Costs of cereal production in Ireland and selected EU member states

P.W. Kelly and U. Shanahan

RMIS 4509 End of Project Report

Summary

This study investigates the costs of production and producers margins for barley and wheat production in Ireland and some other EU member states. Ireland is compared with Germany, Denmark, France (for wheat only), the UK and Italy. The data used was from the Farm Accounts Data Network (FADN) of the EU and relates to the calendar year 1998. It is derived from specialist producers in the Cereals, Oilseeds and Protein (COP) sector.

For barley, the average size of the specialist farms growing the crop varied from 8 ha in Italy to 141 ha in the UK. Average barley yields on these farms varied between 4.67 tonnes per ha and 5.62 tonnes per ha in Germany. The price received by farmers for barley varied from a low of IR£85.17 in Ireland to IR£123.40 in Italy. These prices were not adjusted for quality or grain moisture content. The price includes both feed and malting barley.

Costs of production for barley were compared on a per ha and a per tonne basis. On a per ha basis specific costs (of seed, fertiliser, crop protection and fuel and lubricants) were highest in the UK at IR£313 per ha and lowest in Italy at IR£158 per ha. In Ireland they were IR£240 per ha. Fixed costs per ha were highest in Denmark at IR£603 and lowest in Ireland at IR£289. The high level of fixed costs is a recurrent feature of Danish agriculture and is largely due to the method of farm transfer, which is by sale and purchase using a mortgage rather than by gift between relatives. Combining specific and fixed costs provided estimates of the total cost of barley production. Total cost per ha was highest in Germany and Denmark at IR£808 and IR£805. Total cost was lowest in Ireland and Italy at IR£530 and IR£529 per ha.

Market based competitiveness for barley is based on cost per tonne. This was highest in Denmark at IR£172 per tonne and lowest in Ireland at IR£109 per tonne.

Farmer returns are normally expressed in returns per ha, since the land may have other uses. Estimation of the margin takes account of the value of output as well as the costs of production. The market based gross margin, (output less specific costs) was highest in Italy at IR£418 per ha and lowest in Ireland at IR£109 per ha. The net margin per ha, if arable aid was not included was negative in all the countries studied except Italy. This indicates that even with internal prices protected by a tariff, the production of barley was not profitable without subsidies.

For wheat, the analysis includes France as there were sufficient specialist farms in the data set to allow this analysis. The average size of specialist wheat producing farms varied very widely. It was - somewhat surprisingly - highest in Ireland at 176.5 ha, closely followed by Germany and the UK. Specific costs per ha for wheat production were higher than for barley, being highest in France at IR£377 per ha and lowest in Italy at IR£200 per ha. The average for Ireland was IR£332 per ha. Fixed costs per ha were higher than specific costs and varied between a very high level of IR£756 in Denmark and IR£377 in Italy. Ireland had the second lowest level of fixed costs per ha at IR£479. Total costs per ha varied between IR£1015 in Denmark and IR£576 in Italy. The high cost per ha in Denmark was due to the very high level of fixed costs, which accounted for 75 per cent of total costs per ha.

On a per tonne basis, the specific costs of wheat production were very similar in all the countries studied. They varied between IR£37 per tonne in Italy and IR£46 in France. Ireland and the UK had the same level of fixed costs per tonne of IR£41. Fixed costs per tonne for wheat production were also fairly similar across countries. They ranged from IR£59 in Ireland to IR£70 in Germany. The exception was Denmark, where the very high fixed costs gave an estimated level of IR£105 per tonne. Total costs per tonne of wheat were relatively similar and varied between IR£100 in Ireland and IR£112 in France. The exception was again Denmark where estimated total costs per tonne were IR£142.

The price of wheat received by farmers varied between IR£83 per tonne in Denmark and IR£126 in Italy. Using both price and cost estimates to calculate producers margins resulted in a range of market based gross margins from IR£310 in Denmark to IR£486 in Italy. Specialist wheat producers in Ireland had the second highest market based margin at IR£406 per ha. The net margin, calculated as output plus subsidies less both specific and variable costs, was positive in all the countries studied, except Denmark. If subsidies are not included, the net margin was negative in all countries except Italy, indicating a lack of competitiveness of wheat production.

The relatively high margin of Irish producers is due in part to the relatively high yields and the relatively low overhead costs. Irish producers of wheat tend to be specialised and often rent land to avail of the economies of scale that may be achieved in the production of this crop. A particular feature of Irish cereal production is the extensive use of contractors services. This reduces depreciation and allows the capture of the economies of scale associated with the use of high capacity machinery when this is used for long periods.

Introduction

This report examines the costs and returns in the production of common wheat *(triticum aestivum)* and barley in Ireland and some comparable EU member states. The EU countries chosen for comparison were the UK, Denmark, France, Germany and Italy. The data is from the Farm Accounts Data Network (FADN) of the Commission of the EU.

The FADN does not record the cost of production of individual products. When production costs are calculated, costs are assigned to particular crops based on the share of that particular crop in the output of the holding. This procedure requires that the farms on which the crop costs are analysed should have a relatively high degree of specialisation in the crop studied. By convention this is at least 40 per cent.

The results in this study may be compared in a broad way with those for 1993 which have been published earlier (Kelly 1997 and 1999). The results presented here are not directly comparable with those for 1993 as there have been some changes in the farm typology schemes since 1996. The earlier publications referred to "specialist cereal farms", a category which no longer exists. The data used in this report comes from "cereals, oilseed and protein crop"- COP specialists, which is the closest class to the "specialist cereal farms" under the new classification.

