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University of Reading  
Department of  
Agricultural Economics & Management

# FISH FARMING IN THE UNITED KINGDOM

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THE UNITED KINGDOM

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Readers will appreciate that the views expressed in this report are those of the author and not necessarily to be regarded as those of the above mentioned institutions or individuals.

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## INTRODUCTION

This Department has previously published two reports on fish farming\* which represented the results of research work commissioned by the Ministry of Agriculture, Fisheries and Food. The research objective was primarily to provide statistical information on the size and structure of the fish farming industry. A detailed analysis of the economics of table trout production and the marketing situation for trout was also presented. Partly as a consequence of the continued growth in the industry the M.A.F.F. commissioned a third research project concerned with establishing in economic terms, the size and structure of the fish farming industry in the U.K. This report presents those findings of this research project which it is felt would be useful information to those either employed in or connected with the industry. This research was undertaken between April 1982-June 1983 inclusive.

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\* Fish Farming in Great Britain, Miscellaneous Study No.67.

Rainbow Trout: Production and Marketing. Miscellaneous Study No.68.  
University of Reading.

## CHAPTER I RESEARCH METHOD and FARM CLASSIFICATION.

There has been much debate in the fish farming industry in recent years concerning how many fish farms are actually operating in the country. This debate has arisen partly because there is no clear definition as to what constitutes a commercial fish farm and partly because there is no central register of fish farms in the country. One of the objectives of this study was to seek to establish how many farms were operating, what species were being farmed, the size of the industry and so on. This information was collected by means of a postal survey for farms in England and Wales and drawing on the advice and results of other researchers for Scotland and N. Ireland.

The addresses for the postal survey were collected from the regional Water Authorities and from information supplied by the Ministry of Agriculture, Fisheries and Food. Obviously, we were also able to draw on a considerable amount of data concerning fish farm addresses collected during the previous research studies at Reading. Some 535 addresses were obtained for England and Wales which compares with 440 addresses collected in 1977 for England, Wales and Scotland. Thirty-one of these addresses were not sent to because it was known from the previous studies that they were not active fish farms. Moreover, it was suspected by the author that many of the remaining addresses were also not active fish farms but it was decided to include them in order to achieve a full coverage.

A short questionnaire was designed with the primary objective of identifying the type of fish farming being undertaken and obtaining trout production data for the years 1981 to 1984 inclusive. A copy of the questionnaire is given in the Appendix. The questionnaires were sent out in October 1982 exactly three years after the previous survey. Following reminder letters 387 questionnaires were returned, being a response rate of 77%. Such a high response rate, in what is a very diverse industry is not only gratifying but also enables one to discuss the results with a high degree of confidence. Moreover, it proved possible to classify the non-respondents in terms of types of activity thus achieving complete coverage for this aspect.



Table 1      Classification of survey response according to type of activity  
in 1982 (England and Wales)

	<u>No</u>	<u>%</u>
Trout holdings	182	36
Other fish holdings	65	13
Returned G.P.O.	35	7
No activity	86	17
Not yet operational	11	2
No data supplied	8	2
 TOTAL returned	 <u>387</u>	 <u>77</u>
 NON Response	 <u>117</u>	 <u>23</u>
 TOTAL	 <u>504</u>	 <u>100</u>

. In the interest of clarity it is necessary to discuss and define the categories shown in Table 1. It should be noted first of all that the term trout holding has been adopted to emphasise the point that the whole range of different sizes of fish producing units are included in the various categories. Thus included in the figure of 182 trout holdings are a small number of farms producing only a few thousand fish per annum. (Data on the size distribution of holdings is given on page 9. With regards to the 182 trout holdings. 88 produced fish solely for the table market. 45 for restocking purposes with 49 supplying both the table and restocking markets. There were 11 returns which were 'not yet operational' and 8 returns for which no data was supplied. The former group consisted of farms that were in the process of being built, whilst the latter group consisted mainly of hobby-type concerns which is why no production data was given.

Sixty-five returns are shown as 'other fish holdings'. These are all non-trout holdings, the majority of which were producing coarse fish for restocking purposes. Also included are ornamental holdings, table-carp farms, eel farms and a number of fisheries (including trout) where it was unclear if any fish were being produced. It should be noted here that those holdings producing both trout and other fish were included in the trout holding category.

The Post Office returned 35 questionnaires franked either as 'address not known' or 'gone away'. This relatively high number is a reflection on the inadequacy of the information available concerning postal addresses, particularly for some areas. In some cases the survey forms were returned unopened because they were addressed to the previous manager or owner who had since moved away. Thus it should be noted that some of these forms returned by the G.P.O. might still relate to actual fish holdings.

