest current	Per cent change in real terms		Statistically significant differences at the 10% level	
				93-94	94-95	93-94	94-95
Group no.	1	2	3				
No. farms	249	261	262				
Yield tonnes per ha	6.13	6.24	6.72	2	8		3>2
Price £ per tonne	112.26	111.38	115.54	-1	4		3>2
Returns	£/ha	£/ha	£/ha				
Output-grain	688.30	695.33	776.77	1	12		3>2
Output-straw	69.53	82.39	92.82	18	13	2>1	3>2
Arable area payment	142.75	187.99	251.26	32	34	2>1	3>2
<b>Total output</b>	<b>900.58</b>	<b>965.72</b>	<b>1120.86</b>	<b>7</b>	<b>16</b>	<b>2&gt;1</b>	<b>3&gt;2</b>
Material costs							
Seed	49.88	51.07	47.86	2	-6		2>3
Fertiliser	71.83	72.94	81.49	2	12		3>2
Crop protection	78.55	74.92	77.34	-5	3		3>2
<b>Total</b>	<b>200.25</b>	<b>198.93</b>	<b>206.69</b>	<b>-1</b>	<b>4</b>		<b>3&gt;2</b>
<b>Margin over materials</b>	<b>700.32</b>	<b>766.79</b>	<b>914.17</b>	<b>9</b>	<b>19</b>	<b>2&gt;1</b>	<b>3&gt;2</b>
Other variable costs							
Casual labour	2.12	1.80	1.90	-15	5		
Contract	24.01	19.10	19.30	-20	1		
Fuel for grain drying	6.01	5.47	1.74	-9	-68		2>3
Miscellaneous	8.63	8.08	8.26	-6	2		
<b>Total</b>	<b>40.76</b>	<b>34.45</b>	<b>31.21</b>	<b>-15</b>	<b>-9</b>		
<b>Total variable costs</b>	<b>241.02</b>	<b>233.37</b>	<b>237.90</b>	<b>-3</b>	<b>2</b>		
<b>Gross Margin</b>	<b>659.56</b>	<b>732.35</b>	<b>882.96</b>	<b>11</b>	<b>21</b>	<b>2&gt;1</b>	<b>3&gt;2</b>

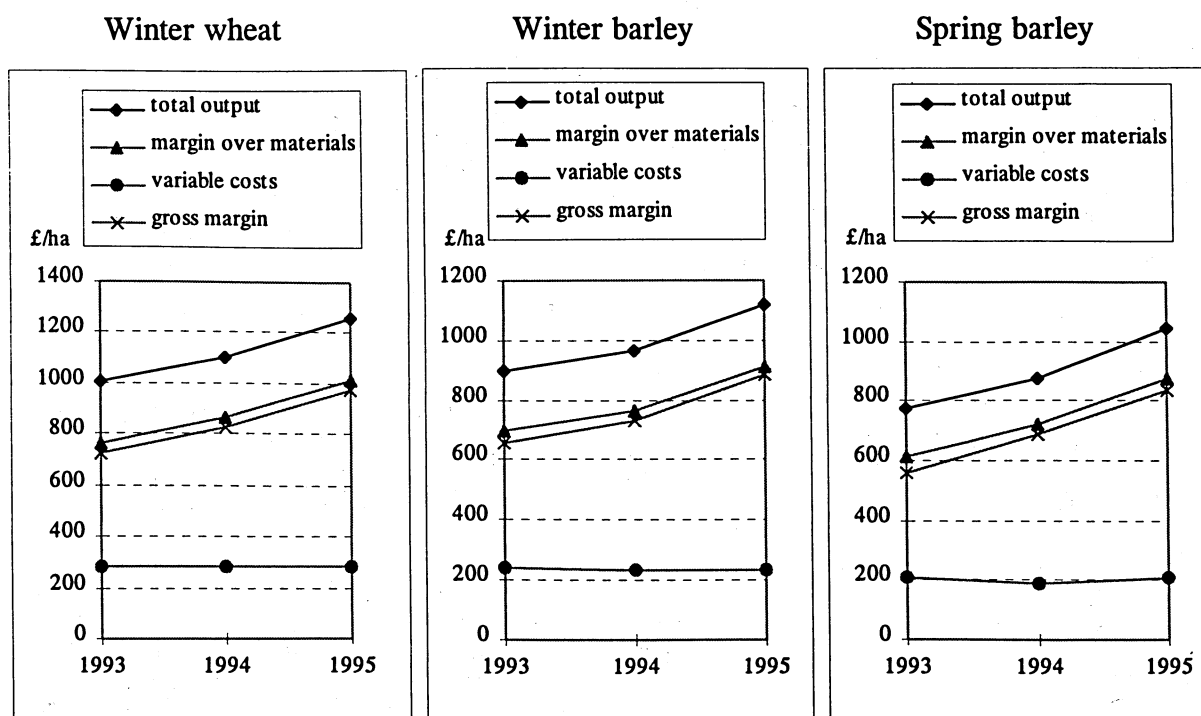
**Table 2.4 Spring Barley: Comparison of Costs and Returns, 1993 to 1995 Harvest Years, in Money of 1995 Purchasing Power (weighted)**

	1993 harvest real terms	1994 harvest real terms	1995 harvest current	Per cent change in real terms		Statistically significant differences at the 10% level	
				93-94	94-95	93-94	94-95
Group no.	1	2	3				
No. farms	242	158	183				
Yield tonnes per ha	4.76	5.03	5.41	6	8		3 > 2
Price £ per tonne	118.71	123.21	132.47	4	8	2 > 1	3 > 2
Returns	£/ha	£/ha	£/ha				
Output-grain	569.73	619.91	716.61	9	16	2 > 1	3 > 2
Output-straw	74.39	84.05	82.13	13	-2	2 > 1	
Arable area payment	129.68	171.10	246.65	32	44	2 > 1	3 > 2
<b>Total output</b>	<b>773.804</b>	<b>875.06</b>	<b>1045.39</b>	<b>13</b>	<b>19</b>	<b>2 &gt; 1</b>	<b>3 &gt; 2</b>
Material costs							
Seed	59.43108	54.66741	56.92	-8	4		
Fertiliser	60.40	59.41	66.99	-2	13		3 > 2
Crop protection	43.68	42.82	46.75	-2	9		
<b>Total</b>	<b>163.51</b>	<b>156.89</b>	<b>170.66</b>	<b>-4</b>	<b>9</b>		<b>3 &gt; 2</b>
<b>Margin over materials</b>	<b>610.29</b>	<b>718.17</b>	<b>874.73</b>	<b>18</b>	<b>22</b>	<b>2 &gt; 1</b>	<b>3 &gt; 2</b>
Other variable costs							
Casual labour	1.504718	1.36	1.04	-10	-24		
Contract	25.80	18.20	22.82	-29	25		
Fuel for grain drying	5.20	4.38	1.99	-16	-55		2 > 3
Miscellaneous	15.52	8.75	11.62	-44	33		
<b>Total</b>	<b>48.02</b>	<b>32.69</b>	<b>37.47</b>	<b>-32</b>	<b>15</b>		
<b>Total variable costs</b>	<b>211.53</b>	<b>189.58</b>	<b>208.12</b>	<b>-10</b>	<b>10</b>		
<b>Gross Margin</b>	<b>562.27</b>	<b>685.49</b>	<b>837.26</b>	<b>22</b>	<b>22</b>	<b>2 &gt; 1</b>	<b>3 &gt; 2</b>

**Table 2.5 Changes in Gross Margin Components, Great Britain, 1993 to 1995, in Money of 1995 Purchasing Power**

	Winter wheat			Winter barley			Spring barley		
	1993-94	1994-95	per cent change 93-95	1993-94	1994-95	per cent change 93-95	1993-94	1994-95	per cent change 93-95
	£/ha	£/ha		£/ha	£/ha		£/ha	£/ha	
Output-grain	38.65	82.29	15	7.03	81.44	13	50.18	96.70	26
Output-straw	8.93	7.97	49	12.86	10.43	33	9.66	-1.92	10
<b>Total crop output</b>	<b>47.58</b>	<b>90.26</b>	<b>16</b>	<b>19.89</b>	<b>91.87</b>	<b>15</b>	<b>59.84</b>	<b>94.78</b>	<b>24</b>
Arable area payment	51.97	68.96	85	45.24	63.27	76	41.42	75.55	90
<b>Total output</b>	<b>99.56</b>	<b>159.22</b>	<b>26</b>	<b>65.14</b>	<b>155.14</b>	<b>24</b>	<b>101.26</b>	<b>170.33</b>	<b>35</b>
Margin over materials	98.91	149.80	32	66.47	147.38	31	107.88	156.56	43
Total variable costs	-3.03	5.53	1	-7.65	4.53	-1	-21.95	18.54	-2
<b>Gross Margin</b>	<b>103.02</b>	<b>153.26</b>	<b>36</b>	<b>72.79</b>	<b>150.61</b>	<b>34</b>	<b>123.22</b>	<b>151.77</b>	<b>49</b>

**Figure 2.1 Levels of Gross Margin Components, Great Britain, 1993 to 1995 in Money of 1995 Purchasing Power**



Overall, however, the total variable costs showed little change because the increases in fertiliser and crop protection costs were offset to some extent by a significant fall in seed costs for winter wheat and barley, and by a reduction in the cost of grain drying for all the crops,

which was not surprising after the hot, dry summer. The changes in the main elements of the gross margin can be seen clearly in Figure 2.1.

## 2.4 Gross Margin Results for England, Wales and Scotland

Financial data to show comparisons between England, Wales and Scotland for the three major cereal crops for the 1995 harvest are presented in Tables 2.6 to 2.8. The factor of most importance to economic performance is the continued increase in yields in England and Scotland, but especially Scotland, for all three crops.

**Table 2.6 Winter Wheat: Costs and Returns by Country, 1995 Harvest Year (weighted)**

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	284		9		36	
Yield tonnes per ha	7.96	(0.63)	7.61	(4.70)	8.81	(1.73)
Price £ per tonne	118.18	(0.04)	119.64	(1.22)	116.01	(0.30)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	940.32	(6.87)	911.03	(51.76)	1022.26	(18.59)
Output-straw	45.35	(1.38)	178.64	(22.19)	85.02	(5.33)
Arable area payment	265.28	(3.62)	224.47	(25.44)	252.75	(9.35)
<b>Total output</b>	<b>1250.95</b>	<b>(7.89)</b>	<b>1314.14</b>	<b>(61.80)</b>	<b>1360.03</b>	<b>(21.48)</b>
Material costs						
Seed	47.92	(1.53)	48.57	(11.71)	61.85	(4.49)
Fertiliser	92.20	(2.14)	116.73	(18.22)	115.45	(6.11)
Crop protection	104.89	(2.29)	96.52	(16.31)	103.38	(5.80)
<b>Total</b>	<b>245.01</b>	<b>(3.49)</b>	<b>261.82</b>	<b>(27.11)</b>	<b>280.68</b>	<b>(9.55)</b>
Margin over materials	1005.94	(7.07)	1052.32	(55.53)	1079.35	(19.24)
Other variable costs						
Casual labour	1.88	(0.32)	2.99	(2.44)	1.92	(0.96)
Contract	20.91	(0.90)	29.10	(4.81)	35.28	(3.50)
Fuel for grain drying	1.97	(0.32)	1.07	(2.03)	14.77	(2.37)
Miscellaneous	8.94	(0.67)	6.91	(4.32)	10.59	(1.95)
<b>Total</b>	<b>33.70</b>	<b>(1.21)</b>	<b>40.07</b>	<b>(7.20)</b>	<b>62.56</b>	<b>(4.75)</b>
<b>Total variable costs</b>	<b>278.71</b>	<b>(3.69)</b>	<b>301.89</b>	<b>(28.05)</b>	<b>343.24</b>	<b>(10.67)</b>
<b>Gross Margin</b>	<b>972.24</b>	<b>(6.97)</b>	<b>1012.25</b>	<b>(55.06)</b>	<b>1016.79</b>	<b>(18.64)</b>



**Table 2.7 Winter Barley: Costs and Returns by Country, 1995 Harvest Year (weighted)**

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	216		20		26	
Yield tonnes per ha	6.60	(0.46)	6.06	(1.36)	8.10	(1.65)
Price £ per tonne	116.88	(0.05)	106.39	(0.52)	109.04	(0.40)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	771.65	(5.04)	644.71	(14.09)	883.36	(17.16)
Output-straw	81.61	(1.59)	203.99	(7.34)	135.32	(6.74)
Arable area payment	255.74	(2.88)	196.43	(7.83)	244.59	(9.00)
<b>Total output</b>	<b>1109.00</b>	<b>(6.02)</b>	<b>1045.13</b>	<b>(17.71)</b>	<b>1263.27</b>	<b>(20.52)</b>
Material costs						
Seed	46.23	(1.22)	50.93	(3.91)	62.04	(4.47)
Fertiliser	77.89	(1.59)	95.84	(5.52)	106.89	(5.88)
Crop protection	77.89	(1.61)	65.31	(4.67)	78.11	(5.11)
<b>Total</b>	<b>202.01</b>	<b>(2.57)</b>	<b>212.08</b>	<b>(8.22)</b>	<b>247.04</b>	<b>(8.98)</b>
<b>Margin over materials</b>	<b>906.99</b>	<b>(5.44)</b>	<b>833.05</b>	<b>(15.68)</b>	<b>1016.23</b>	<b>(18.45)</b>
Other variable costs						
Casual labour	1.74	(0.22)	3.22	(1.13)	1.58	(0.80)
Contract	17.41	(0.66)	38.95	(2.61)	28.33	(2.75)
Fuel for grain drying	1.25	(0.21)	0.46	(0.47)	6.71	(1.62)
Miscellaneous	7.82	(0.51)	10.02	(1.70)	11.64	(2.12)
<b>Total</b>	<b>28.21</b>	<b>(0.89)</b>	<b>52.65</b>	<b>(3.35)</b>	<b>48.25</b>	<b>(3.91)</b>
<b>Total variable costs</b>	<b>230.22</b>	<b>(2.72)</b>	<b>264.74</b>	<b>(8.88)</b>	<b>295.29</b>	<b>(9.80)</b>
<b>Gross Margin</b>	<b>878.77</b>	<b>(5.37)</b>	<b>780.39</b>	<b>(15.32)</b>	<b>967.98</b>	<b>(18.03)</b>

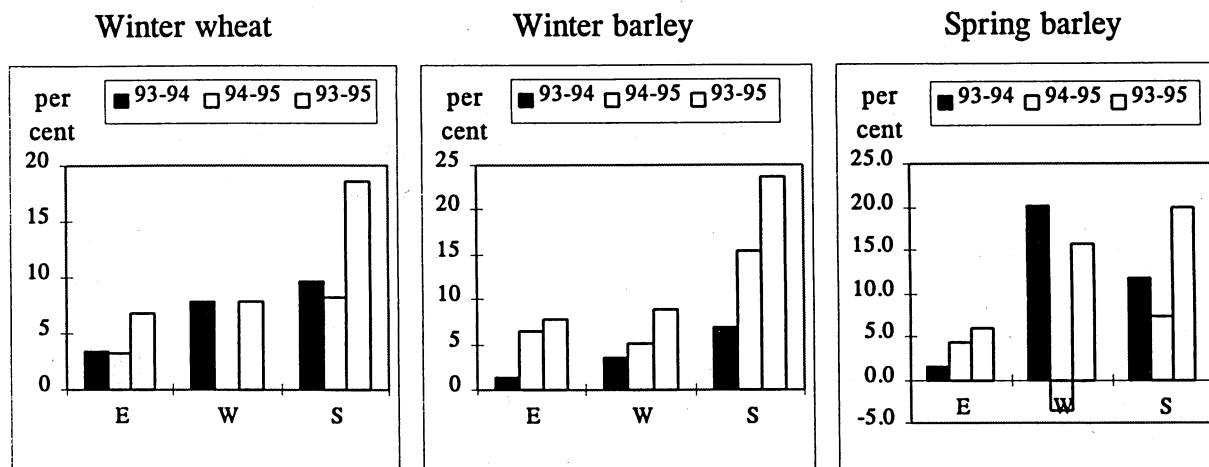
**Table 2.8 Spring Barley: Costs and Returns by Country, 1995 Harvest Year (weighted)**