For wheat production, the sample of farms for Ireland was too small to give meaningful results so the results that are presented are based on a three year average.

Barley

The structure of "specialist COP" farms producing barley in Ireland, Germany, Denmark, UK and Italy in 1998 is shown in Table 1.

Table 1: Selected structural characteristics of "specialist COP" farms producing barley in Ireland, Germany, Denmark, UK and Italy, 1998.

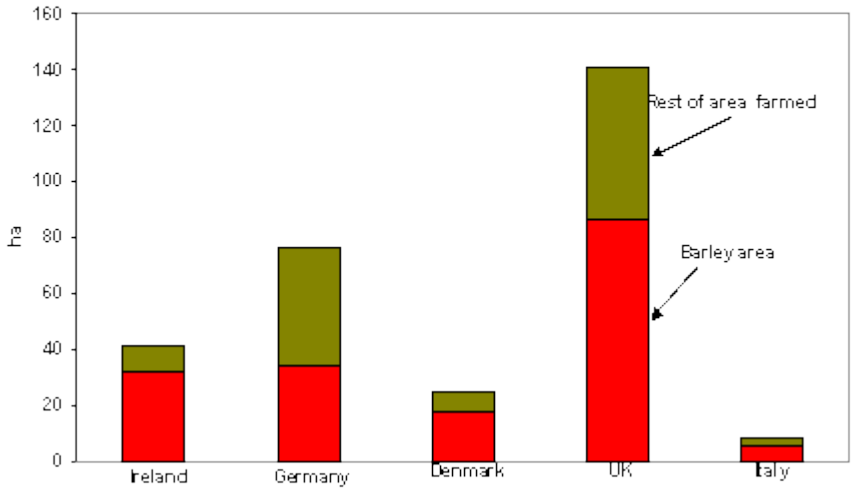
	Ireland	Germany	Denmark	UK	Italy
Degree of specialisation (barley as % of output)	60.1	50	83	60	66
Economic size - ESU[1]	20.2	39.3	13.5	93	5.4
Labour input - AWU[2]	0.96	1.41	0.41	1.72	0.73
Unpaid labour input - FWU[3]	0.914	1.274	0.38	0.998	0.72
Utilised Agricultural Area (UAA) ha	40.8	76.1	24.4	140.8	8
Rented area ha	8.2	47.6	0.4	53.7	0.6
Area of barley ha	31.68	34.23	17.58	86.49	5.39
Average yield of barley (tonnes per ha)[4]	4.87	5.62	4.67	4.79	5.02
Average barley price ECU/tonne	108.32	124.31	112.81	146.49	156.95
Average barley price IR£/tonne	85.17	97.74	88.70	115.18	123.40

Notes:
[1] Economic Size Units.
[2] Agricultural Work Units.
[3] Family Work Units. For full definitions, see glossary at the end of the report.
[4] Measured "off the combine" not at standard moisture level.

Table 1 gives an indication of the characteristics of specialist barley producing farms. The largest farms in terms of area were in the UK where the average size was 140.8 ha. The next largest were in Germany but even there, at 76.1 ha, the farms were only about half the area of those in the UK. The economic size of the farms follows the same pattern but the UK

were proportionately even larger than the others. The greatest labour use was in the UK which is not surprising as these were larger farms. Labour use was also high in Germany where specialisation was lower and the balance of the farms activities were taken up with other enterprises which needed more labour than barley production. Land rental was most important for specialist barley producers in Germany where the farms rented an average of 47.6 ha or 62.5 per cent of their UAA. The UK was the other country where land rental was important for specialist barley producers. On average these farms rented 53.7 ha or 38.1 per cent of their UAA. In the other countries land rental was relatively much less important. In Ireland, the barley specialist farms rented 8.2 ha which was about 20 per cent of their barley area. The barley "price" refers to reciepts from grain sales and is not a quoted price.

Figure 1: Barley area as a proportion of farm area (UAA) on specialist barley producing farms



Cost comparisons

Cost comparisons of barley production are presented as costs per ha. This is a basis which does not change very much from year to year. For comparisons of competitiveness, the most appropriate basis is cost per tonne of barley. This is because price per tonne is important to buyers when deciding whether to buy barley at all and from where it should be bought. Cost per ha will be determined by the price of inputs but also by the quantity used. Winter sown crops will require more inputs than spring ones so the cost per ha will be higher. This should be reflected in a higher yield, so that cost per tonne will take account of this.

In these comparisons costs of production are divided into "specific" costs, ie costs of purchased inputs which may be entirely allocated to the barley crop (these include seed, fertiliser, crop protection expenses, motor fuel and lubricants) and "other crop specific costs". In the case of Ireland these "other costs" are mainly contractors' charges.

A comparison of specific costs per ha is given in Figure 2.

Figure 2: Specific costs of barley production (IR£/ha)

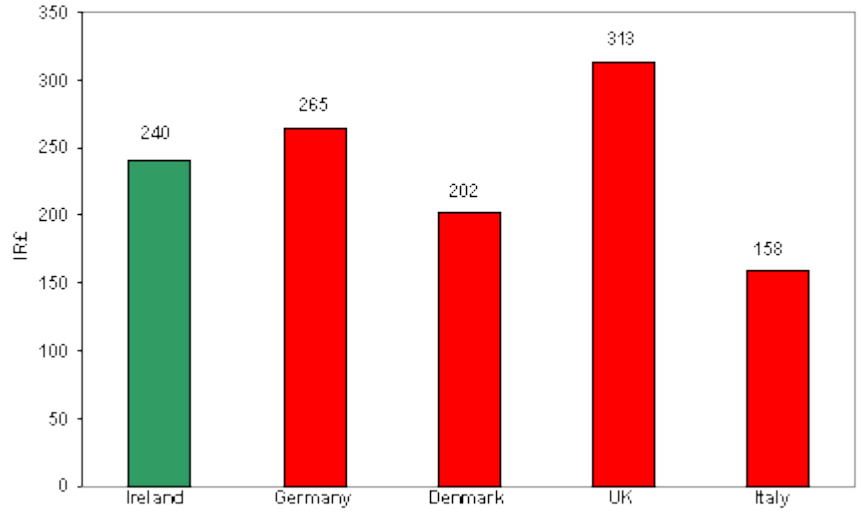
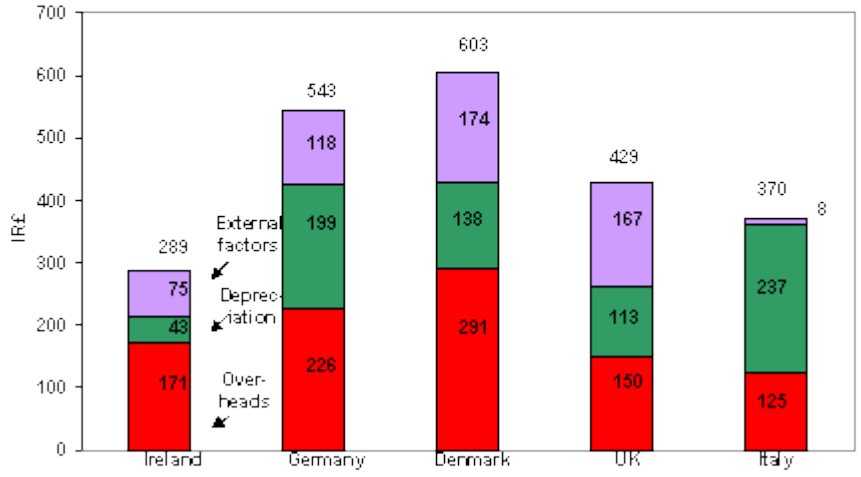


Figure 2 shows that the specific costs per ha for barley production were highest in the UK and lowest in Italy. Ireland's specific costs per ha were unusually high in 1998, at about IR£10 per ha above those for earlier years. In the UK and Ireland the main specific costs were seeds and crop protection expenditure. The crop protection expenditure is largely a reflection of weather conditions.

Fixed costs

In the FADN cost classification, fixed costs are divided into "farming overheads", "depreciation" and "external factors". Total fixed costs of barley production vary considerably between the Member States studied. This is shown in Figure 3.

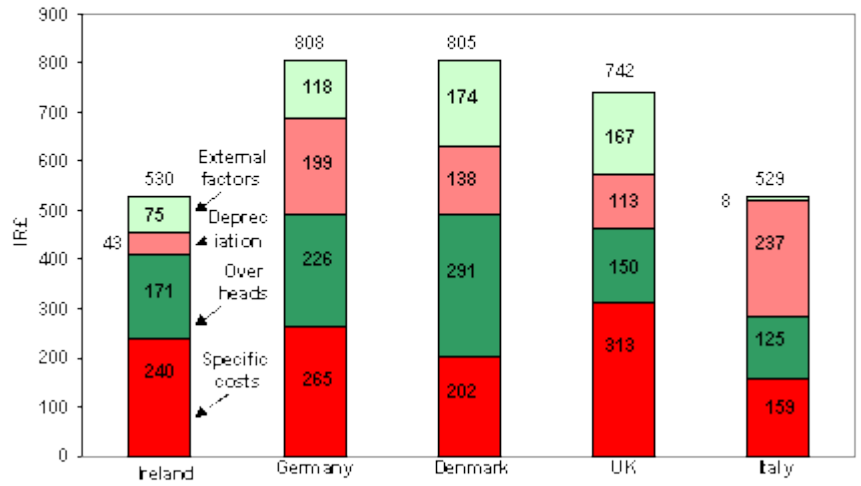
Figure 3: Fixed costs of barley production on specialist farms 1998 (IR£/ha)



Ireland had the lowest fixed costs per ha for barley production of all the countries studied. Denmark had the highest. In Ireland, Germany, and Denmark "overheads" were the largest part of fixed costs. In the UK "external factors" were the largest and in Italy it was "depreciation". "Overheads include machinery and building maintenance, contract works, energy (excluding fuel and lubricants) and "other direct costs". "External factors" include wages, rent and interest net of subsidies. Depreciation is not sub-divided any further.

When both fixed and overhead costs per ha were added together they gave an estimate of the total costs per ha of barley production. The results of this exercise are shown in Figure 4.

Figure 4: Total barley production costs on specialist farms, 1998. (IR£/ha)



Total costs per ha on specialist barley producing farms were highest in Germany, due to the high level of fixed costs there. Depreciation and overheads were relatively high in Germany due to the mixed nature of the farms and the relatively high levels of capital employed. Ireland and Italy had the lowest costs per ha for barley production. Overhead costs were particularly high in Denmark due to the high levels of loan repayments which arise because of the transfer of farms by purchase rather than by inheritance which is more common elsewhere.