	England		Wales		Scotland	
		s.e.		s.e.		s.e.
No. farms	109		16		58	
Yield tonnes per ha	5.16	(0.46)	5.05	(1.40)	5.82	(0.95)
Price £ per tonne	135.91	(0.11)	106.82	(0.65)	133.16	(0.20)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	700.66	(5.40)	539.92	(14.61)	775.07	(11.08)
Output-straw	57.44	(1.41)	181.40	(7.77)	93.40	(3.67)
Arable area payment	261.30	(3.26)	174.41	(8.91)	241.79	(6.23)
<b>Total output</b>	<b>1019.40</b>	<b>(6.46)</b>	<b>895.73</b>	<b>(18.80)</b>	<b>1110.26</b>	<b>(13.23)</b>
Material costs						
Seed	52.67	(1.46)	49.67	(4.31)	62.87	(3.12)
Fertiliser	58.67	(1.54)	68.07	(5.51)	74.91	(3.50)
Crop protection	56.32	(1.52)	33.48	(3.69)	37.53	(2.48)
<b>Total</b>	<b>167.66</b>	<b>(2.61)</b>	<b>151.22</b>	<b>(7.91)</b>	<b>175.31</b>	<b>(5.30)</b>
Margin over materials	851.74	(5.91)	744.52	(17.06)	934.95	(12.12)
Other variable costs						
Casual labour	0.43	(0.14)	4.09	(1.06)	1.43	(0.50)
Contract	18.31	(0.86)	24.90	(2.40)	29.80	(2.00)
Fuel for grain drying	1.07	(0.22)	0.06	(0.16)	3.62	(0.73)
Miscellaneous	7.19	(0.53)	12.20	(2.11)	16.41	(1.67)
<b>Total</b>	<b>27.01</b>	<b>(1.04)</b>	<b>41.25</b>	<b>(3.37)</b>	<b>51.24</b>	<b>(2.75)</b>
Total variable costs	194.67	(2.81)	192.46	(8.60)	226.55	(5.97)
Gross Margin	824.73	(5.82)	703.27	(16.72)	883.71	(11.80)

The percentage changes in yield since 1993, for the three major cereals, are shown in Figure 2.2. It can be seen that since 1993 Scotland has achieved an average increase in yield of 18.6 per cent for winter wheat, 23.7 per cent for winter barley and 20.4 per cent for spring barley. England maintained a more modest increase in yield, under ten per cent for wheat and barley since 1993. Wales showed an increase in yield for all three crops in 1994 but between 1994 and 1995 there was an increase only for winter barley, and for spring barley the average yield fell. Although there was a difference in yield between England and Wales for spring barley of only two per cent, the average price difference was 27 per cent (£29.00 per tonne). This results from the much higher proportion of malting spring barley grown in England, whereas in Wales it is usually grown for feed. The average yields obtained from the survey farms have been consistently higher than those published by MAFF/HGCA for England and Wales,

in 1993, 1994 and 1995 for winter wheat and winter and spring barley by between two and eight per cent. Average yields for Scotland have shown greater differences particularly for winter barley where survey yield averages were 27 per cent higher than HGCA published figures in 1993, and 14 per cent higher in 1995.

**Figure 2.2 Percentage Changes in Yield for England, Wales and Scotland, 1993 to 1994, 1994 to 1995, and From 1993 to 1995, by Crop**



Gross margin increases were observed for the three crops, continuing the trend since 1993. The contributing factors are shown in Table 2.9. Scotland keeps its position at the head of the rankings by gross margin for the three crops, but for winter wheat Wales has overtaken England in 1995. Scotland's high gross margin for winter wheat is mainly attributable to its increased yield, to a level of 0.85 tonnes per hectare greater than England. Despite the higher arable area payments, the crop output had more effect on gross margin increases than the compensatory payment for winter wheat in all three countries. For England this was a changed situation from 1994, when the increase in the crop output was less than that in the area payment. The higher arable area payments did result in an increase in the proportion of this component to the total output for all countries compared with 1994. Arable area payments were 21 per cent of the total output for winter wheat in England, 19 per cent in Scotland and 17 per cent in Wales, an increase of three percentage points for each country.

It must be emphasised that the results for Wales must be viewed with caution because of the small sample in this category. The yield of winter wheat in Wales showed no increase between 1994 and 1995 and the improvement in the gross margin of this crop was largely due to a decrease in variable costs, particularly for contract labour. This was the result of one or two farms ceasing to grow winter wheat and consequently not employing contract labour as they had the year before. It highlights the effect a small change in the sample can have on the results when the sample number is low. The importance of livestock in Wales is evident in a higher contribution to output for straw, and more use of grain for feed on the farm. Wheat straw made up 14 per cent of the total returns (compared with four per cent in England and

six per cent in Scotland). Also cereal margins do not benefit from the arable area payment in the same way in Wales as in England and Scotland, because a higher proportion of farmers opt to count at least part of the cereal area as forage to qualify for the livestock premium payment, and because area payments in Wales, particularly for LFAs, are lower (Table 2.10).

**Table 2.9 Changes in Gross Margin Components, by Country, 1993 to 1995, in Money of 1995 Purchasing Power**

	England		Wales		Scotland	
	1993-94	1994-95	1993-94	1994-95	1993-94	1994-95
<b>Winter wheat</b>						
	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	30.47	80.38	51.78	67.16	116.91	110.96
Output-straw	7.35	8.23	47.72	22.00	-10.39	11.98
<b>Total crop output</b>	<b>37.82</b>	<b>88.61</b>	<b>99.49</b>	<b>89.16</b>	<b>106.52</b>	<b>122.94</b>
Arable area payment	52.79	68.99	68.30	63.79	45.83	70.09
<b>Total output</b>	<b>90.61</b>	<b>157.61</b>	<b>158.46</b>	<b>152.95</b>	<b>152.34</b>	<b>193.04</b>
Margin over materials	89.42	149.31	168.60	153.08	169.45	157.56
Total variable costs	-1.96	2.72	49.44	-50.40	-34.84	42.93
<b>Gross Margin</b>	<b>92.57</b>	<b>154.88</b>	<b>118.36</b>	<b>203.35</b>	<b>187.18</b>	<b>150.11</b>
<b>Winter barley</b>						
	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	5.19	79.45	24.57	23.80	28.84	116.61
Output-straw	11.41	6.17	40.20	34.53	7.25	17.11
<b>Total crop output</b>	<b>16.61</b>	<b>85.62</b>	<b>64.76</b>	<b>58.33</b>	<b>36.09</b>	<b>133.71</b>
Arable area payment	47.35	62.98	37.41	70.90	44.68	66.30
<b>Total output</b>	<b>63.95</b>	<b>148.60</b>	<b>102.17</b>	<b>129.23</b>	<b>80.76</b>	<b>200.01</b>
Margin over materials	65.79	141.66	105.26	108.42	80.23	191.50
Total variable costs	-8.85	3.33	-4.71	4.84	-8.04	15.02
<b>Gross Margin</b>	<b>72.81</b>	<b>145.26</b>	<b>106.88</b>	<b>124.39</b>	<b>88.80</b>	<b>184.99</b>
<b>Spring Barley</b>						
	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	30.27	99.86	98.41	-17.18	114.39	65.52
Output-straw	9.19	1.49	14.41	57.53	7.42	-7.88
<b>Total crop output</b>	<b>39.46</b>	<b>101.35</b>	<b>112.82</b>	<b>40.36</b>	<b>121.81</b>	<b>57.64</b>
Arable area payment	46.97	71.69	29.01	81.26	50.21	64.33
<b>Total output</b>	<b>86.43</b>	<b>173.04</b>	<b>141.83</b>	<b>121.61</b>	<b>172.02</b>	<b>121.98</b>
Margin over materials	87.54	159.05	149.72	123.57	179.75	111.58
Total variable costs	-9.19	13.44	-10.66	7.99	-32.24	27.94
<b>Gross Margin</b>	<b>95.62</b>	<b>159.60</b>	<b>152.50</b>	<b>113.63</b>	<b>204.25</b>	<b>94.04</b>

**Table 2.10 Arable Area Payments for Cereals 1993, 1994 and 1995 Harvest Years**

	Area Payment £ per hectare		
	1993	1994	1995
England	140.64	193.53	269.17
Scotland (LFA)	114.07	156.97	238.10
Scotland (non-LFA)	131.39	180.51	259.12
Wales (LFA) (1)	110.28	108.35	230.78
Wales (non-LFA) (1)	110.28	168.72	236.26

(1) There was no distinction between LFAs and non-LFAs in Wales before 1994

In gross margins for winter and spring barley, England remained in second place to Scotland. Yields in Scotland again improved between 1994 and 1995 by 15.5 per cent for winter barley and 7.7 per cent for spring barley. This compares to increases in yield in England of 6.5 per cent for winter barley and 4.2 per cent for spring barley. England and Scotland both achieved much higher prices for spring barley, the effect of high premia for the large proportion sold for malting. In Wales barley straw was a much more important part of the total returns, at 20 per cent compared to 10 per cent in Scotland and seven per cent in England. In Wales the 20 per cent increase in yield between 1993 and 1994 for spring barley was eroded by a fall in yield between 1994 and 1995 of four per cent. Arable area payments constituted 23 per cent of the total output of winter barley for England, and 19 per cent for Scotland, an increase between two and three percentage points for both countries from 1994. In Wales the area payment was 14 per cent of total output in 1994 but jumped to 19 per cent in 1995, a reflection of the greater increase for LFA area payments in Wales compared to the other two countries. For spring barley the area payment for Wales was also 19 per cent of total output showing an even larger increase on 1994.

With the exception of winter wheat in Wales, the total variable costs for all crops rose in real terms between 1994 and 1995, having previously fallen between 1993 and 1994. However, these were far outweighed by the increases in output (Table 2.9). In England and Wales, for winter wheat, a significant increase in the cost per hectare of fertiliser was somewhat offset by lower grain-drying charges and a surprising decrease in the cost of seed. Seed cost and application is considered in more detail in Chapter 3. Scotland also showed an increase in fertiliser costs for winter wheat and a larger increase in the cost per hectare of crop protection materials; however, the percentage of the total variable costs for materials, ie seeds, fertilisers and crop protection materials, remained at 82 per cent in 1995, the same as in 1994. For the barley crops, on which applications of nitrogen are less intense, there was a

smaller increase in fertiliser cost in all three countries, partly offset by a reduction in seed costs (as for wheat) with the exception of spring barley in Scotland, where seed costs rose slightly.

## 2.5 Combined Wheat and Barley Enterprises

The weighted individual crop results for the three countries were aggregated to give a combined wheat and barley crop average (Table 2.11). Again Scotland has the highest gross margin, followed by England and then Wales. Although Scotland has the highest yield, it also has higher variable costs than England which has the effect of giving England the lowest production cost per tonne for combined wheat and barley enterprises. Table 2.11 also clearly shows the importance of straw and the increased importance of the arable area payment in Wales, already discussed.

**Table 2.11 Combined Wheat and Barley Enterprises: Costs and Returns by Country, 1995 Harvest Year (weighted)**

	England	Wales	Scotland	Per cent change 1994-95		
				E	W	S
No. farms	310	30	61			
Yield tonnes per ha	7.32	6.62	7.39	6	15	18
Price £ per tonne	119.91	113.52	121.86	12	11	7
Returns	£/ha	£/ha	£/ha			
Output-grain	873.32	758.95	888.56	18	29	25
Output-straw	55.23	184.76	98.97	-2	25	-9
Arable area payment	262.59	205.64	246.41	42	109	45
<b>Total output</b>	<b>1191.13</b>	<b>1149.35</b>	<b>1233.93</b>	<b>21</b>	<b>38</b>	<b>25</b>
Material costs	226.06	222.82	228.97	9	24	23
Margin over materials	965.07	926.53	1004.97	25	41	25
Total variable costs	257.71	265.88	283.76	2	9	19
Gross Margin	933.42	883.47	950.17	28	49	27

## 2.6 Outlook

The CAP reform measures, intended to reduce production and lower prices, were overtaken by world events. A world shortage of cereals kept prices high, and increased output resulting from lower set-aside and higher yields together with weak sterling, leading to devaluation of

the green £ and boosting area payments, combined to make 1995 another profitable year for wheat and barley growers in Great Britain. Some politicians have questioned the level of area payments but it must be remembered that they were higher in the UK, because of the devaluation of the green pound, than in strong currency EU countries. Discussions are now taking place on proposals to cut the payments to pay for the cost of BSE compensation.

Consequently the sustainability of this prosperity is questionable. Significant cost increases for fertilisers and crop protection materials have been observed in 1995, and are expected to continue; set-aside (other than the conservation reserve) has been further reduced for 1996/97, and abolished in the USA, already resulting in increased production and lower prices. The proposed continuation of these studies over the next few years will enable any changes to be monitored in this eventful period for cereal production.

## Chapter 3: Further Analysis of Wheat and Barley Production

### 3.1 Introduction

The results given in the previous chapter are averages obtained from a wide range of individual farms. To examine this variability more closely and identify factors affecting profitability, to the level of gross margin, further analyses have been undertaken. First investigated is the effect of the area of the combined wheat and barley enterprises; then for individual enterprises comparisons are made between upper and lower quartile groups. Analysis of variance has been carried out to identify which factors vary significantly at the 10 per cent level. Management practices have also been examined with respect to seed, fertiliser and crop protection. It is recognised that other factors involved in performance, such as the interaction between weather and soil quality, are largely beyond the farmer's control and in a dry year such as 1995 this factor is likely to have had more effect on production than usual. 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

To abstract the effect of differences in size that result from regional variations in the pattern of farming, two analyses by size of cereal enterprise have been undertaken, for winter wheat and for total winter and spring barley. Table 3.1 presents costs and returns for five size groups, based on the area of cereals plus set-aside, for counties in England where cereals constitute 40 per cent or more of the crops and grass area. Table 3.2 presents results for the cereal-extensive counties (cereals < 40 per cent of total crops and grass area) for the same size groups. A list of cereal-intensive and cereal-extensive counties is given in Appendix B.

For farms in the cereal-intensive counties of England yields, significant consistent economies of size are not apparent. Table 3.1 demonstrates more clearly the particular diseconomies of small size for those farms with cereals enterprises of less than 40 hectares. For both winter wheat and barley, at the gross margin and the margin over materials level, there is a significant difference between the group with the smallest area and the others. Yield and price are both significantly lower, at the ten per cent level, than all other groups for winter wheat. For barley there is a significant difference between the total output for farms with a cereal plus set-aside area of less than 40 hectares and the larger groups. The low yield and price obtained by this group make the grain output significantly lower than that for farms with cereal enterprises over 120 hectares. As with wheat, the arable area payment is significantly lower than for all the other larger groups. Variable costs are higher for the smallest group mainly due to high contract costs incurred, resulting in the higher variable costs per tonne for this group, but even when these are excluded from the gross margin the smallest group still has a significantly lower margin.