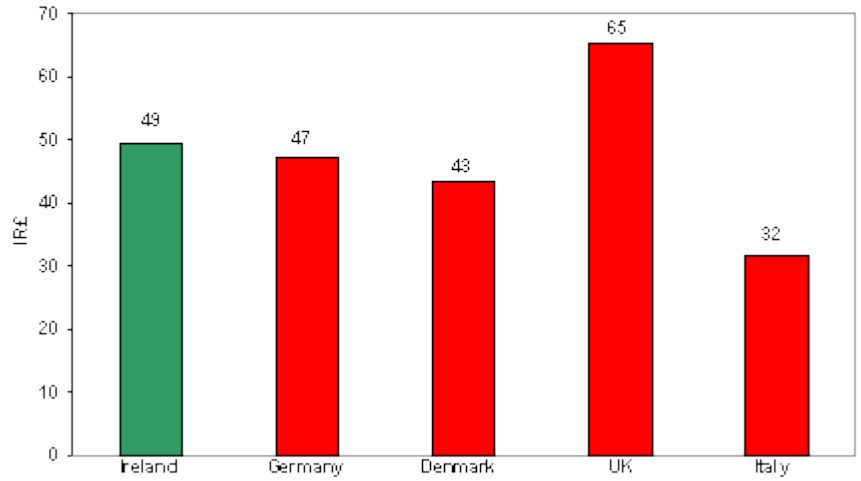
Costs per tonne

Competitiveness in the market place for a commodity such as barley will be largely determined by costs of production. This is not entirely the case as quality differences, especially between malting and feed barley as well as transport costs to the point of purchase will also be important. A further complication with the data used for this study is that the grain price is not standardised for moisture content.

The short run cost of production may be considered as the variable, or in this case the "specific" cost per tonne.

A comparison of the specific cost per tonne is shown in Figure 5.

Figure 5. Barley, specific costs on specialist farms, 1998 (IR£/tonne)



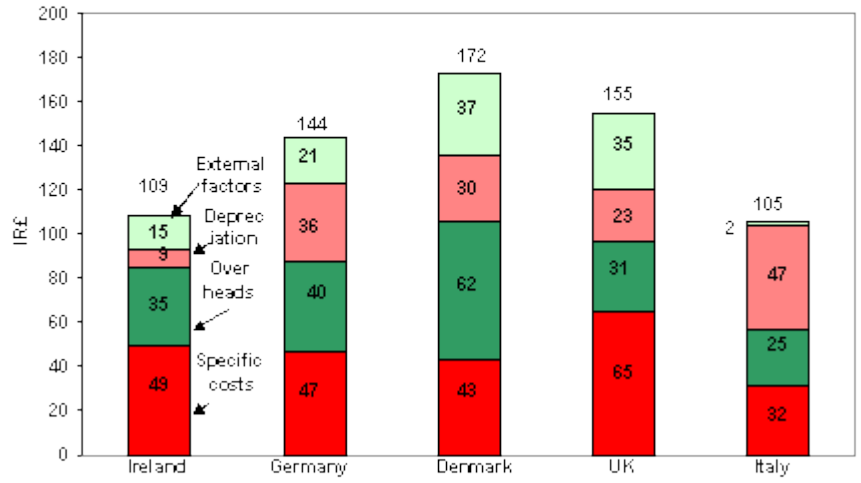
Specific costs per tonne for barley were significantly higher in the UK than in the other member states. This is probably due to the relatively large proportion of low yielding malting barley grown there. Specific costs per tonne varied between IR£65 in the UK and IR£32 in Italy. Specific costs per tonne in Ireland were the second highest of those studied.

Total costs per tonne

Combining fixed and specific costs gives an estimate of total costs per tonne of barley on specialist COP farms in the countries studied.

This is illustrated in Figure 6.

Figure 6: Estimated total costs per tonne of barley, 1998 (IR£/tonne)



Estimated total costs per tonne of barley were highest in Denmark at IR£172 and lowest in Italy at IR£105. At these cost levels, all the countries studied would have been producing barley at above the "world" price and hence be considered uncompetitive.

The effects of these high costs on margins was counterbalanced by the relatively high support price (intervention price) and area aid payments.

Margins per ha for barley production on specialist farms are given in Table 2.

Table 2: Analysis of margins in barley production on specialist farms in selected EU member states, 1998.

	Ireland	Germany	Denmark	UK	Italy
A. Crop price IR£/tonne	85	98	89	115	123
B. Crop output IR£/ha	415	549	414	552	619
C. Compensation IR£/ha	274	234	229	264	152
D. Gross output IR£/ha (B+C)	689	783	643	816	771
E. Specific costs IR£/ha	240	265	202	313	158
F. Fixed costs IR£/ha	289	543	603	429	370
G.Market margin IR£/ha (B-E)	109	212	157	154	418
H.Gross margin IR£/ha (B+C-E)	383	446	386	418	570
I. Net margin including compensation	160	-25	-162	74	243
J. Net margin not including compensation	-114	-258	-390	-190	91

Table 2 shows that when margins are analysed, barley production on specialist farms in all the member states studied had a positive gross margin (ie gross output less specific costs) of over IR£380 per ha. When account was taken of fixed costs in order to arrive at a net margin, the net margin was negative in all cases. When subsidies or "compensation" was added back in margins remained positive in Ireland, the UK and particularly Italy.

Wheat

The structure of "specialist COP" farms producing wheat in Ireland, Germany, Denmark, UK and Italy in 1998 is shown in Table 3.

Table 3: Selected structural characteristics of "specialist COP" farms producing common wheat in Ireland, Germany, Denmark, UK and Italy, 1998.