**Table 3.1 Costs and Returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-aside, 1995 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	
<b>WHEAT</b>						
No. observations	18	29	26	37	47	
Yield tonnes per ha	7.31	7.97	7.84	8.18	8.21	542 > 1
Price £ per tonne	111.22	117.35	115.69	119.41	120.37	5423 > 1 54 > 3 5 > 2
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	809.78	933.92	905.51	975.71	986.45	5423 > 1 54 > 3 5 > 2
Output-straw	26.12	48.79	31.84	30.13	22.68	2 > 5
Arable area payment	247.49	266.74	268.14	268.46	263.04	5432 > 1
<b>Total output</b>	<b>1083.39</b>	<b>1249.44</b>	<b>1205.50</b>	<b>1274.31</b>	<b>1272.16</b>	<b>4523 &gt; 1 45 &gt; 3</b>
<b>Material costs</b>						
Seed	53.26	51.97	48.52	47.14	46.73	12 > 54
Fertiliser	82.41	89.21	85.98	84.78	95.14	5 > 341
Crop protection	105.99	104.01	100.60	112.07	108.97	-
<b>Total</b>	<b>241.66</b>	<b>245.18</b>	<b>235.10</b>	<b>243.98</b>	<b>250.84</b>	-
Other variable costs	51.76	26.03	30.83	21.19	15.30	1 > 3245 3 > 5
<b>Total variable costs</b>	<b>293.42</b>	<b>271.21</b>	<b>265.93</b>	<b>265.17</b>	<b>266.15</b>	-
Margin over materials	841.72	1004.26	970.40	1030.32	1021.32	4523 > 1 4 > 3
Gross Margin	789.96	978.23	939.57	1009.14	1006.01	4523 > 1 45 > 3
Gross margin before contract	832.64	994.35	957.77	1017.44	1008.56	4523 > 1 4 > 3
Variable costs £/tonne	40.98	34.42	34.47	32.96	32.77	1 > 3245
<b>BARLEY</b>						
No. observations	13	21	17	26	35	
Yield tonnes per ha	5.79	6.38	6.26	6.75	6.61	45 > 1
Price £ per tonne	114.06	118.64	118.08	120.70	124.83	5 > 1
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	661.34	742.97	734.43	812.38	818.65	54 > 1 5 > 23
Output-straw	61.44	78.69	92.38	59.46	53.84	3 > 5
Arable area payment	214.75	260.07	269.13	268.12	260.13	3452 > 1
<b>Total output</b>	<b>937.53</b>	<b>1081.73</b>	<b>1095.94</b>	<b>1139.96</b>	<b>1132.62</b>	<b>4532 &gt; 1</b>
<b>Material costs</b>						
Seed	50.13	48.91	44.36	43.90	48.35	125 > 4
Fertiliser	69.12	75.09	71.16	69.35	76.07	-
Crop protection	75.46	70.73	70.37	85.24	81.92	-
<b>Total</b>	<b>194.71</b>	<b>194.73</b>	<b>185.89</b>	<b>198.49</b>	<b>206.35</b>	-
Other variable costs	53.93	23.63	26.35	20.03	13.82	1 > 3245
<b>Total variable costs</b>	<b>248.64</b>	<b>218.36</b>	<b>212.24</b>	<b>218.51</b>	<b>220.17</b>	<b>1 &gt; 3</b>
Margin over materials	742.83	887.00	910.05	941.47	926.27	4532 > 1
Gross Margin	688.89	863.37	883.70	921.44	912.45	4532 > 1
Gross margin before contract	735.76	878.35	899.63	930.40	915.42	4532 > 1
Variable costs £/tonne	47.31	34.74	35.49	33.00	33.60	1 > 3254

**Table 3.2 Costs and Returns for Wheat and Barley Enterprises, Grouped by Area of Cereals + Set-aside, 1995 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	
<b>WHEAT</b>						
No. observations	25	31	21	28	22	
Yield tonnes per ha	6.77	7.45	7.95	8.13	7.95	4352 > 1 4 > 2
Price £ per tonne	115.05	117.00	119.89	119.23	117.24	34 > 1
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	775.31	871.70	954.01	970.88	934.18	4352 > 1 43 > 2
Output-straw	102.03	79.35	82.25	60.77	48.16	132 > 5 1 > 4
Arable area payment	254.60	263.63	266.38	265.77	268.58	5342 > 1
<b>Total output</b>	<b>1131.94</b>	<b>1214.67</b>	<b>1302.63</b>	<b>1297.41</b>	<b>1250.92</b>	<b>3452 &gt; 1 34 &gt; 2</b>
Material costs						
Seed	49.62	48.70	47.13	46.48	47.73	-
Fertiliser	91.29	90.93	102.64	100.89	93.02	34 > 12
Crop protection	92.14	98.79	101.73	98.23	99.54	-
<b>Total</b>	<b>233.06</b>	<b>238.42</b>	<b>251.51</b>	<b>245.61</b>	<b>240.28</b>	-
Other variable costs	86.37	61.51	36.24	27.78	55.57	125 > 4 1 > 53
<b>Total variable costs</b>	<b>319.43</b>	<b>299.93</b>	<b>287.75</b>	<b>273.39</b>	<b>295.85</b>	<b>1 &gt; 4</b>
Margin over materials	898.88	976.25	1051.13	1051.80	1010.64	435 > 1 4 > 2
<b>Gross Margin</b>	<b>812.51</b>	<b>914.74</b>	<b>1014.89</b>	<b>1024.02</b>	<b>955.07</b>	<b>4352 &gt; 1 43 &gt; 2</b>
Gross margin before contract	886.77	963.66	1038.11	1038.19	994.84	435 > 1
Variable costs £/tonne	50.55	41.95	36.58	34.02	37.53	12 > 4 1 > 253
<b>BARLEY</b>						
No. observations	37	24	17	23	20	
Yield tonnes per ha	5.78	6.35	6.59	6.30	6.27	324 > 1
Price £ per tonne	109.25	111.92	117.18	119.31	118.76	453 > 1 45 > 2
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	
Output-grain	634.77	707.79	773.02	748.05	741.37	3452 > 1
Output-straw	133.63	90.45	91.92	96.46	74.04	1 > 4325
Arable area payment	232.38	260.19	263.12	268.34	268.66	5432 > 1
<b>Total output</b>	<b>1000.78</b>	<b>1058.43</b>	<b>1128.07</b>	<b>1112.85</b>	<b>1084.06</b>	<b>345 &gt; 1</b>
Material costs						
Seed	49.21	51.13	46.78	47.14	49.22	-
Fertiliser	74.13	80.05	78.06	82.04	73.04	-
Crop protection	58.60	74.46	77.38	66.32	71.92	325 > 1
<b>Total</b>	<b>181.95</b>	<b>205.64</b>	<b>202.22</b>	<b>195.50</b>	<b>194.18</b>	<b>23 &gt; 1</b>
Other variable costs	67.10	48.07	28.87	22.69	41.79	1 > 534 2 > 4
<b>Total variable costs</b>	<b>249.05</b>	<b>253.71</b>	<b>230.49</b>	<b>218.19</b>	<b>235.97</b>	<b>21 &gt; 4</b>
Margin over materials	818.83	852.07	925.85	917.35	889.88	34 > 1
<b>Gross Margin</b>	<b>751.73</b>	<b>804.72</b>	<b>897.58</b>	<b>894.66</b>	<b>848.09</b>	<b>345 &gt; 1 4 &gt; 2</b>
Gross margin before contract	808.83	842.86	916.86	907.31	875.30	34 > 1
Variable costs £/tonne	44.32	41.86	35.41	35.78	38.28	1 > 543 2 > 4

For farms in the cereal-extensive counties of England, cereal enterprises of less than 40 hectares again achieved a significantly lower average gross margin for wheat in comparison with the other groups; for barley the gross margin was significantly lower than for cereal enterprises above 80 hectares, again showing the diseconomy of very small size. Yield and price were significantly lower and variable costs in £ per tonne were significantly higher than on larger cereal enterprises. In comparison with the cereal-intensive counties differences were apparent in the value of wheat straw. In these counties straw accounted for about four to six per cent of total output for winter wheat in most groups but on those enterprises with less than 40 hectares of cereals and set-aside it was nine per cent; this may be compared with between two and four per cent for all groups in the cereal-intensive counties. Barley straw showed less difference between the two areas, accounting for between five and nine per cent of total output for all groups in both areas, with the exception of cereal enterprises of less than 40 hectares in the cereal-extensive counties where it was more important at 13 per cent of total output. For wheat overall, the two highest gross margins were achieved by groups three and four in the cereal-extensive area. There was little difference in yields obtained in the equivalent groups in the intensive counties; the better performance was the result of a higher average price per tonne obtained by group three in the extensive counties and the better straw output in both groups. For barley across all counties, the highest average gross margins were achieved by the two groups of cereal enterprises over 120 hectares in the cereal-intensive region, where higher yields and prices were obtained.

### **3.3 Dispersion in Gross Margin**

For the three main cereal crops, winter wheat, winter barley and spring barley, sample farms have been ranked by the margin over materials and the top 25 per cent compared with the bottom 25 per cent. The results are given in Tables 3.3, 3.4 and 3.5. For winter wheat the gross margin for the upper quartile group is 64 per cent higher than for the lower quartile group, the main contribution to this coming from the components of the total output which all show significantly higher differences. The mean area in the best performing quartile group was also significantly higher. These findings are consistent with similar analyses done in recent years. A particular feature of the 1995 results is the significantly higher fertiliser cost for the upper quartile; however this is offset by significantly lower costs in this group for seed and crop protection, resulting in no significant difference overall in the total material cost. The higher fertiliser cost per hectare may indicate a higher fertiliser usage in the upper quartile which has contributed to the higher yield, but equally the sample farms in this group may have benefitted from higher rainfall than average or heavier land. The significant difference in the cost of fuel for grain drying could suggest that the weather had some effect at least on the good performance in the upper quartile.

For winter and spring barley (Tables 3.4 and 3.5) there are no significant differences between the quartile groups for material costs, and the major component affecting gross margin performance is the combination of yield and price. For winter barley the upper quartile produced an average 46 per cent higher yield, a similar difference to that for winter wheat, and for spring

barley the yield was 57 per cent higher. The significant difference in area payment suggests that there were smaller mixed units in the lower quartile, opting for the simplified scheme of area payment. On these farms barley was more likely to be grown for feed, and this resulted in the higher prices obtained by the upper 25 per cent of sample farms, particularly for spring barley, a high proportion of which was grown for malting and received a high premium. The gross margin for winter barley in the upper quartile group was 80 per cent higher than the lower quartile group, and for spring barley it was nearly twice that in the lower quartile group.

**Table 3.3 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Wheat, 1995 Harvest Year**

	Upper 25%		Lower 25%		Statistically significant differences at the 10% level
		s.e.		s.e.	
Group	1		2		
No. farms	82		82		
Crop area	88.9		60.83		1>2
Yield tonnes per ha	9.21	(0.10)	6.33	(0.12)	1>2
Price £ per tonne	120.89	(0.70)	114.42	(0.85)	1>2
Returns	£/ha		£/ha		
Output-grain	1112.83	(12.78)	722.32	(13.20)	1>2
Output-straw	89.58	(7.72)	48.79	(5.56)	1>2
Arable area payment	264.00	(1.09)	252.62	(5.33)	1>2
<b>Total output</b>	<b>1466.40</b>	<b>(11.72)</b>	<b>1023.72</b>	<b>(13.23)</b>	<b>1&gt;2</b>
Material costs					
Seed	48.80	(1.36)	52.49	(1.22)	2>1
Fertiliser	98.79	(2.74)	92.49	(3.02)	1>2
Crop protection	97.74	(3.32)	106.94	(3.73)	2>1
<b>Total</b>	<b>245.32</b>	<b>(4.53)</b>	<b>251.93</b>	<b>(5.75)</b>	
<b>Margin over materials</b>	<b>1221.08</b>	<b>(11.31)</b>	<b>771.79</b>	<b>(11.63)</b>	<b>1&gt;2</b>
Other variable costs					
Casual labour	2.54	(0.72)	1.63	(0.57)	
Contract	29.43	(5.10)	46.80	(8.32)	2>1
Fuel for grain drying	5.46	(1.17)	2.27	(0.62)	1>2
Miscellaneous	10.51	(1.15)	7.54	(0.73)	1>2
<b>Total</b>	<b>47.94</b>	<b>(5.26)</b>	<b>58.25</b>	<b>(8.35)</b>	
<b>Total variable costs</b>	<b>293.26</b>	<b>(7.03)</b>	<b>310.18</b>	<b>(11.16)</b>	
<b>Gross Margin</b>	<b>1173.15</b>	<b>(12.71)</b>	<b>713.55</b>	<b>(14.54)</b>	<b>1&gt;2</b>

It is often assumed that the farms in the upper quartiles have been subjected to better management, and this is undoubtedly a contributing factor, although soil quality and weather have already been discussed as having a major effect on production. The survey also highlights other factors. It

shows that the majority of farms in the upper quartiles are situated on the eastern side of the country, in intensive-cereal areas, and are large enough to obtain economic benefits denied to smaller cereal enterprises. The farms in the lower quartiles tend to be the smaller units where livestock, and their feed, have a greater importance.

**Table 3.4 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Winter Barley, 1995 Harvest Year**

	Upper 25%		Lower 25%		Statistically significant differences at the 10% level
		s.e.		s.e.	
Group	1		2		
No. farms	65		65		
Crop area	33.35		29.20		
Yield tonnes per ha	7.88	(0.15)	5.40	(0.15)	1>2
Price £ per tonne	123.14	(2.29)	107.12	(0.72)	1>2
Returns	£/ha		£/ha		
Output-grain	958.95	(15.68)	578.05	(15.94)	1>2
Output-straw	136.53	(12.13)	77.34	(8.20)	1>2
Arable area payment	264.66	(1.11)	219.48	(10.76)	1>2
<b>Total output</b>	<b>1360.15</b>	<b>(12.94)</b>	<b>874.87</b>	<b>(19.78)</b>	<b>1&gt;2</b>
Material costs					
Seed	50.65	(1.57)	48.58	(1.45)	
Fertiliser	82.50	(3.84)	83.47	(4.10)	
Crop protection	78.76	(3.65)	78.81	(4.87)	
<b>Total</b>	<b>211.91</b>	<b>(6.05)</b>	<b>210.86</b>	<b>(7.86)</b>	
Margin over materials	1148.24	(11.25)	664.01	(16.44)	1>2
Other variable costs					
Casual labour	0.87	(0.27)	1.38	(0.51)	
Contract	16.71	(3.81)	34.51	(5.86)	2>1
Fuel for grain drying	1.82	(0.40)	0.61	(0.27)	1>2
Miscellaneous	11.42	(1.35)	7.17	(1.08)	1>2
<b>Total</b>	<b>30.82</b>	<b>(4.17)</b>	<b>43.67</b>	<b>(6.26)</b>	
Total variable costs	242.73	(7.53)	254.53	(9.87)	
Gross Margin	1117.42	(12.32)	620.34	(16.88)	1>2

**Table 3.5 Costs and Returns per Hectare, by Margin over Materials Quartile Groups, Spring Barley, 1995 Harvest Year**

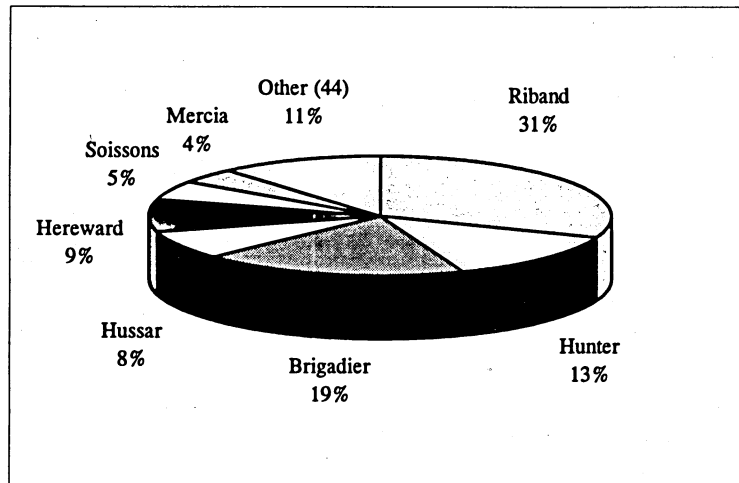
Group	Upper 25%		Lower 25%		Statistically significant differences at the 10% level
		s.e.		s.e.	
No. farms	46		46		
Crop area	38.92	(6.57)	19.06	4.37	1>2
Yield tonnes per ha	6.39	(0.12)	4.08	(0.18)	1>2
Price £ per tonne	143.59	(2.82)	110.98	(1.25)	1>2
Returns	£/ha		£/ha		
Output-grain	912.28	(18.99)	450.79	(18.74)	1>2
Output-straw	97.25	(9.41)	85.57	(9.38)	
Arable area payment	256.17	(3.11)	206.88	(15.01)	1>2
<b>Total output</b>	<b>1265.70</b>	<b>(16.67)</b>	<b>743.24</b>	<b>(17.99)</b>	<b>1&gt;2</b>
Material costs					
Seed	56.14	(1.86)	56.06	(2.28)	
Fertiliser	68.93	(3.16)	63.72	(3.58)	
Crop protection	45.81	(3.34)	46.19	(4.37)	
<b>Total</b>	<b>170.87</b>	<b>(5.18)</b>	<b>165.97</b>	<b>(6.37)</b>	
<b>Margin over materials</b>	<b>1094.83</b>	<b>(15.05)</b>	<b>577.27</b>	<b>(17.56)</b>	<b>1&gt;2</b>
Other variable costs					
Casual labour	1.49	(0.55)	1.45	(0.64)	
Contract	22.57	(5.90)	26.97	(5.69)	
Fuel for grain drying	2.79	(0.97)	1.91	(0.61)	
Miscellaneous	14.11	(4.50)	9.17	(2.11)	
<b>Total</b>	<b>40.96</b>	<b>(7.64)</b>	<b>39.51</b>	<b>(6.79)</b>	
<b>Total variable costs</b>	<b>211.84</b>	<b>(9.26)</b>	<b>205.48</b>	<b>(10.56)</b>	
<b>Gross Margin</b>	<b>1053.87</b>	<b>(15.87)</b>	<b>537.76</b>	<b>(20.71)</b>	<b>1&gt;2</b>

### 3.4 Materials: Costs and Use

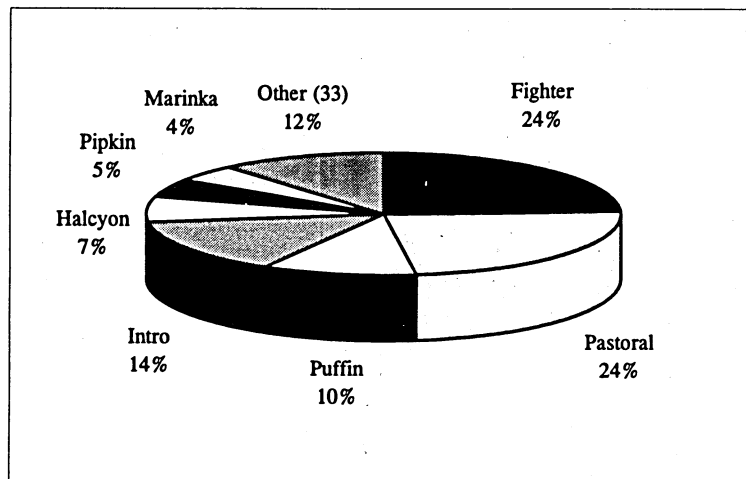
As reported in Chapter 2 this survey shows significant differences in material costs, in real terms, for winter wheat when compared with the surveys from 1993 and 1994 (Table 2.2). Surprisingly seed costs per hectare decreased significantly, a nine per cent drop from 1993 to 1995. As seed application rates have shown hardly any change over the period this is partly due to an increase in the use of home saved seed but also to the predominant use of established seed varieties which are not so expensive as newly developed varieties. As can be seen from Figure 3.1, 51 different types of winter wheat were recorded but nearly 90 per cent of the wheat grown was accounted for by only seven varieties. Again the most popular variety was Riband, planted on nearly one third of the

**Figure 3.1 Top Seed Varieties, Winter Wheat, Winter Barley and Spring Barley, 1995 Harvest Year**

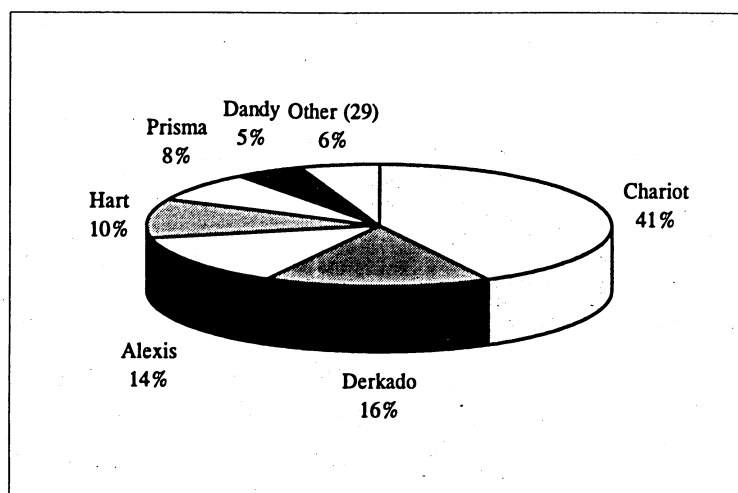
**Winter wheat**



**Winter barley**



**Spring barley**



winter wheat area, although its usage continued the downward trend observed in the last three years. Brigadier showed a significant increase. Of the established Group 1 milling wheats, Hereward and Mercia together accounted for 13 per cent of the area, a slight fall of about two per cent from 1993 and 1994.

Of winter barley, Fighter and Pastoral accounted for nearly half the area, as they did in 1994. Intro showed a significant increase from four per cent in 1994 to 14 per cent in 1995. Puffin decreased further in popularity, being planted on only 10 per cent of the winter barley area in 1995 compared to 14 per cent in 1994. For spring barley, the area planted to Chariot continued to increase while that planted to Alexis and Hart declined. Halcyon, Pipkin and Puffin, the most popular of the winter barley varieties recommended for malting by the Institute of Brewing, made up 22 per cent of the 1995 plantings, a fall of three per cent from 1994. Spring barley malting varieties, Alexis, Prisma, Derkado and Chariot accounted for 79 per cent of the planted area in 1995 continuing the increase in area of spring barley planted to malting varieties.

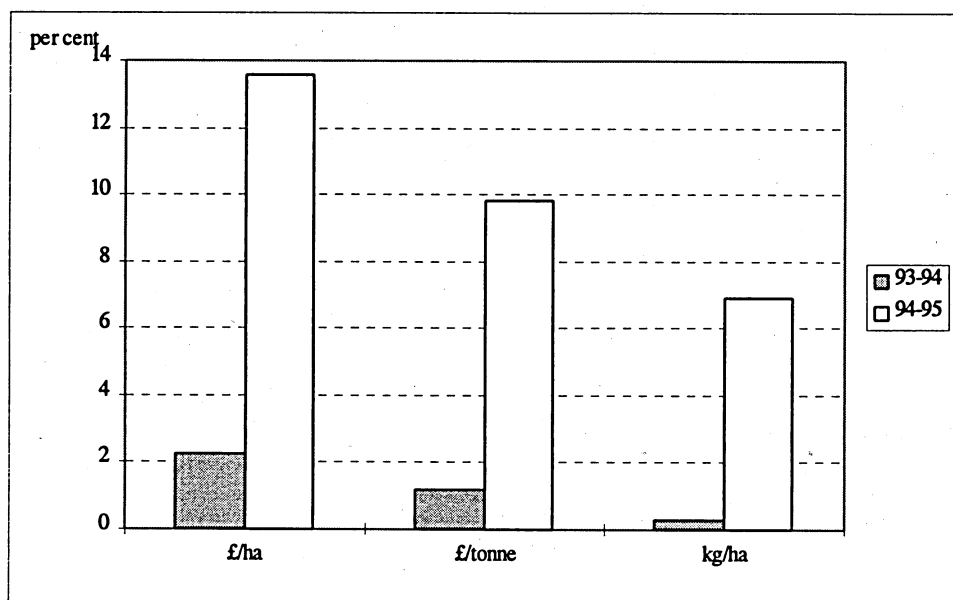
**Table 3.6 Fertiliser Costs and Rates of Application for Winter Wheat, Cereal-Intensive Counties, 1993,1994 and 1995 Harvest Years**

	1993	1994	1995
Cost of fertiliser in £ per hectare	72.74	74.39	84.50
Cost of fertiliser in £ per tonne	98.56	99.72	109.54
Rate of use in kg per hectare	737.15	739.52	790.77

An increase in the price of fertiliser resulted from a fall in world manufacturing capacity coupled with rising demand. In Great Britain the lower set-aside rates brought areas of land back into cultivation with a corresponding increase in the total fertiliser requirement. To investigate any further changes in physical input and costs, fertiliser data for winter wheat from 1993, 1994 and 1995 surveys were analysed and the results presented in Table 3.6 and Figure 3.2. In addition to a significant increase in the cost per tonne for fertiliser between 1994 and 1995, an increase in the application rate was also observed. Both these factors contributed to the significant rise in the cost per hectare for fertiliser. Although the costs given in Table 3.6 are current there were also increases in real terms. While increased yields continue to give profitable returns and further reductions in set-aside result in an overall increase in fertiliser demand, it is unlikely that price increases or environmental concerns about nitrates and phosphates will encourage less fertiliser use.



**Figure 3.2 Percentage Change in Fertiliser Cost (£ per hectare and £ per tonne) and Rate of Application for Winter Wheat, Cereal-Intensive Counties, 1993 to 1994 and 1994 to 1995 Harvest Years**



Further analyses have been carried out on seed rates and costs, fertiliser usage and costs, and crop protection costs, by size of cereal enterprise and by degree of specialisation in cereal production for winter wheat in the cereal-intensive region of England. With crop protection the large variety of materials used makes it impossible to compare physical inputs and so comparisons in this area are purely on a cost per hectare basis. The results are presented in Tables 3.7 and 3.8.

When the winter wheat enterprises are grouped by size of cereal plus set-aside area (Table 3.7) no significant differences are found in the seed rate applied or in the crop protection costs between the groups. Economies of size are apparent in the higher proportion of home saved seed used on larger enterprises where the larger amounts of seed involved make the unit costs of dressing the seed lower. Less use of purchased seed results in a lower cost per hectare and per tonne for seed for the larger enterprises. They also pay less per tonne for fertiliser, the result of better bargaining power when buying in bulk, although only the group of largest farms show a significant difference over the others. However, as this group uses significantly more fertiliser on the cereals, it also has the highest cost per hectare.

The effects of specialisation of cereal production on costs (Table 3.8) show the average margin over materials increasing as the proportion of cereals and set-aside in the crops and grass area increases to about 80 per cent. Beyond this point performance decreases largely due to poorer yields. Fertiliser costs are higher because of the need for high nitrogen applications when crops such as peas and beans or potatoes do not feature in the rotation, and seed costs also increased. Farms with over 80 per cent of cereals plus set-aside in their total area tend not to be the very large farms and therefore do not have the same ability to negotiate lower fertiliser prices or find the same profit in using saved seed observed in Table 3.7. Other input costs involved in cereal growing are

hidden at the gross margin level. For example seed production can involve extra labour and other costs to keep machinery exceptionally clean. The investigation at the gross margin level does not always give a true insight into profitability of production.

**Table 3.7 Seed, Fertiliser and Crop Protection for Winter Wheat Units, by Size Group, 1995 Harvest Year, Cereal-Intensive Counties of England**

	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	18	29	26	37	47	
Winter wheat area (hectares)	15.67	37.61	60.17	93.45	232.52	
Cereals + set-aside area (hectares)	22.69	60.79	97.79	147.90	357.20	
Yield (tonnes per hectare)	7.31	7.97	7.84	8.18	8.21	1 < 542
Seed rate applied	kg/ha 192.16	kg/ha 197.25	kg/ha 190.30	kg/ha 188.34	kg/ha 191.25	none
Cost seed per tonne	£/tonne 279.11	£/tonne 267.93	£/tonne 256.51	£/tonne 244.16	£/tonne 245.33	1 > 45
Cost seed per hectare	£/ha 53.26	£/ha 51.97	£/ha 48.52	£/ha 47.14	£/ha 46.73	12 > 54
Ratio of purchased seed to saved seed	9.0:1	6.4:1	6.9:1	2.4:1	2.7:1	
Fertiliser applied	kg/ha	kg/ha	kg/ha	kg/ha	kg/ha	
Nitrogen	174.83	194.87	196.71	189.98	213.81	5 > 142
Phosphate	41.51	41.02	52.63	51.86	69.91	5 > 2143
Potash	45.28	46.45	44.37	34.17	74.08	5 > 432
Total fertiliser	673.27	740.76	748.34	731.64	931.61	5 > 1432
Cost fertiliser per tonne	£/tonne 116.63	£/tonne 113.43	£/tonne 110.53	£/tonne 110.65	£/tonne 103.09	5 < 3421
Cost fertiliser per hectare	£/ha 82.41	£/ha 89.21	£/ha 85.98	£/ha 84.78	£/ha 95.14	5 > 341
Cost crop protection per hectare	105.99	104.01	100.60	112.07	108.97	none
Margin over materials	841.72	1004.26	970.40	1030.32	1021.32	4523 < 1 4 > 3

**Table 3.8 Seed, Fertiliser and Crop Protection for Winter Wheat, by Specialisation of Production, 1995 Harvest Year, Cereal-Intensive Counties of England**

	Proportion of cereals + set-aside in crops + grass area				Statistically significant differences at the 10% level
	< 50%	50% - < 65%	65% - < 80%	80%+	
Group no.	1	2	3	4	
No. of farms	22	45	65	25	
Winter wheat area (hectares)	63.63	110.34	131.93	97.86	32 > 1
Cereals + set-aside area (hectares)	98.42	164.68	205.95	163.80	32 > 1
Yield (tonnes per hectare)	7.46	7.87	8.26	7.83	3 > 12
Seed rate applied	kg/ha 197.77	kg/ha 187.38	kg/ha 190.75	kg/ha 196.65	none
Cost seed per tonne	£/tonne 258.71	£/tonne 256.44	£/tonne 254.27	£/tonne 252.63	none
Cost seed per hectare	£/ha 52.26	£/ha 46.84	£/ha 48.87	£/ha 50.96	14 > 2
Ratio of purchased seed to saved seed	7.8:1	2.5:1	4.1:1	6.4:1	
Fertiliser applied (kg per hectare)	kg/ha	kg/ha	kg/ha	kg/ha	
Nitrogen	178.94	190.97	204.03	208.68	1 < 34
Phosphate	48.75	49.24	58.31	57.54	none
Potash	41.68	66.25	45.37	51.08	none
Total fertiliser	690.67	822.22	801.22	792.04	2 > 1
Cost fertiliser per tonne	£/tonne 111.12	£/tonne 105.44	£/tonne 109.31	£/tonne 115.99	4 > 23 1 > 2
Cost fertiliser per hectare	£/ha 77.08	£/ha 81.14	£/ha 86.62	£/ha 91.31	4 > 12 3 > 1
Cost crop protection per hectare	96.30	107.59	111.07	101.29	3 > 1
Margin over materials	951.45	993.83	1015.34	948.21	3 > 41

## Chapter 4: Marketing and Disposal of Grain and Straw

### 4.1 Introduction

One of the intentions of the CAP reforms, implemented in 1993, was to reduce EU cereal prices by lowering intervention prices to match world prices. In 1995 as a result of global conditions, particularly the poor harvest in the USA, world grain stocks were at their lowest for some 20 years and demand was increasing. Not since 1992/93 has world production of wheat and coarse grain exceeded consumption. Consequently world cereal prices rose, causing domestic prices to rise well above support levels to match those of the years before CAP reform.

Overall, high prices and increased yields resulted in good profitability for British cereal growers in 1995/96, despite some increase in input costs, particularly for fertilisers. However, within the year there have been some price fluctuations, which have made decisions over when and how to market especially difficult. Holding on to grain, in anticipation of prices rising still further, has to be weighed against storage costs and loss of interest (which can become a higher cash cost if there is the risk of entering an overdraft situation). IACS payments, arriving in the later months of the calendar year, now alleviate cash flow problems to some extent and make it possible to delay selling for longer. Anecdotal evidence suggests that the practice of selling forward is becoming more popular, although when the market subsequently rises dramatically, as has happened this year, it can be risky. Increasingly options are being used as a mechanism to guarantee a minimum price and thus reduce the risk during times of fluctuating prices. If direct measures of price support do not continue, as agriculture is increasingly under pressure to be treated similarly to other industries, futures markets could play an important role in providing some price certainty.

This chapter is concerned with the disposal of grain by quality and price received, movement of grain throughout the year in relation to price, the difference in margins from producing high quality grain, particularly milling wheat and malting barley, and the disposal of straw.

### 4.2 Disposal by Quality and Price

The report on the harvest year 1994 to 1995 identified an apparent discrepancy between the amount of home grown wheat going for human and industrial usage, according to official statistics, and the equivalent extrapolated from the survey data. For the 1995 harvest, Table 4.1 shows that 21 per cent of winter wheat was sold for milling which is only about 60 per cent of that officially claimed to be used. For grain sold for feed the situation is reversed. Although the survey data, produced from a random sample, are likely to show some difference to official statistics, it seems apparent that some grain, sold by the farmer as feed quality, is eventually used for milling.

**Table 4.1 Disposal of Grain by Quality, Proportion and Price, 1995 Harvest Year, Weighted**

	Winter wheat		Winter Barley		Spring Barley	
	per cent	£/tonne	per cent	£/tonne	per cent	£/tonne
Milling	21.4	124.69				
Malting	0.9	118.92	23.4	133.89	54.6	140.25
Seed	2.7	126.97	3.6	118.94	5.6	146.89
Feed	64.8	114.60	47.0	107.91	14.1	106.35
<b>Total sales</b>	<b>89.7</b>	<b>117.41</b>	<b>74.0</b>	<b>116.16</b>	<b>74.3</b>	<b>134.00</b>
	per cent	valuation £/tonne	per cent	valuation £/tonne	per cent	valuation £/tonne
Unsold at 31.5.96	6.4	125.26	2.3	113.44	1.4	123.22
Proportion retained for						
seed	0.6	118.78	0.5	124.50	0.6	141.51
feed	3.3	114.43	23.2	107.75	23.7	107.76
<b>Total retentions</b>	<b>3.9</b>	<b>116.60</b>	<b>23.7</b>	<b>110.59</b>	<b>24.4</b>	<b>117.29</b>

**Table 4.2 Range of Prices for Grain Sales, 1995 Harvest Year, Weighted**

	Weighted average £/tonne	Minimum £/tonne		Maximum £/tonne	
<b>Winter wheat</b>			(1)		(1)
Milling	124.69	94.91	(111.62)	145.00	(135.87)
Seed	127.63	112.19	(112.45)	160.39	(159.40)
Feed	114.88	90.26	(102.45)	130.00	(125.00)
<b>Winter barley</b>					
Malting	133.89	105.00	(107.95)	165.01	(161.69)
Seed	118.94	107.86		195.00	
Feed	107.91	93.98	(98.85)	136.56	(118.07)
<b>Spring barley</b>					
Malting	140.25	108.79	(115.76)	173.15	(160.33)
Seed	146.89	103.57		246.69	
Feed	106.35	75.00	(88.91)	121.00	(119.66)

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

In Table 4.2 the average price obtained is given followed by the maximum and minimum in each case indicating the wide range of prices received by individual farms. As prices at the ends of the ranges often come from only a small number of readings, and for small loads, 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 barleys because of the small number of readings, but for other types of production the new ranges are much closer to the mean. When the ranges of prices for wheat sales are considered the milling premium is not easily identifiable at the extremes; the minimum price received for milling wheat was in fact less than the average price for feed wheat. In recent years the premium for milling wheat has been falling; in 1993 it was an average of 13 per cent on feed wheat, in 1994, 11 per cent, and in the current survey year only nine per cent. As a result feed and milling prices are getting closer with considerable overlap between the upper end of the feed price and the lower end of the milling price. The proportion of winter wheat sold for seed is similar to that of 1994, as is the proportion unsold at the 31st May and that retained on the farm for seed and feed.