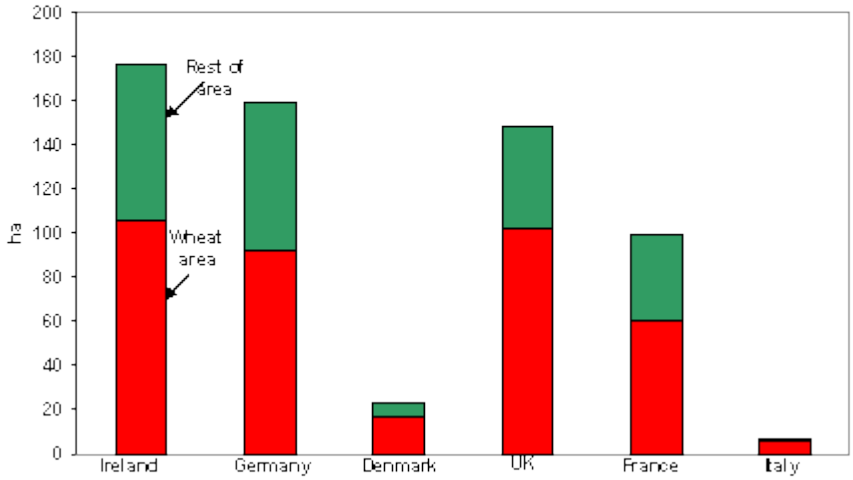
	Ireland	Germany	Denmark	UK	France	Italy
Degree of specialisation (wheat as % of output)	64	57	77	75	71	88
Economic size - ESU[1]	110	103	17	115	63	5
Labour input - AWU[2]	1.44	2.22	0.39	1.57	1.22	0.56
Unpaid labour input - FWU[3]	1.08	1.56	0.39	0.84	1.04	0.55
Utilised Agricultural Area (UAA) ha	176.5	159.4	23.1	148	99	7.3
Rented area ha	108	125	3	31	79	1
Area of wheat ha	106	92	17	102	60	6
Average yield of wheat (tonnes per ha)[4]	8.1	6.9	7.2	7.9	8.3	5.4

Average wheat price ECU/tonne	116.68	119.95	101.84	116.26	106.57	161.89
Average wheat price IR£/tonne	90.86	93.41	79.30	90.53	82.99	126.07

Notes:
[1] Economic Size Units.
[2] Agricultural Work Units.
[3] Family Work Units. For full definitions see glossary at the end of the report.
[4]Measured at actual moisture content when harvested - not standardised.

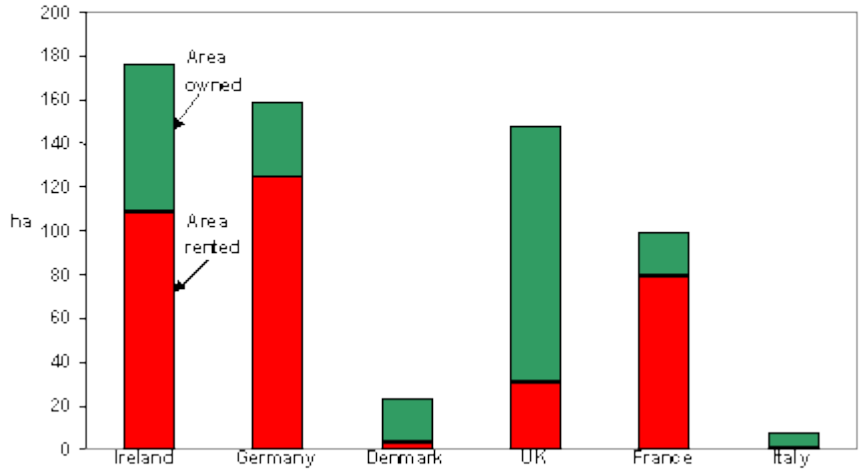
The degree to which the farms specialised in wheat production, as expressed by the area grown is shown graphically in Figure 7.

Figure 7: Wheat area on specialist wheat farms, as part of total area farmed, 1998



It is clear that specialist wheat producing farms in the UK and especially Ireland are relatively large in terms of their area. In Ireland, Germany and France, much of this area is rented (Table 8). A large amount of the land of wheat producing farms in the UK is also rented but this is usually on a long term basis as part of the rental of a whole farm. In Ireland, the rental period is usually for a single year.

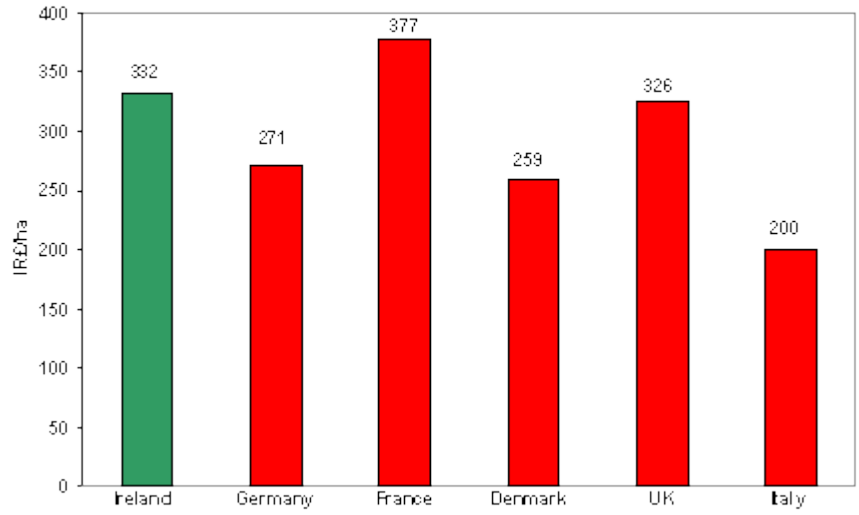
Figure 8: Area rented and owned on specialist wheat farms 1998.



Specific costs

A comparison of specific costs per ha on specialist wheat producing farms in selected member states is shown in figure 9. This shows that specific costs per ha were highest in France and Ireland and lowest in Italy. Higher levels of specific costs for wheat production are associated with larger proportions of winter wheat in the wheat crop for the countries studied. Winter crops usually require extra expenditure on crop protection, fertilizers and growth regulators.

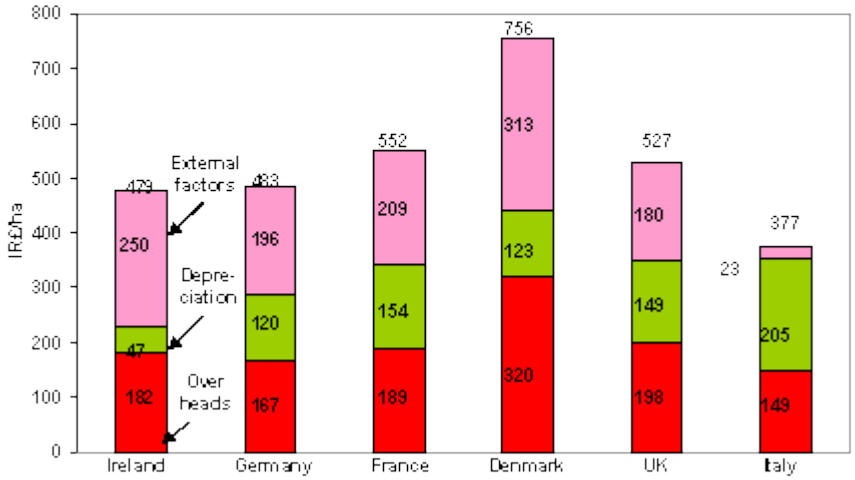
Figure 9: Specific costs of wheat production 1998



Fixed costs

The fixed costs of wheat production on specialist COP farms in the member states studied are shown in figure 10

Figure 10: Fixed costs of wheat production on specialist farms 1998 (IR£/ha)

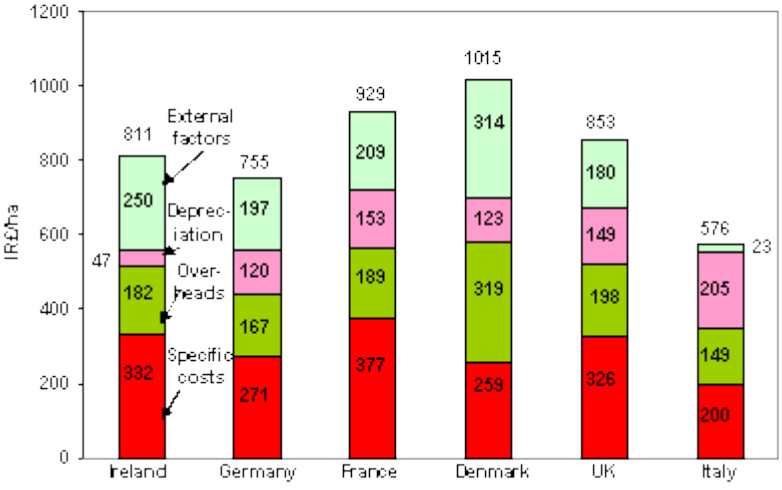


Fixed costs per ha on specialist wheat farms was lowest in Italy mainly due to the very low level of "external factors" and also in Ireland, this time due to low depreciation charges. This is very much connected with the high use of contractors' services which occur as part of 'specific costs'. Fixed costs per ha were highest in Denmark, due to the high level of interest repayments which are classed as "external factors". This is a by-product of the land transfer system in Denmark where producers normally buy their farms with a mortgage. Inheritance without payment is much less common than in Ireland.

Total costs per ha

Estimated total costs per ha for wheat production in the member states studied are shown in Figure 11. This indicates that estimated total costs per ha were highest in Denmark and lowest in Italy. Ireland's costs per ha were estimated at IR£811 per ha, which puts it in the mid-range of costs.

Figure 11: Total costs per ha for wheat production 1998 (IR£)



Costs per tonne

As wheat is priced on a per tonne basis, cost based comparisons of competitiveness need to be on a per tonne basis also.

Comparisons of the specific costs per tonne for wheat production are shown in Figure 12.

Figure 12: Wheat, specific costs per tonne 1998. (IR£)