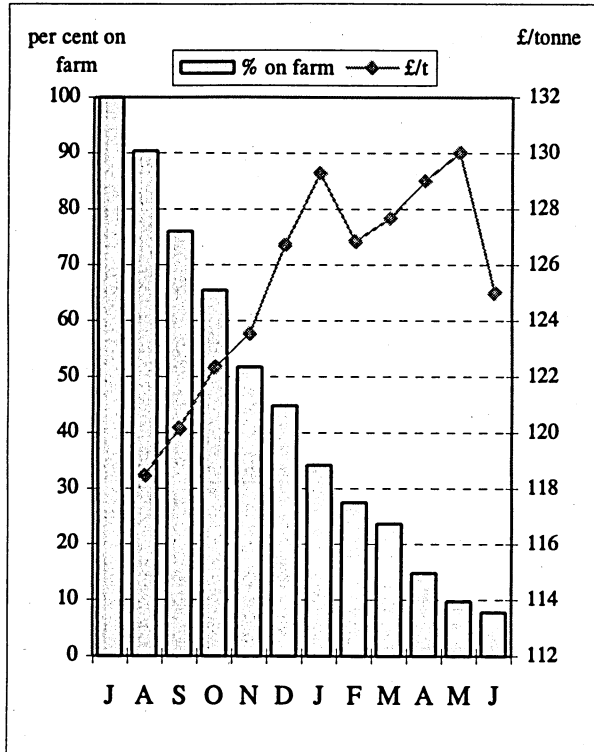
The price differential between malting and feed barley is greater than that between milling and feed wheat. The malting premium continued to increase, as it has done over the last ten years, to an average of 24 per cent for winter barley and 32 per cent for spring barley. When disposals by month are considered later in the chapter, it can be seen that, despite fluctuations in price, there is a clear distinction between the average prices obtained per month for malting barley and feed barley throughout the year (Figure 4.1). The percentage of winter barley sold for malting, at 23 per cent, was similar to that in 1993 and 1994, but the fall in the percentage of feed quality grain, observed between 1993 and 1994, was reversed, with 47 per cent sold for feed. Fifty-five per cent of the spring barley grain was sold for malting, an increase by 10 percentage points since 1993, with 14 per cent sold for feed. The proportion of barley sold for seed shows little change from that recorded in 1994, although the average price obtained for winter barley seed was considerably lower than that for spring barley seed. This is due to a few very high prices recorded for spring barley seed where the price quoted is gross of seed dressings and royalties. The proportions of spring and winter barley unsold or retained on the farm for seed also show little change, but there is a fall of about five per cent in the amounts kept on farm for livestock feed from both winter and spring sown crops. This was possibly due to some farmers selling more barley grain to maintain cash flows, where, before the BSE crisis, they would have sold livestock.

#### **4.3 Disposal by Month**

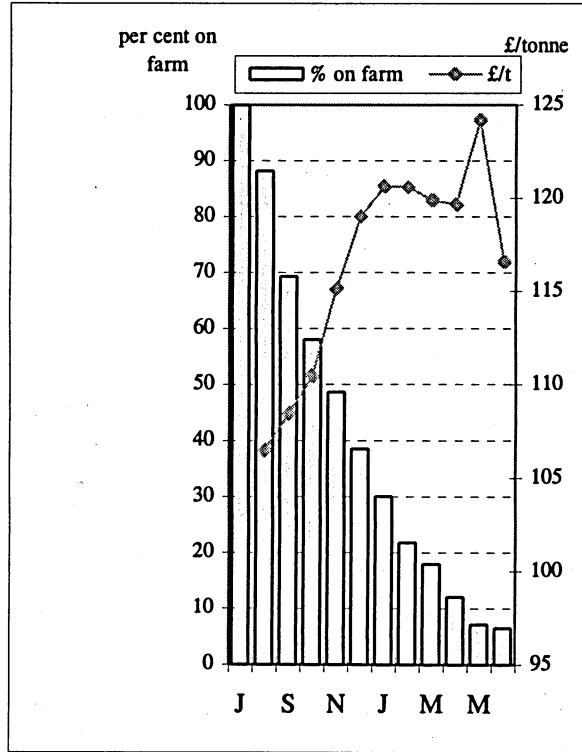
It has been shown in Table 4.2 that average prices quoted conceal quite wide ranges obtained by individual farms. They also conceal considerable monthly fluctuations. Thus in the case of winter wheat, the price obtainable towards the end of the season for feed wheat was greater than that for milling wheat at harvest time. Figure 4.1 shows the average proportion of milling wheat, malting barley, and feed wheat and barley remaining on the farm each month as the season progressed, and compares the movement of the average price obtained. The price shown includes that for grain sold forward and so cannot be directly related to market prices, as grain sold forward at harvest time may have left the farm later in the season at considerably below the current market value. Prices were not so volatile as in 1994; low stocks and resulting high world prices sustained a steady price increase and made intervention redundant. For milling wheat, about 60 per cent was sold on an

Figure 4.1 Monthly Proportion of Grain Remaining on Farm with Monthly Average Prices

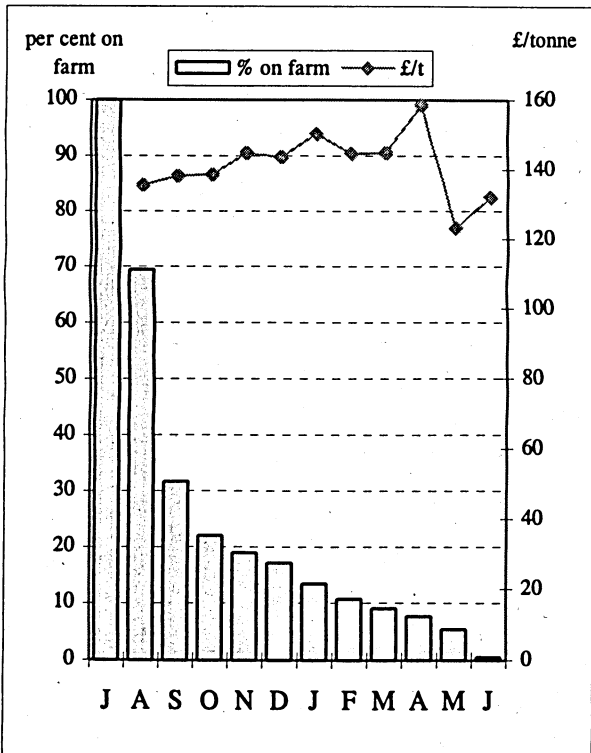
Milling Wheat



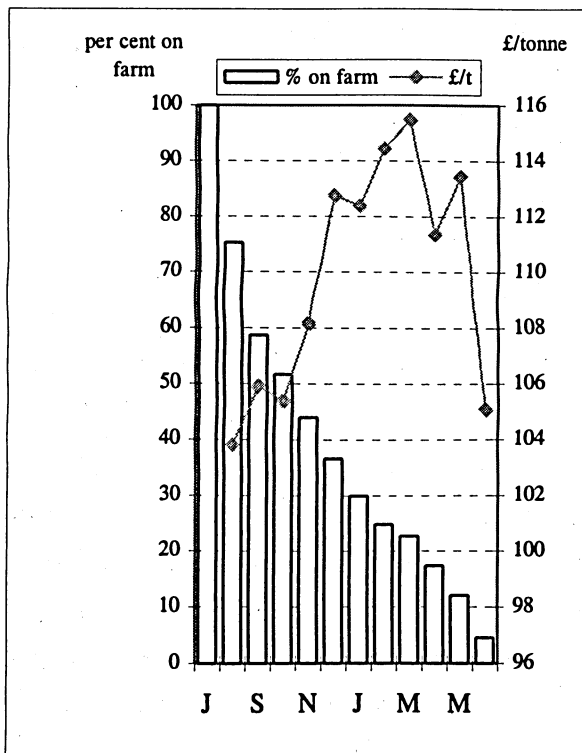
Feed Wheat



Malting Barley



Feed Barley



initial rising market up to January 1996 and a further 15 per cent of milling wheat left the farm between February and May when prices started to rise again. Wheat prices were depressed early in the new year, when a standing tax on EU wheat exports was introduced. EU exports no longer entered the world market at world prices and there was a greater control over exports. However the tight supply situation caused world wheat prices to rise to record levels in March, and, despite an increase in the export tax, UK prices rose again reaching their highest level in May. Between January and February milling prices fell by about £3 per tonne and after May they fell again by about £5 a tonne. In all about 18 per cent of milling wheat was sold on a falling market, leaving about seven per cent unsold at the end of May. The situation for feed wheat was very similar but with a smaller, more gradual fall in price in the first part of the year.

Malting barley showed a different pattern of disposal to wheat and feed barley, with 70 per cent having left the farm by September. Prices were more volatile than for wheat, but also reached a high in April/May. Feed barley disposal followed a similar pattern to feed wheat with 70 per cent having left the farm by January.

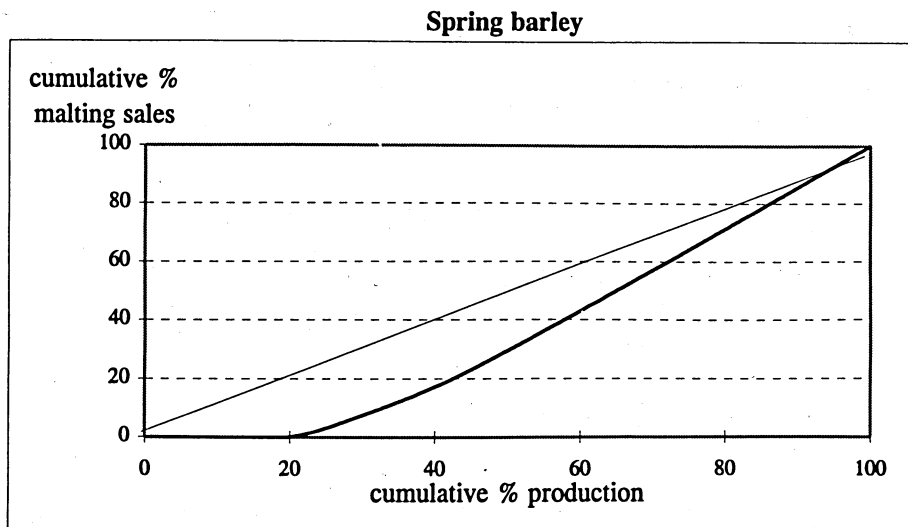
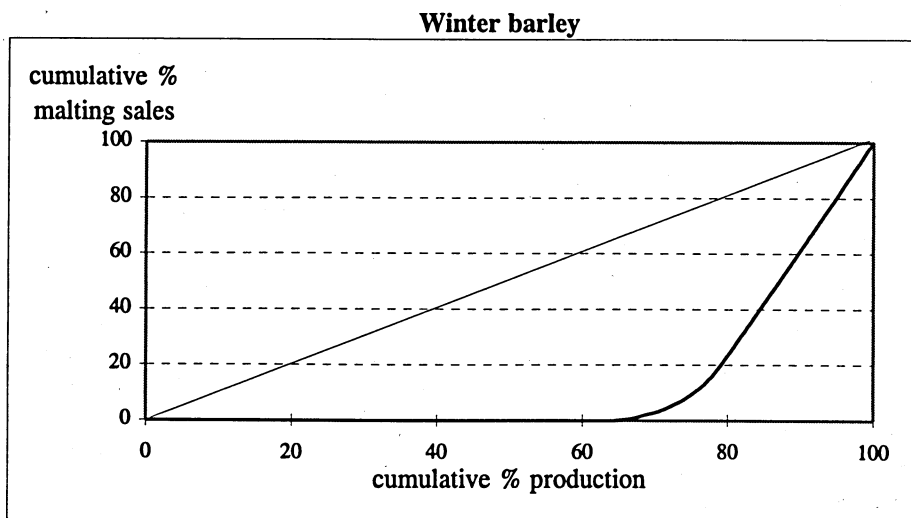
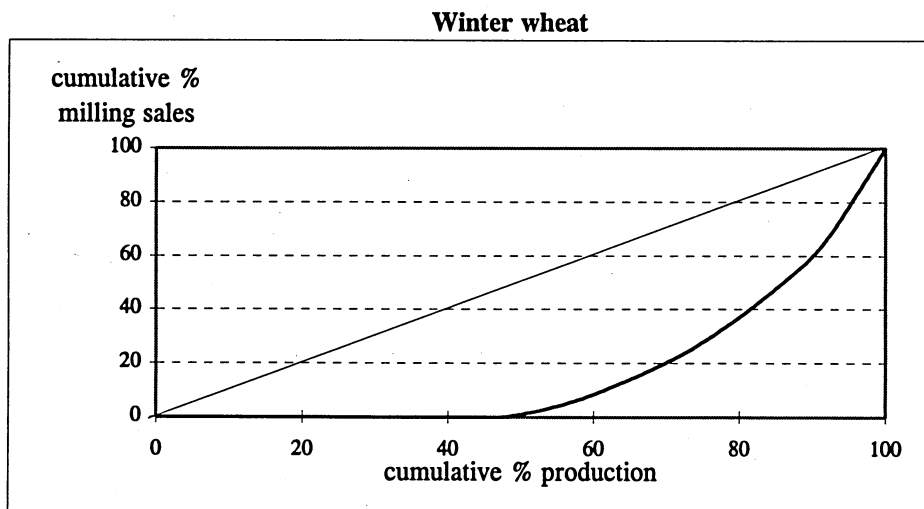
#### 4.4 Specialisation of Production

The cumulative graphs in Figure 4.2 indicate the degree of specialisation of milling wheat and malting barley, with the diagonal in the graph indicating the situation if each producer supplied the same proportion of wheat for milling or barley for malting. It can be seen that for spring barley the curve is very close to the diagonal reflecting the spread of malting production across all the sales. For winter barley, malting production is restricted to a much smaller proportion of the sales and milling production for winter wheat is in between the two. Thus the winter wheat graph shows that production of milling quality wheat is fairly specialised with 70 per cent of production accounting for only about 20 per cent of milling sales and 80 per cent of production accounting for about 40 per cent of milling sales. Less than half (42 per cent) of winter wheat growers in the survey sold milling wheat. The graph for winter barley shows an higher degree of specialisation with over 60 per cent of production yielding no malting sales; out of 256 winter barley growers in the survey, only 26 per cent sold grain for malting. Spring barley for malting was far more widely grown with the malting sales derived from over 80 per cent of the production; this was produced by 59 per cent of the spring barley growers. Those growing only grain for feed were, on average, smaller producers.

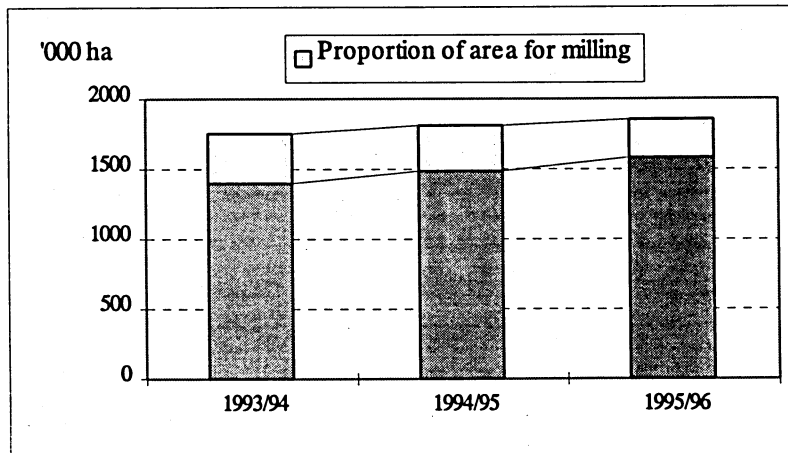
The decision whether to grow grain for milling or malting, as opposed to feed, involves several factors. Lower yields must be balanced against the premium obtainable, and perhaps more importantly, there is the uncertainty of achieving grain of a suitable quality because of uncontrollable elements such as the weather. Since 1993, although the overall area of wheat planted has risen, the area planted with milling wheat varieties has declined (Figure 4.3).