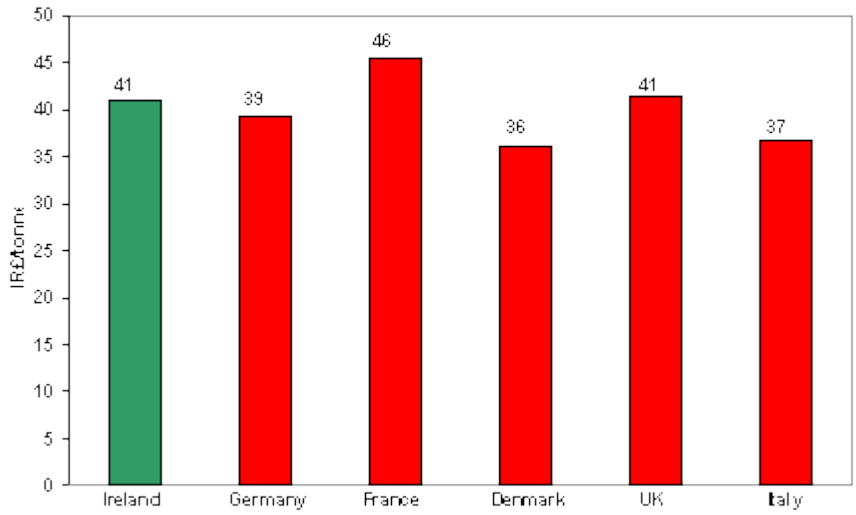


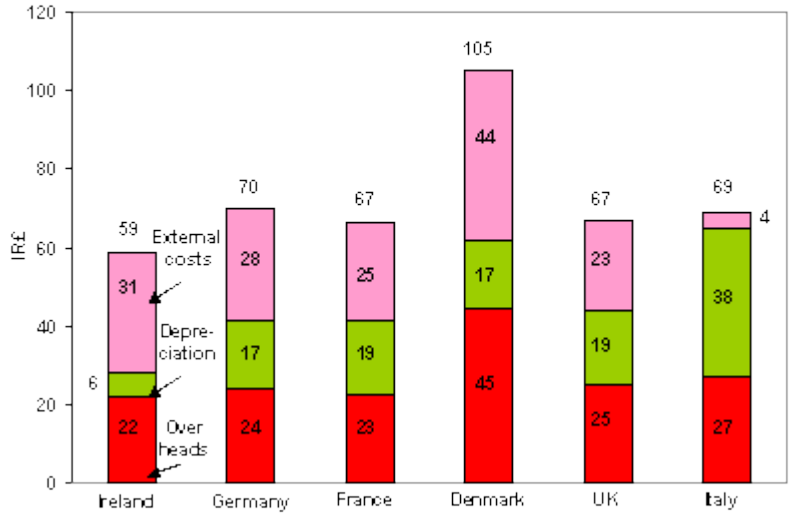
Figure 12 shows a distinct convergence of specific costs per tonne of wheat produced in the member states studied. The specific costs per tonne are relatively high in Ireland and France because the wheat is mainly winter varieties. In France the specific costs are particularly high due to the lower yield per ha. This is counter balanced by the generally higher price obtained for wheat there since much of it produces grain of bread making quality.

Fixed costs

Fixed costs per tonne for wheat production show greater divergence than fixed costs since the fixed costs are more closely linked to the whole farming system. This varies considerably from country to country as was shown in the summary of the farm characteristics in Table 3.

Fixed costs per tonne for 1998 are illustrated in Figure 13.

Figure 13: Fixed costs per tonne of wheat 1998. (IR£)



Although there are differences in the components of fixed cost tonne of wheat, the level is fairly constant at between IR£59 and IR£70 per tonne. The exception is Denmark, where high overheads and external costs push the fixed costs per tonne up to IR£105. Depreciation

was particularly low in Ireland, since not much capital is owned and use is made of contractors' services. In Italy, by contrast, depreciation was high but the farms were less specialised and much smaller.

Total costs per tonne

Combining specific and fixed costs gives estimates of total costs per tonne for wheat on specialist farms in the countries studied. This is illustrated in Figure 14.

Figure 14: Total costs per tonne of wheat, 1998. (IR£)

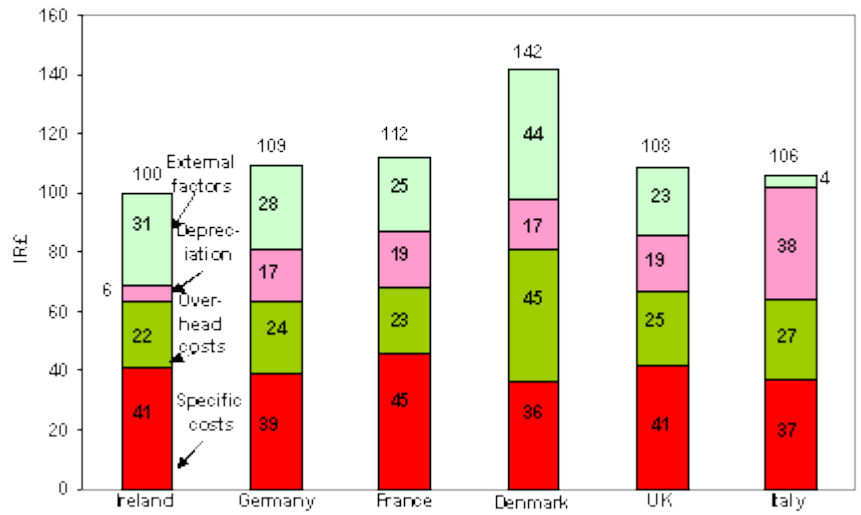


Figure 14 illustrates the relative similarity of costs per tonne for wheat in each of the member states studied. Except in Denmark, the costs per tonne were within a IR£12 range. Ireland was the country with the lowest cost per tonne for wheat production. Denmark had the highest cost. Most of this high cost was due to the high overhead and external costs. Specific costs per tonne in Denmark were the lowest of all the countries studied.

Margins

The relationship between costs and price is indicated by the value of various margins over costs. The workings of the Common Agricultural Policy mean that it is possible for a member state to produce wheat uncompetitively but for the producers to maintain positive margins. Table 4 shows the prices and margins for the wheat enterprise on specialist wheat producing farms in 1998 in the member states studied.

Table 4: Margins per ha for wheat production on specialist farms are given in table 5.