**Figure 4.2 Cumulative Graphs to Show Specialisation of Production for Milling Wheat and Malting Barley, Ranked by Proportion of Crop Sold for Milling or Malting, Harvest Year 1995**



**Figure 4.3 Total UK Area of Wheat Planted, with the Proportion Planted with Milling Varieties, 1993/94 to 1995/96**

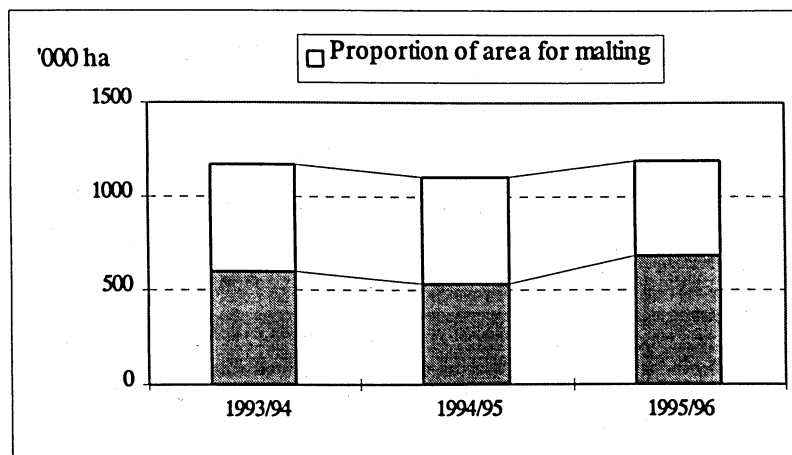


Source: Home Grown Cereals Authority; MAFF

This may be explained when the costs and returns of winter wheat producers that sell 100 per cent of their grain for milling are compared to those of a group that sell 100 per cent of their grain for feed. The results, presented in Table 4.3, show a situation similar to that produced by the same analysis in 1993. Only the average price is significantly different between the two groups. Although input costs between the milling producers and feed producers show no great difference and milling grain attracts a premium, these factors are not enough to make a significant difference at the gross margin level. It has already been shown that the milling premium has been declining over the past three years, and it would seem that, increasingly, the risks involved in attempting to grow winter wheat of milling quality are not sufficiently rewarded.

The barley area planted has been in decline for several years but showed a slight increase between 1994/95 and 1995/96. Figure 4.4 shows, however, that the area planted with malting varieties recommended by the Institute of Brewing declined slightly.

**Figure 4.4 Total UK Area of Barley Planted, with the Proportion Planted with Malting Varieties, 1993/94 to 1995/96**



Source: Home Grown Cereals Authority; MAFF

**Table 4.3 Comparison of Output and Variable Costs of Winter Wheat for Milling and Feed**

Group	Sales 100 per cent for milling		Sales 100 per cent for feed		Statistically significant differences at the 10% level
		s.e.		s.e.	
No. farms	1 22		2 93		
Yield tonnes per ha	7.55	(0.30)	7.76	(0.15)	
Price £ per tonne	117.57	(1.81)	113.87	(0.78)	1>2
Returns	£/ha		£/ha		
Output-grain	888.07	(39.84)	884.75	(18.07)	
Output-straw	77.24	(17.95)	63.72	(5.85)	
Arable area payment	262.71	(3.10)	260.90	(2.31)	
<b>Total output</b>	<b>1228.02</b>	<b>(46.81)</b>	<b>1209.37</b>	<b>(18.56)</b>	
Material costs					
Seed	52.34	(2.93)	53.60	(1.29)	
Fertiliser	90.25	(5.29)	94.57	(2.85)	
Crop protection	93.34	(6.07)	104.55	(3.27)	
<b>Total</b>	<b>235.94</b>	<b>(9.50)</b>	<b>252.72</b>	<b>(5.00)</b>	
<b>Margin over materials</b>	<b>992.08</b>	<b>(46.03)</b>	<b>956.66</b>	<b>(19.02)</b>	
Other variable costs					
Casual labour	2.55	(1.20)	2.60	(0.67)	
Contract	38.57	(14.69)	43.27	(6.99)	
Fuel for grain drying	2.83	(1.18)	2.95	(0.68)	
Miscellaneous	8.06	(1.52)	8.98	(1.04)	
<b>Total</b>	<b>52.01</b>	<b>(14.63)</b>	<b>57.80</b>	<b>(7.14)</b>	
<b>Total variable costs</b>	<b>287.95</b>	<b>(15.98)</b>	<b>310.52</b>	<b>(9.03)</b>	
<b>Gross Margin</b>	<b>940.07</b>	<b>(49.06)</b>	<b>898.86</b>	<b>(20.68)</b>	

Table 4.4 compares the costs and returns for winter barley producers selling 100 per cent of their grain as malting quality with a group selling 100 per cent feed quality. As with wheat, there appears to be little economic benefit at the gross margin level in producing grain of higher quality. Even with the relatively high premium obtained for malting barley the margin over materials is actually greater for the feed group. Although input costs between the two groups show no significant difference, when added to other variable costs particularly that for contract labour, the total variable costs are significantly higher for the feed group but these are offset by the high return for straw achieved. There is a regional effect noticeable because feed barley is grown mainly in livestock areas and the enhanced price for straw reflects the greater demand.

**Table 4.4 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			57	
	26		71				
Yield tonnes per ha	7.00	(0.55)	7.20	(0.31)		5.40	(0.17)
Price £ per tonne	139.60	(3.59)	107.02	(0.74)	1 > 2	139.78	(1.98)
Returns	£/ha		£/ha			£/ha	
Output-grain	840.56	(67.02)	835.09	(36.05)		754.33	(24.16)
Output-straw	17.43	(5.21)	51.37	(6.80)	2 > 1	61.38	(6.15)
Arable area payment	237.68	(17.17)	238.36	(9.11)		256.40	(5.21)
<b>Total output</b>	<b>1095.67</b>	<b>(83.91)</b>	<b>1124.82</b>	<b>(45.49)</b>		<b>1072.11</b>	<b>(25.83)</b>
Material costs							
Seed	42.71	(3.55)	46.70	(2.10)		54.48	(1.60)
Fertiliser	78.08	(6.65)	90.65	(4.37)		62.07	(2.69)
Crop protection	94.16	(8.80)	94.82	(4.44)		52.24	(3.27)
<b>Total</b>	<b>214.96</b>	<b>(17.16)</b>	<b>232.17</b>	<b>(9.42)</b>		<b>168.79</b>	<b>(4.43)</b>
Margin over materials	880.71	(69.70)	892.64	(38.45)		903.32	(25.30)
Other variable costs							
Casual labour	1.52	(0.96)	1.10	(0.40)		0.85	(0.39)
Contract	11.17	(7.30)	30.47	(7.75)		23.28	(5.86)
Fuel for grain drying	1.33	(0.69)	2.48	(0.70)		1.55	(0.73)
Miscellaneous	8.88	(2.21)	7.80	(1.17)		7.09	(0.84)
<b>Total</b>	<b>22.90</b>	<b>(7.71)</b>	<b>41.84</b>	<b>(8.22)</b>		<b>32.77</b>	<b>(5.94)</b>
Total variable costs	230.23	(12.36)	269.42	(8.33)	2 > 1	201.55	(7.56)
Gross Margin	857.82	(68.08)	850.80	(38.30)		870.55	(24.96)

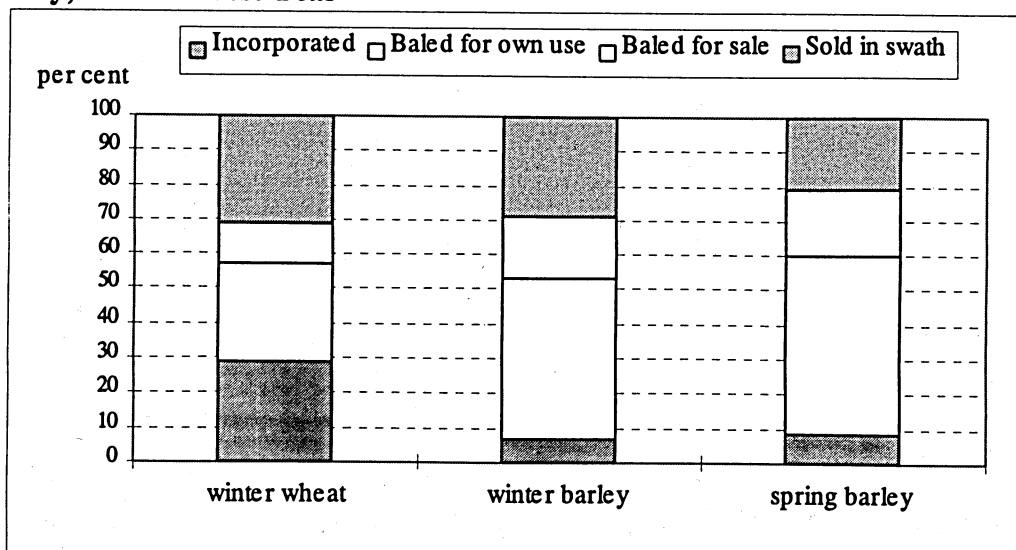
For spring barley, it is not meaningful to compare production in the same way because of regional variations in patterns of farming. A large proportion of the crop is grown for malting on farms in cereal intensive parts of the country, mainly in the East, whereas the smaller area of feed barley production tends to be concentrated on more mixed farms in the West. This could account for the higher value of spring barley straw. It is useful to look at the costs and returns for malting production for spring barley in comparison to those for winter malting barley, and these have been included in Table 4.4. The lower output for grain, resulting from the lower yield, is more than offset by higher output from straw and lower input costs because of the residual elements from autumn dressings. Overall there is a difference of nearly £13 per hectare at the gross margin stage which, together with the increasing premium and advantages in spreading labour and machinery

requirements, appears to be sufficiently attractive to maintain the large proportion of growers planting malting varieties of spring barley. The tight supply and demand situation which has pushed prices so high is likely to persist, aggravated by an increasing world demand for beer, and the area planted to malting barley varieties seems likely to increase. However, improved technology, enabling barleys with a higher nitrogen content to be used for malting, means that the maltsters may have access to a larger barley supply than before and may be able to use other varieties than those recommended by the IOB.

#### 4.5 Disposal of Wheat and Barley Straw

For most arable farms straw is not a major factor when considering the economic benefits of cereal growing. In fact it can be little more than a nuisance to be disposed of as cost-effectively as possible. Chapter 2 showed that for the average wheat and barley enterprise in England, straw is only five per cent of the total output. However, it does have considerably more value to the farmer in the more livestock-intensive areas of Great Britain. In Wales, for example, it is 16 per cent of output for an average wheat and barley grower, and 20 per cent of the output for winter and spring barley enterprises. These averages conceal quite wide ranges, and so for some farms the value of straw is a major factor when considering cereal growing.

**Figure 4.5 Methods of Straw Disposal and Proportions for Winter Wheat, Winter Barley and Spring Barley, 1995 Harvest Year**



Since the banning of straw burning in England and Wales in 1993, straw has had to be incorporated, baled for use on the farm, baled for sale or sold in swath. Figure 4.5 shows the proportions of the type of disposal from winter wheat, and winter and spring barley. The methods, which involve selling the straw, account for between 40 and 50 per cent of straw from the three main cereals, although much less winter wheat straw is baled. As might be expected, a large proportion of barley straw, nearly half the total, is baled and used on the farm, whereas a much higher proportion of winter wheat straw is incorporated.

**Table 4.5 Comparison of the Disposal of Wheat and Barley Straw Between 1985 and 1993 to 1995 Harvest Years**

	1985	1993	1994	1995
<b>Winter wheat</b>				
	per cent	per cent	per cent	per cent
Burnt	39.8			
Incorporated	19.7	32.5	28.9	28.7
Baled for own use	29.9	31.5	33.4	28.4
Baled for sale	3.2	11.5	8.8	11.8
Sold in swath	7.4	24.5	28.9	31.1
Return from sales in £ of 1995 value using the Retail Price Index				
	£/ha	£/ha	£/ha	£/ha
Sold baled	56.13	114.98	114.54	100.51
Sold in swath	20.35	25.65	29.56	31.13
<b>Winter barley</b>				
	per cent	per cent	per cent	per cent
Burnt	18.5			
Incorporated	12.1	11.4	8.7	6.7
Baled for own use	54.4	52.2	53.6	46.8
Baled for sale	3.5	16.6	13.9	17.8
Sold in swath	11.5	19.8	23.8	28.8
Return from sales in £ of 1995 value using the Retail Price Index				
	£/ha	£/ha	£/ha	£/ha
Sold baled	55.01	129.92	130.19	130.01
Sold in swath	19.40	34.19	42.85	49.29
<b>Spring barley</b>				
	per cent	per cent	per cent	per cent
Burnt	11.3			
Incorporated	8.7	5.1	6.8	8.8
Baled for own use	64.9	57.3	61.1	51.3
Baled for sale	3.6	20.7	15.7	19.1
Sold in swath	11.5	16.9	16.4	20.8
Return from sales in £ of 1995 value using the Retail Price Index				
	£/ha	£/ha	£/ha	£/ha
Sold baled	83.16	105.73	129.57	100.37
Sold in swath	20.51	35.24	38.83	53.31

Table 4.5 compares the changes in disposal for the survey years since 1985, when burning was still an option. The returns per hectare are also presented, with values inflated to 1995 purchasing power by using the Retail Price Index, to make comparisons more meaningful. For winter wheat the amount of straw sold has increased from just over 10 per cent in 1985 to 43 per cent in 1995, mostly due to the amount sold in swath. The survey results indicate that much of the wheat straw that would have been previously burnt is now sold, as the proportion used on farm is very similar and the amount incorporated has only increased slightly. However, straw was in demand in the

survey year because of the dry weather and the results obtained may not be typical. Much less barley straw than wheat straw was burnt in 1985, and the changes in the last ten years are not so dramatic. However, as with wheat, the total amounts sold for both winter and spring barley have substantially increased, but the proportion baled and sold has increased more than that sold in swath. The amount of winter barley straw incorporated has decreased.

The value of straw has risen substantially in the past 10 years. When the values in 1985, reflatd to the equivalent of 1995 purchasing power, are compared with the average prices from 1993 to 1995, most straw has more than doubled in price, with the exception of winter wheat sold in swath and spring barley sold baled where the increases have been about 40 per cent. With the advent of straw burning power stations on the horizon, straw may have yet more potential to contribute to the profitability of the cereal enterprise in the future.

## Chapter 5: The Third Year of CAP Reform

### 5.1 The Effects of Reform and Global Events

In 1995/96 the impact of the CAP reforms has been muted by wider issues of exchange rates and world market prices. British farmers have been shielded from the effects of cuts in cereal support prices by successive devaluations of the green pound and the cereal sector has been further buoyed by the unexpected high price for cereals on world markets. Intervention stocks in the EU have been reduced and the term "grain mountain", so politically embarrassing in the 1980s, is now inappropriate. Table 5.1 shows that, in terms of global food security, world stocks have also been depleted to an unsatisfactory level. However, with the abolition of set-aside in the US and reductions in the EU, and a good harvest globally in 1996, this situation is not likely to last.

**Table 5.1 World Grain Supply and Demand, 1985/86 to 1995/96**

	Production mt	Consumption mt	End stock (a) mt	Trade mt
<b>Wheat and wheat flour</b>				
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
<b>Coarse grains (b)</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

(a) Based on aggregate of different local market years

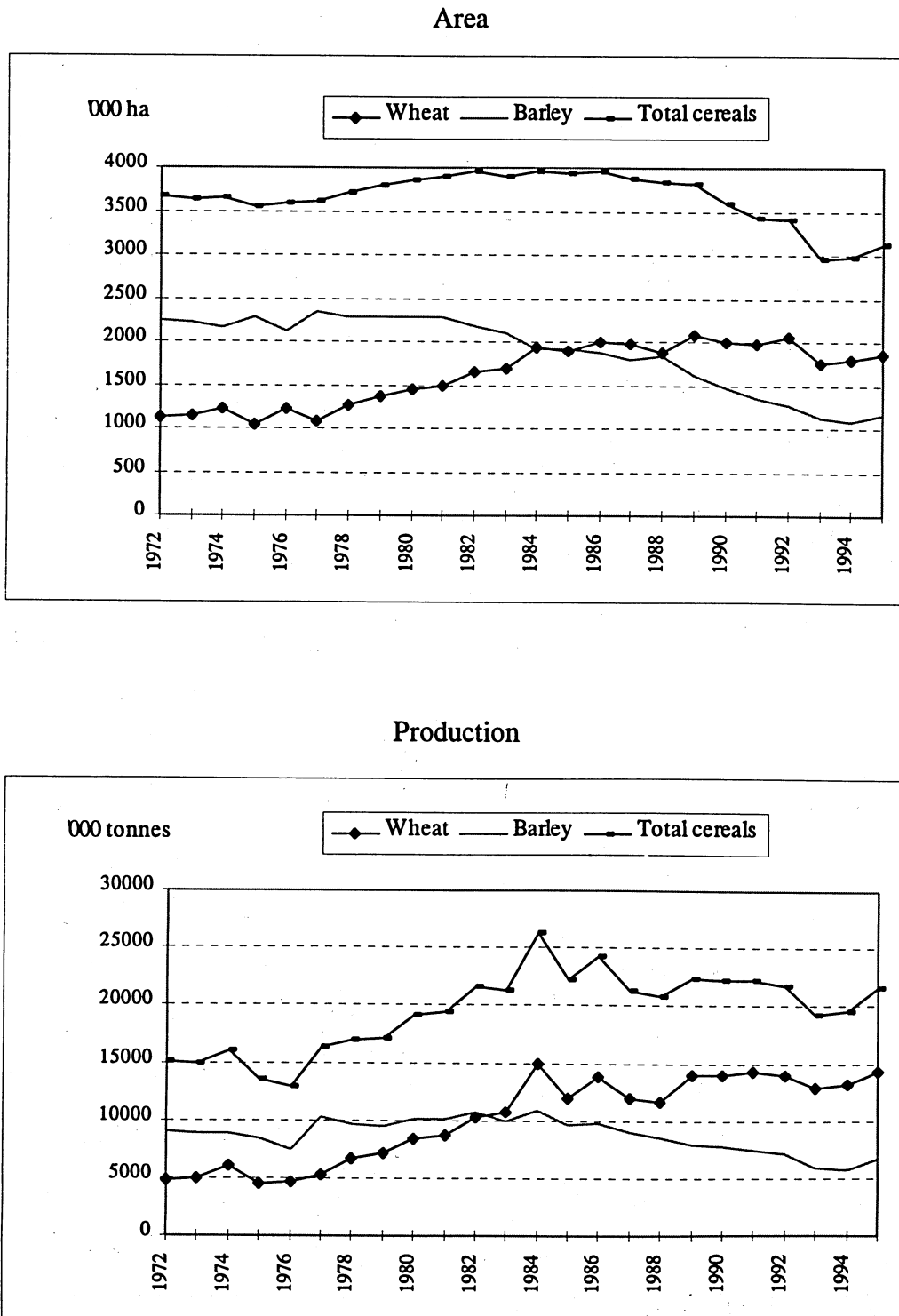
(b) Includes rye, barley, oats, maize, sorghum, millet and mixed grains

Source: USDA/Home Grown Cereals Authority



In Great Britain increased cereal plantings for both wheat and barley were evident in 1995 as shown in Figure 5.1 because of a reduction in required set-aside and the substitution of cereals for oilseed rape and proteins. Together with the increased yields obtained, this resulted in even higher percentage increases in production.

Figure 5.1 Cereal Area and Production in Great Britain, 1972 to 1995



Source: Home Grown Cereals Authority; MAFF

The effect of the introduction of set-aside in 1993 is clear for wheat, but the fall in the area of barley planted is not so steep (Figure 5.1). Table 5.2 shows in more detail the effect of set-aside on the major combinable crops and production of winter wheat, winter barley and spring barley for the years 1992 to 1995. The winter barley area showed the effect of set-aside in 1993 but spring barley grown at a premium for malting maintained its area in 1993 and consequently when the total barley area is considered as in Figure 5.1, the steady decline for barley, apparent since the mid 1980s, continued until 1994 without a sharp fluctuation.

**Table 5.2 Changes in the Area of Major Combinable Crops and Set-Aside, and Production of Winter Wheat, Winter Barley and Spring Barley in Great Britain, 1992 to 1995**

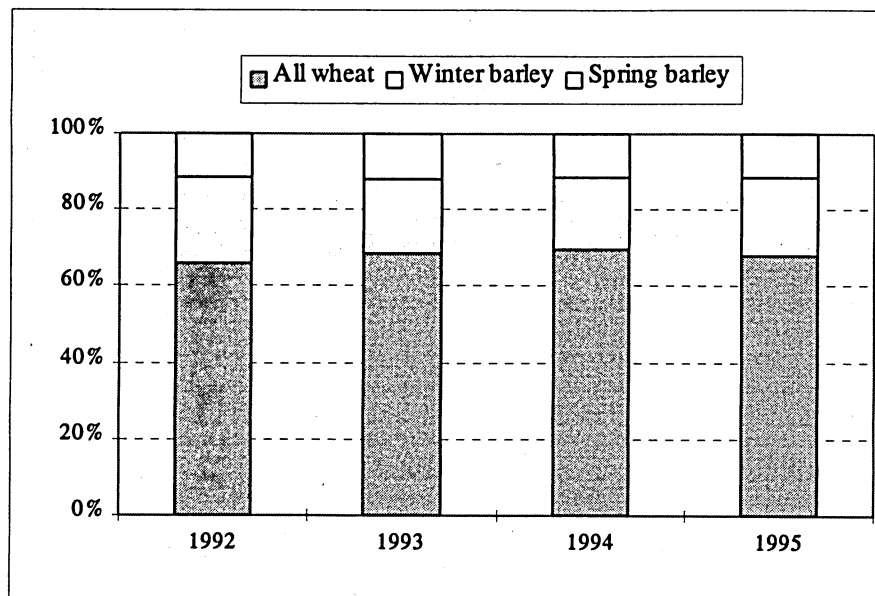
	1992	1993	1994	1995	Change		
					92-93	93-94	94-95
	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha	'000 ha
<b>Area</b>							
All wheat	2060	1752	1804	1852	-308	52	48
Winter barley	778	643	621	682	-135	-22	61
Spring barley	482	484	452	477	2	-32	25
Total wheat and barley	3320	2879	2877	3011	-441	-2	134
Pulses	213	253	239	201	40	-14	-38
OSR	420	376	404	354	-44	28	-50
Set-aside	133	586	726	631	453	140	-95
<b>Production</b>							
	'000 t	'000 t	'000 t	'000 t			
All wheat	14042	12854	13264	14260	-1188	410	996
Winter barley	4799	3687	3615	4226	-1112	-72	611
Spring barley	2397	2214	2172	2439	-183	-42	267
Total wheat and barley	21238	18755	19051	20925	-2483	296	1874

Source: Home Grown Cereals Authority; MAFF

The continuing increase in the planted area of wheat and barley, apart from that due to the reduction in set-aside, has been shown to be at the expense of break crops, for example peas, beans and oilseed rape. This will be investigated further in the report on the 1996 harvest year, but the consequences of potential lost export and specialist market opportunities for the break crops should be of concern to the industry if, as is likely, the recent strong world cereals market proves transient. The expansion in areas sown to wheat and barley in 1996/97, in the major cereal producing countries, combined with a further increase in yield should restore a better balance between consumption and production and possibly increase stocks. Although the set-aside rate remained unchanged at 15 per cent in 1994 and overall the total area planted to wheat and barley fell, total production actually rose. This was due to a good harvest with increased yields (Table 5.2).

Changes in the proportions of wheat and barley crop production, after 1992, are shown in Figure 5.2. The proportion of spring barley in the total wheat and barley production has stayed fairly constant since 1992, at around 10 per cent, but after 1992 the proportion of winter wheat increased slightly at the expense of winter barley. Spring barley is able to maintain its share of production because of the large proportion grown at a premium for malting and because it has become relatively more profitable as a result of area payments.

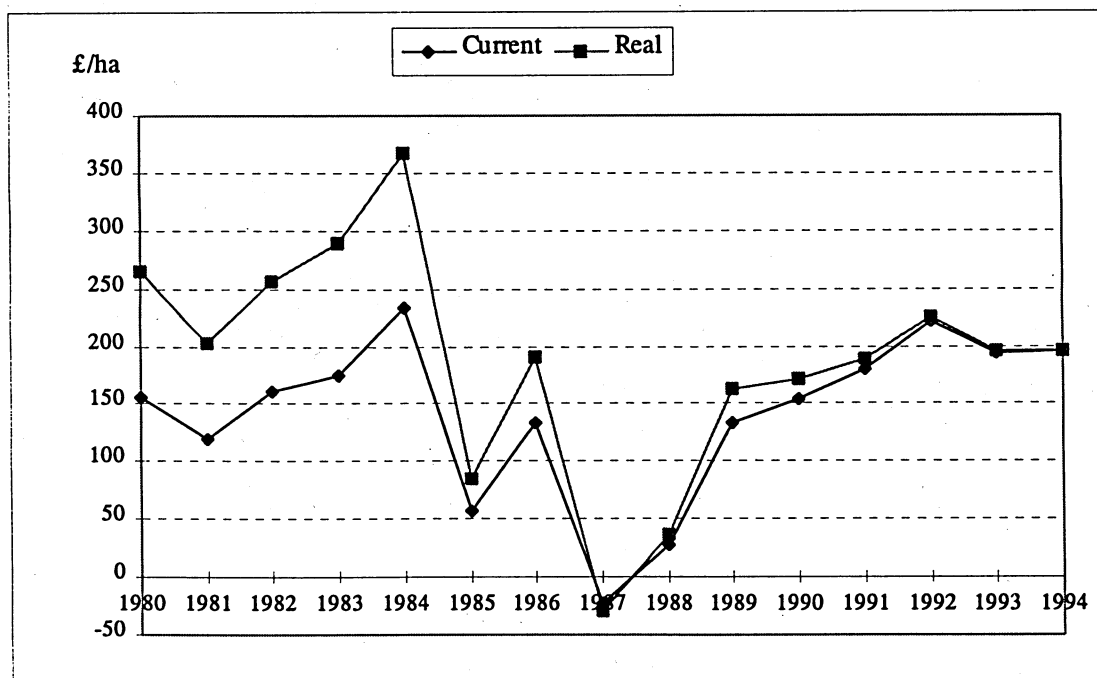
**Figure 5.2 Proportions of Wheat, Winter Barley and Spring Barley in Great Britain Total Wheat and Barley Production, 1992 to 1995.**



Source: Home Grown Cereals Authority; MAFF

The high world prices for grain which brought domestic prices to well above intervention levels, benefitted British farmers considerably in 1995. However, 'bonanza' incomes enjoyed by cereal growers in the last few years must be put into historical context. In the Report on Farming in the Eastern Counties of England, 1994/5 (Murphy, M.C., 1996) a comparison of real and current farm incomes for mainly cereal farms is given for 1980 to 1994. It shows that despite the increases in recent years, in real terms the farm income is still below the average experienced in the early 1980s, and is only recompensing for the troughs later in that decade (Figure 5.3).

**Figure 5.3 Net Farm Income Per Hectare on Mainly Cereal Farms in the Eastern Counties of England, in Terms of Current Values and Pounds of 1994 Purchasing Power, 1980 to 1994**



Source: Murphy, M.C., Report on Farming in the Eastern Counties, 1994/95

It is interesting to investigate what the situation would have been if prices had fallen, as anticipated two years ago, to a level similar to the intervention price. Table 5.3 shows the hypothetical situation for winter wheat growers in the top quartile group and that for growers in the lower quartile group, based on Table 3.3 in Chapter 3. If the average price for winter wheat had fallen to £100 per tonne, the hypothetical average price obtained, based on differences in price between the quartile groups observed in Table 3.3, would have been £102.43 per tonne for the upper quartile group and £96.85 per tonne for the lower quartile group. Assuming arable area payments had remained at a high level because of the devaluation of the green pound, this would have resulted in a fall of £169 per hectare and £109 per hectare respectively at the gross margin level. If area payments had not been boosted by the weak pound the reduction per hectare would have been even greater. For simplicity the same variable costs and yields have been assumed, although if prices had not increased it is possible that chemical costs would not have risen so sharply, but it is doubtful whether this factor would have affected the outcome significantly. Had prices been at intervention levels gross margins would have been some 15 per cent lower. It is salutary to recognise this effect because it would need only a couple of good harvests world-wide for stocks to accumulate and prices to fall, as indeed is happening in 1996/97.

**Table 5.3 Costs and Returns for Winter Wheat Production: Actual and Hypothetical (based on intervention price) for 1995**

	Upper 25%		Lower 25%	
	1995	hypothetical	1995	hypothetical
Yield tonnes per ha	9.21	9.21	6.33	6.33
Price £ per tonne	120.89	102.43	114.42	96.85
Returns	£/ha	£/ha	£/ha	£/ha
Output-grain	1112.83	943.38	722.32	613.06
Output-straw	89.58	89.58	48.79	48.79
Arable area payment	264.00	264.00	252.62	252.62
<b>Total output</b>	<b>1466.40</b>	<b>1296.96</b>	<b>1023.72</b>	<b>914.47</b>
Material costs				
Total	245.32	245.32	251.93	251.93
Margin over materials	1221.08	1051.64	771.79	662.54
Other variable costs				
Total	47.94	47.94	58.25	58.25
Total variable costs	293.26	293.26	310.18	310.18
Gross Margin	1173.15	1003.70	713.55	604.29

## 5.2 CAP Reform and the Environment

The introduction of set-aside has only modestly affected the environment. The 1995 study showed that rotational set-aside accounted for nearly 90 per cent of the total set-aside area, with 17 per cent of this sown with industrial crops. Although rotational set-aside can be of benefit to certain species of farmland birds in providing food through winter stubbles, it does not have the potential of well managed non-rotational land. The management of set-aside is the subject of trials run by the Allerton Research and Educational Trust in partnership with the Game Conservancy Trust, the results of which suggest management techniques that can benefit the farmer and the environment (Arable Farming, March 12th 1996). One example of this is to delay spraying for weed control until late May which maximises the habitat available to wildlife and is the optimum time for control of weeds such as barren brome and blackgrass which are capable of regrowth if sprayed too early. In future most set-aside is likely to be non-rotational and, well managed, is likely to benefit wildlife by allowing more flexible fanning practices such as long rotations. As a result environmentalists are not in favour of set-aside being abolished. However, the increase in chemical applications, observed in this study, looks likely to continue as land is returned from set-aside to crop production and while the high prices for cereals make high yields

so profitable. Table 3.6, in Chapter 3, reported an increase of over seven per cent in the rate of fertiliser application to winter wheat between 1993 and 1995.

It seems apparent that environmentally related CAP reforms will have a greater importance in future discussions. The Commission's Agricultural Strategy Paper for the Madrid Summit in December 1995, identified an integrated rural policy as one of three principles for the future development of CAP reform (along with higher competitiveness through reduced reliance on price support, and simplification and subsidiarity through five year negotiations on CAP price support). The integrated rural policy would attempt to achieve a balance between agriculture, rural development and conservation. The MAFF CAP Review Group stated as one of their conclusions that "Securing a better environment would be at the heart of the policy, instead of on the fringe" (European Agriculture: the Case for Radical Reform, 1995). A move away from the current trend towards "wall to wall" cereals, discussed earlier, would benefit the farmer and improve the environment. In Table 3.8 in Chapter 3 it was observed that the optimum for yield and margin over materials for winter wheat was reached when the proportion of cereals and set-aside in the crops and grass area was between 60 and 80 per cent. When the degree of cereal production specialisation was higher than this, both yield and margin decreased.