	Ireland	Germany	France	Denmark	UK	Italy
A. Crop price IR£/tonne	91	93	83	79	90	126
B. Crop output IR£/ha	736	646	688	569	712	686

C. Compensation IR£/ha	275	248	305	228	269	174
D. Gross output IR£/ha (B+C)	1011	894	992	796	980	859
E. Specific costs IR£/ha	332	271	377	259	326	200
F. Fixed costs IR£/ha	479	483	552	756	527	376
G. Market margin IR£/ha (B-E)	404	375	311	310	386	486
H. Gross margin inc compensation IR£/ha (B+C-E)	679	623	615	538	654	660
I. Net margin including compensation IR£/ha (B+C)-(E+F)	200	140	64	-218	127	283
J. Net margin not including compensation IR£/ha (B-(E+F)	-75	-108	-241	-446	-142	110

Table 4 shows that market margin per ha including compensation was positive for all the countries studied. When area aid payments were added in this margin increased. The gross margin per ha was highest in Italy and Ireland and lowest in Denmark and France. The effect of fixed costs on margins is shown in the net margin results. When compensation is included, all the countries studied had positive net margins, except Denmark. But when compensation payments were not included all the countries had negative net margins, except for Italy.

Conclusions

The conclusions of this study have been reached with a degree of caution as the data on which they are based comes from a relatively small sample of farms; the types of wheat or barley grown are not distinguished by quality or end use. The cereal grains sold by the farmer are not classified by type eg malting or feed barley, nor is the price standardised for moisture content. Against these negative points, one can set the standardised typology and accounting methods of the EU Farm Accounts Data Network and the fact that the data is taken from a reasonably representative sample of farms. The results are not based on all the farms producing the crop but only on those farms which specialise in its production.

In the case of barley, specific costs per ha (seeds, fertilizer, crop protection, and fuel and lubricants) were highest in the UK and lowest in Italy. Specific costs were not the largest proportion of costs. The largest proportion may be classed as "fixed" costs. These include "external factors" such as wages, rent, and net interest; "depreciation" and "overheads" which include maintenance, contract works, and energy (excluding fuel). Ireland had the lowest fixed costs per ha for barley production and Denmark had the highest. Total costs per ha for barley production were highest in Germany and Denmark and lowest in Italy.

On a per tonne basis, which is the market based measure of competitiveness for cereals, Ireland and Italy had the lowest cost per tonne for barley and Denmark had the highest. The cost levels for all the countries studied would have made them uncompetitive at world prices.

The addition of area aid ("compensation") gave barley production a positive net margin per ha in all the countries studied except Denmark where farmers appeared to be producing at a loss due to the very high level of fixed costs.

The costs of wheat production on specialist farms in the countries studied were higher than for barley.

The highest specific costs per ha for wheat production were in France and Ireland and lowest in Denmark and Italy. Fixed costs per ha were also lowest in Italy. Ireland also had relatively low fixed costs for wheat production. Fixed costs per ha were highest in Denmark. Total costs per ha were lowest in Italy and highest in Denmark.

On a per tonne basis the levels of specific costs were similar across all the countries studied. Fixed costs per tonne were also relatively similar except in Denmark where they were about one and a half times the level of fixed costs per tonne in the other countries. These differences were reflected in the estimates of total cost per tonne which ranged between IR£100 per tonne in Ireland, (the lowest cost producer) and IR£112 in France. The exception was Denmark where total costs per tonne for wheat were about one third higher than in the other countries.

If enterprise "profits" are considered to be represented by the "net margin" , ie output plus subsidies less fixed plus specific costs, then the wheat enterprise was profitable in all the countries except Denmark. Without subsidies wheat was produced at a loss in all the countries studied except Italy.

References

Kelly, P.W. *Cereal Production Costs in Ireland and comparisons with other EU countries.* In Proceedings of the National Tillage Conference. Dublin. Teagasc. 1997.

Kelly, P.W. *Cost competitiveness of Irish Cereal Production*. End of Project Report. Dublin. Teagasc. 1999.

Glossary

ESU- European Size Unit

This is a measure of farm size using economic size rather than area. 1 ESU=1,200 Euro of Standard Gross Margin. The Standard Gross Margin is a measure of economic activity on the farm. The Standard Gross Margin (SGM) is defined as the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output. The standard gross margins are based on three year averages and are updated every two years. Each region or country in the Farm Accountancy Data Network, (FADN) calculates Standard Gross Margins for that region.

AWU-Annual Work Unit

In the Farm Accountancy Data Network (FADN) of the EU, the total force regularly employed is expressed in numbers of annual units. A person who spends his or her entire annual working time employed on the holding, (a full-time worker) represents one 'annual unit', even if their actual working time exceeds the normal annual working time in the region under consideration and on the same type of holding. A person who does not work the whole year on the holding represents a fraction of an 'annual unit'.

The 'annual unit' of each person es obtained by dividing their actual annual working time by the normal annual working time of a full-time worker in the region under consideration and on the same type of holding.

When a person is incapable of performing normal duties - for example because of disablement- their total labour input is adjusted to the working time corresponding to a fit person.

In Ireland, one labour unit is defined as at least 1,800 hours worked on the farm by a person over 18 years of age. Persons under 18 years of age are given the following labour unit equivalents:- 16-18 years: 0.75; 14-16 years: 0.50. An individual cannot exceed one labour unit even if he or she works more than 1800 hours on the farm.

FWU - Family Work Unit

This is the same as an Annual Work Unit (see above) but refers to unpaid labour.