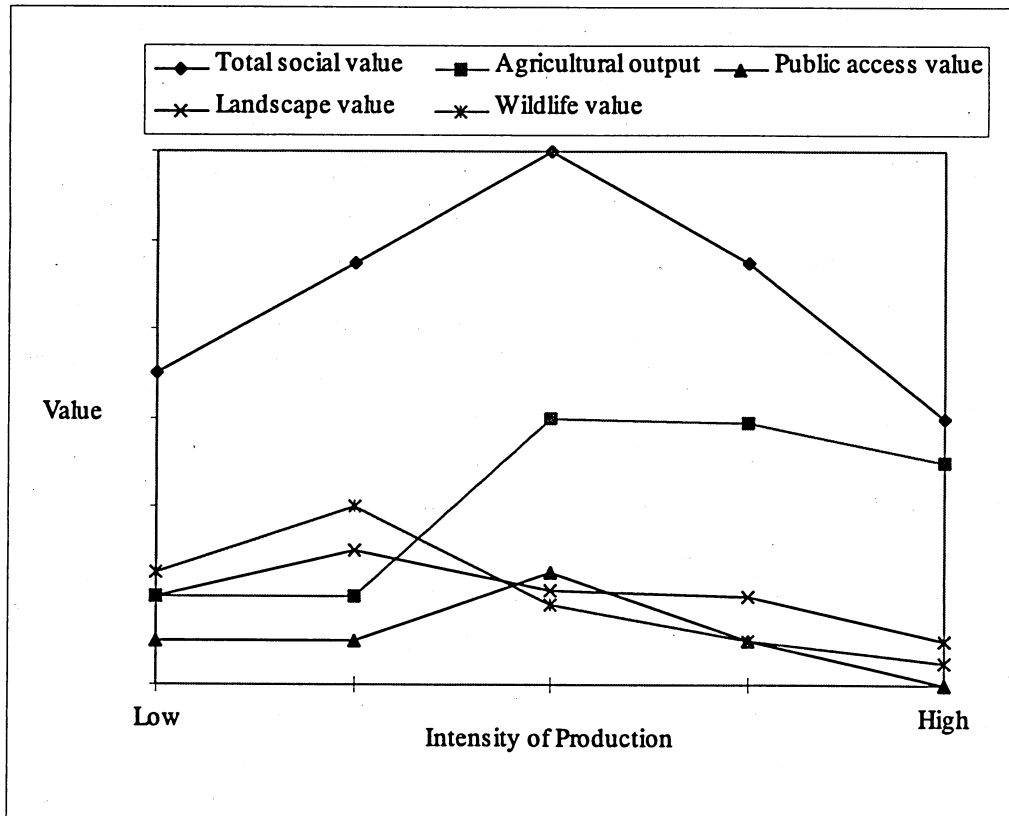
**Table 5.4 Input Costs, Yield and gross Margin by Input Quartile Graphs for Winter Wheat Production in Great Britain**

Quartile group	Cost of fertiliser + spray per ha	Yield t/ha	Gross margin £/ha
1	147.26	7.28	946.47
2	182.43	7.93	980.61
3	208.15	8.16	981.73
4	248.97	8.17	921.05

There may also be some complementarity of interest between farmers and environmentalists in reducing the use of chemicals. When winter wheat production in the survey is analysed in quartile groups by intensity of production, it is apparent that those farming most intensively do not achieve much higher yields and in fact obtain the lowest gross margin of all the groups (Table 5.4). Intensity of production has been determined by the cost per hectare of fertilisers and sprays used. Although larger farms on average pay less for their inputs (Table 3.7), which might be thought to skew the results, there is no significant difference between size groups for the cost of crop protection and the overall difference of fertiliser costs between the size groups is only £10.00 per hectare. The results from Table 5.4 show a similarity in gross margin for the two middle quartile groups, an increase of nearly £40 per hectare on the lowest quartile group, and then a fall of over £60 per hectare for the most intensive group. In Figure 5.4 Harvey indicates a hypothetical point of "social optimal intensity of production" (Harvey 1995) around the mid point of intensity of production. The results from the survey indicate

that it is the medium-intensive producers in the second and third quartile groups that are also the most profitable at the gross margin level.

**Figure 5.4 Hypothetical Relationships Between Agricultural Output and Environmental Values of Land**



Source: Winter, M., 1996, modification of a diagram in Harvey 1995

Winter (1996) observes that the relationship between agricultural production and the value of the environment can vary substantially between individual farms but that modern technology may enable intensity and environmental value to be less mutually exclusive through integrated farming systems and precision farming.

### 5.3 Beyond 1995

The policy settings which have provided the context of the crop year here reported are unlikely to persist in the future. Forces for change include continuing pressure on the EU budget, the prospective accession to the Union of countries of the CEEC with large agricultural potential, the recent relaxation of production controls in the USA and greater decoupling of support, the re-opening of WTO negotiations in 1999 and possibly also the continuing need to meet the commitments of the Uruguay round on subsidised exports. The likely directions of change are these: producers will be more regularly and directly exposed to the influences of world markets but on the other hand they will be less encumbered by

untargeted and unselective land withdrawals; and compensation payments will be more selective and conditional and more thoroughly decoupled from production decisions, for example by being paid on past rather than current area.

In Great Britain many larger producers might well welcome the opportunity to gain a larger share of the export market and compete on an equal footing with competitors outside the EU, but any decline in farmgate prices or any other reduction in income will marginalise the small family farms. The average farm size has increased in recent years (MAFF, June Census) but there is a belief that the smaller farms are more environmentally friendly, although often by default through not being able to make the investment in technology for intensive farming. External forces, such as the WTO negotiations, are likely to encourage the EU to decouple environmental and other social measures from market forces. One possibility is to change the emphasis so that large producers get returns from the market, through benefits derived from their scale of operation, while smaller farms qualify for social subsidies. Such a policy would mean lower FEOGA payments for the UK in comparison with other EU members but could nevertheless be beneficial to UK agriculture because of the larger farm sizes in this country. Completely decoupled measures targeted at the environment, in the form of domestic support mechanisms, may be a long term strategy but will pose problems in terms of agreement of subsidies and EU funding. In any case further CAP reform is not on the agenda at present and it is likely to be the issue of eastern enlargement of the EU to CEEC countries that will force the timing of further discussion. In the shorter term, the third largest cereal harvest of all time was recorded in 1996 in the UK and with good harvests in several other European countries, the EU has a larger export surplus after domestic requirements than in recent years. However, world-wide harvests were also good and the resulting competition has forced world prices down below those in the EU. This will pull EU prices down to intervention levels. Exports will require subsidies and intervention stocks of wheat and barley are likely to grow substantially if EU exports do not increase this year. Increased global demand has been predicted particularly in the Far East, although the future is uncertain, not least because the logistics of delivery and the infrastructure of countries such as China may make the outcome less favourable than expected.

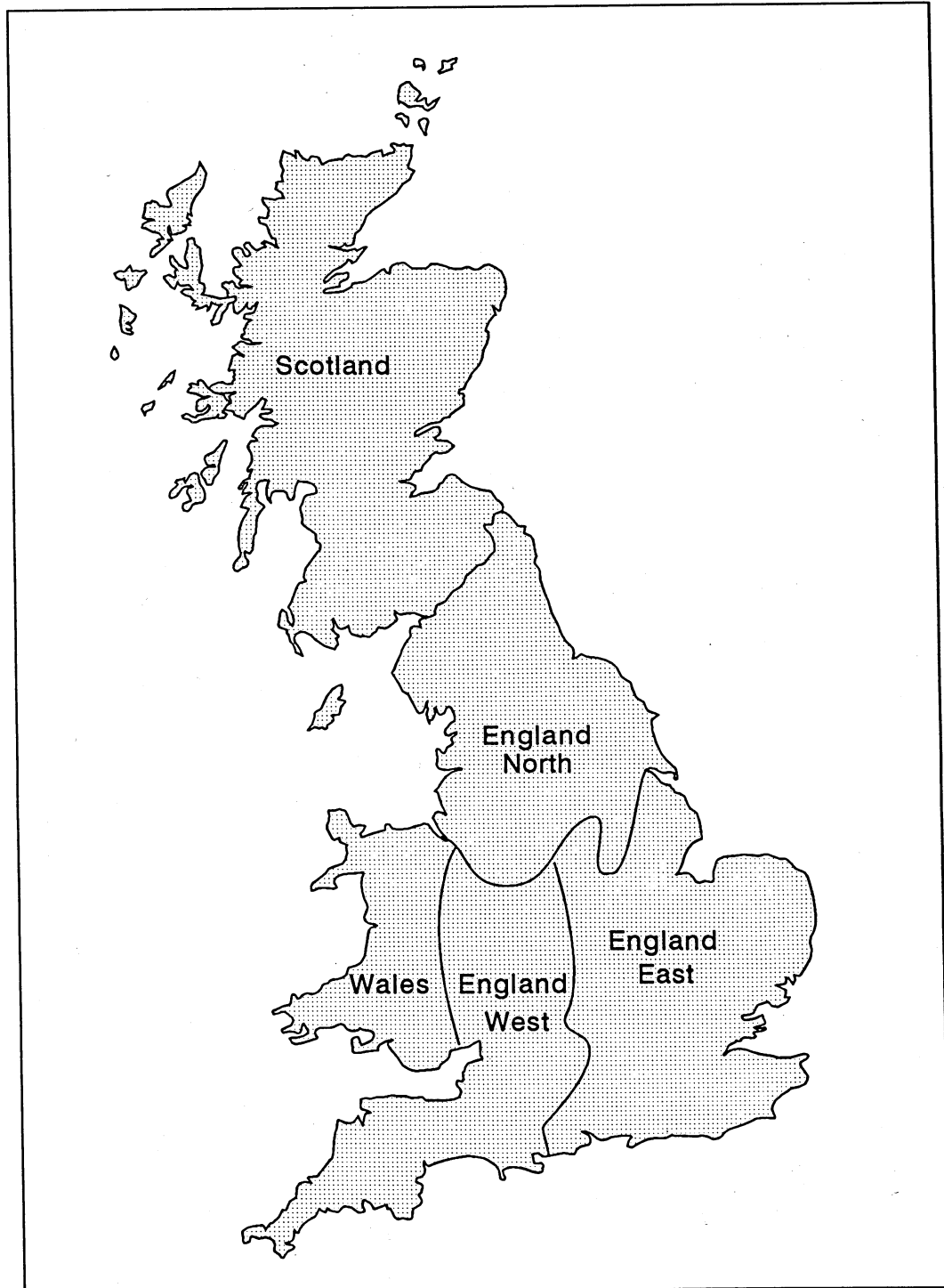


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APPENDIX A

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, 1995 Harvest Year (weighted)**

	Winter wheat		Winter barley		Spring barley	
	s.e.m.		s.e.m.		s.e.m.	
No. farms	57		57		31	
Yield tonnes per ha	8.50	(1.47)	7.28	(1.05)	5.42	(1.05)
Price £ per tonne	117.19	(0.19)	110.87	(0.19)	124.32	(0.36)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	995.52	(15.90)	807.16	(11.11)	673.29	(11.72)
Output-straw	63.86	(3.64)	110.59	(3.94)	97.58	(4.45)
Arable area payment	265.42	(8.16)	260.27	(6.26)	248.32	(7.07)
Total output	1324.80	(18.24)	1178.02	(13.34)	1019.20	(14.39)
Material costs						
Seed	50.15	(3.55)	48.50	(2.68)	54.44	(3.34)
Fertiliser	100.08	(5.00)	85.55	(3.59)	58.94	(3.47)
Crop protection	92.50	(4.85)	73.47	(3.47)	45.52	(3.07)
Total	242.73	(7.82)	207.53	(5.67)	158.90	(5.71)
Margin over materials	1082.07	(16.48)	970.50	(12.08)	860.29	(13.21)
Other variable costs						
Casual labour	0.82	(0.50)	1.19	(0.45)	0.67	(0.34)
Contract	30.01	(2.60)	21.20	(1.59)	23.23	(2.19)
Fuel for grain drying	3.29	(0.96)	2.35	(0.61)	0.52	(0.28)
Miscellaneous	6.55	(1.31)	6.55	(0.97)	4.53	(0.93)
Total	40.68	(3.10)	31.28	(2.01)	28.96	(2.42)
Total variable costs	283.41	(8.41)	238.81	(6.01)	187.86	(6.20)
Gross Margin	1041.39	(16.18)	939.21	(11.91)	831.34	(12.99)

**Table A.2 EU Region - England East: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1995 Harvest Year (weighted)**

	Winter wheat		Winter barley		Spring barley	
	s.e.m.		s.e.m.		s.e.m.	
No. farms	169		106		47	
Yield tonnes per ha	7.97	(0.88)	6.41	(0.76)	5.07	(0.87)
Price £ per tonne	118.88	(0.06)	120.03	(0.10)	140.90	(0.26)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	947.28	(9.62)	769.52	(8.43)	714.11	(10.48)
Output-straw	30.01	(1.60)	58.71	(2.25)	28.96	(1.83)
Arable area payment	264.53	(5.04)	252.60	(4.81)	266.33	(6.29)
Total output	1241.82	(10.98)	1080.83	(9.96)	1009.40	(12.36)
Material costs						
Seed	47.34	(2.12)	44.60	(2.00)	51.45	(2.80)
Fertiliser	89.06	(2.93)	73.87	(2.57)	56.69	(2.90)
Crop protection	109.83	(3.28)	78.36	(2.66)	59.25	(3.03)
Total	246.23	(4.88)	196.83	(4.20)	167.38	(5.04)
Margin over materials	995.59	(9.83)	884.00	(9.03)	842.01	(11.28)
Other variable costs						
Casual labour	2.49	(0.51)	2.25	(0.46)	0.05	(0.05)
Contract	16.11	(1.08)	12.16	(0.86)	18.43	(1.66)
Fuel for grain drying	1.77	(0.41)	0.72	(0.25)	1.20	(0.44)
Miscellaneous	9.12	(0.94)	8.08	(0.85)	6.75	(0.95)
Total	29.49	(1.57)	23.21	(1.32)	26.42	(1.96)
Total variable costs	275.72	(5.13)	220.04	(4.41)	193.80	(5.41)
Gross Margin	966.10	(9.71)	860.79	(8.93)	815.60	(11.11)

**Table A.3 EU Region - England West: Costs and Returns for Winter Wheat and Winter and Spring Barley, 1995 Harvest Year (weighted)**

	Winter wheat s.e.m.		Winter barley s.e.m.		Spring barley s.e.m.	
No. farms	58		53		31	
Yield tonnes per ha	7.33	(1.39)	6.37	(0.98)	5.03	(1.03)
Price £ per tonne	116.81	(0.19)	116.42	(0.21)	133.58	(0.38)
Returns	£/ha	£/ha	£/ha	£/ha	£/ha	£/ha
Output-grain	856.48	(14.95)	741.45	(10.64)	671.82	(12.31)
Output-straw	81.73	(4.20)	102.86	(3.70)	77.23	(3.84)
Arable area payment	267.12	(8.35)	256.49	(6.18)	262.67	(7.41)
Total output	1205.33	(17.63)	1100.81	(12.85)	1011.71	(14.87)
Material costs						
Seed	47.09	(3.51)	47.74	(2.67)	52.66	(3.31)
Fertiliser	95.06	(5.05)	80.06	(3.48)	60.83	(3.62)
Crop protection	101.66	(5.04)	83.25	(3.54)	56.22	(3.44)
Total	243.81	(7.95)	211.06	(5.64)	169.72	(5.99)
Margin over materials	961.52	(15.74)	889.75	(11.55)	842.00	(13.61)
Other variable costs						
Casual labour	1.02	(0.57)	1.30	(0.51)	0.92	(0.52)
Contract	28.29	(2.07)	25.70	(1.54)	19.57	(1.62)
Fuel for grain drying	1.23	(0.64)	1.36	(0.58)	1.02	(0.56)
Miscellaneous	10.86	(1.63)	8.37	(1.12)	8.28	(1.47)
Total	41.40	(2.77)	36.73	(2.06)	29.79	(2.31)
Total variable costs	285.21	(8.42)	247.79	(6.00)	199.50	(6.42)
Gross Margin	920.12	(15.49)	853.02	(11.36)	812.21	(13.41)

## APPENDIX B

### Cereal-Intensive Counties of England

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

### Cereal-Extensive Counties of England

Avon	Kent
Buckinghamshire	Lancashire
Cheshire	Merseyside
Cornwall	Northumberland
Cumbria	North Yorkshire
Derbyshire	Salop
Devon	Scilly Isles
Durham	Somerset
East Sussex	Staffordshire
Gloucestershire	Surrey
Greater London	Warwickshire
Greater Manchester	West Midlands
Hereford and Worcester	West Sussex
Isle of Wight	West Yorkshire
	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 21	Agricultural Contracting in the United Kingdom by J Wright and R Bennet University of Reading August 1993	£8.00
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<br>on Production Economics and Marketing<br>by Geoff Davidson and Carol Asby<br>University of Cambridge<br>July 1995                                | £12.00 |
| No 29 | Wheat and Barley Production in Great Britain, 1994/95:<br>Year Two of the CAP Reform<br>by Geoff Davidson<br>University of Cambridge<br>March 1996   | £12.00 |
| No 30 | Linseed<br>by MR Lewis<br>Askham Bryan College<br>April 1996   | £10.00 |
| No 31 | Lowland Sheep 1994: Production Economics<br>and Management<br>by Mark Fogerty and Martin Turner<br>University of Exeter<br>April 1996  | £10.00 |
| No 32 | Hardy Nursery Stock Production in England and Wales<br>by R Crane and C Barahona<br>University of Reading<br>March 1996  | £12.50 |
| No 33 | The Structure of Pig Production in England and Wales:<br>The Results of the National Survey of Pig Production<br>Systems, 1 February 1996<br>by Andrew Sheppard<br>University of Exeter<br>June 1996 | £8.00  |

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

## APPENDIX E

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- ASKHAM BRYAN**  
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School of Economic Studies  
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