Some 86 returns have been classified as 'no activity'. This is a large number and relates to several different situations. Three main types may be distinguished. First, there were those holdings which had produced fish in the past but were no longer doing so. Second, there were a number of holdings that received more than one questionnaire and the duplicates were included in this category of 'no activity'. Third, some of the addresses sent to related to activities that were not primarily concerned with fish production though fish may have been kept for other reasons. Included here would be research establishments, some retail and trading concerns and a number of other specialist businesses.

As indicated earlier, it was possible to classify the non-respondents into type of activity either because such information had been obtained from previous surveys or because this information was available from Water Authority officials. Table 2 presents the classification of the raised results.

Table 2 . Suggested classification of addresses according to type of activity in 1982 (England and Wales).

	<u>No</u>
Trout holdings	258
Other fish holdings	77
No activity	62
No information	<u>50</u>
TOTAL	<u>447</u>

The table shows some 258 trout holdings though this includes three trout hatcheries and a further 15 trout holdings that were not fully operational in 1982. The 'no activity' category is defined slightly differently here compared to its useage in Table.I. It consists mainly of those holdings that had ceased production and also some six holdings that were not primarily concerned with fish production (e.g. research establishments). It does not include returns relating to duplicate addresses. There were 77 other fish holdings and 50 addresses for which no information was

available. The difference between the total of 447 and the number of questionnaires sent out (504) is accounted for by the exclusion of questionnaires relating to either duplicate addresses or to holdings that were never actively involved in fish production. Table 3. presents a more detailed breakdown of the trout and other fish holdings listed in Table 2. The trout holdings have been divided into the specialist table and restocking farms, those producing both and those combining trout with other fish production. The category of 'other trout holdings' relate primarily to farms which had not begun production in 1982 but also includes three trout hatcheries. Most farms selling eggs, fry and fingerlings were also selling larger fish and so have been included in the other categories.

The other fish holdings have also been sub-divided. Thirteen farms were specialist carp producers, mainly for restocking purposes and 18 farms produced a mixture of coarse species (including carp) and/or ornamental species. Six salmon hatcheries, five eel farms or fisheries and four shellfish operations have been grouped together in the 'others' category. The table shows that there were 31 fisheries covering both trout and coarse fisheries. This number relates to those which were known to be fisheries but for which no production data was obtained. Many of the trout and other fish holdings indicated that they operated a fishery and, in total, some 139 fisheries were recorded.

Table 3     Suggested classification of fish holdings in 1982

(England and Wales.)

<u>Trout holdings:</u>	<u>No</u>
Table only	109
Restocking only	62
Table and Restocking	53
Trout and 'other fish'	16
Other trout holdings	18

sub-total	258
-----------	-----

Non-Trout holdings:

Carp only	13
Coarse and Ornamental	18
Other fish holdings	15
Fisheries.	31

sub-total	77
-----------	----

TOTAL	335
-------	-----

CHAPTER II      PRODUCTION and MARKETING in ENGLAND AND WALES.

This chapter examines total output, output by region, size distribution of holdings and the marketing outlets used by trout farmers. The results presented are taken from the postal survey and therefore relate to England and Wales. Chapter III presents U.K. output data and also data on trade and consumption.

Total O.

Respondents were asked to record their actual production figures for 1981 and 1982 and their planned production figures for 1983 and 1984. These results are given in Table 4 which shows total trout output sub-divided into table trout and restocking trout.

Table 4      Survey Data for Trout Production in England and Wales 1981-1984  
(tonnes per annum)

	<u>1982</u>	<u>1982</u>	<u>1983*</u>	<u>1984*</u>
Table	4207	4907	5993	6749
Restocking	1421	1536	1788	1931
	—	—	—	—
Total	5628	6443	7781	8680
	—	—	—	—

\* planned production

The figures given above are those recorded by survey respondents and give a very clear indication of both the current rate of growth and the relative importance of the table and restocking sectors of the trout industry.

It is possible to estimate total trout production for 1982 as shown in Table 5. These figures are derived by adding together estimated output of non-respondents and survey data for respondents. One complication is that some table-sized trout is sold to other farms and this has to be deducted to avoid double-counting. If one assumes that the figures given on survey forms are reasonably accurate and, on balance, they probably are, we can state that the figures given in Table 5 are a close approximation to 'actual' production figures. They are certainly the most accurate and detailed figures

available. The figure of 400 tonnes sold to other farms has been estimated based on information recorded on the returned questionnaires. The output of non-respondents has been estimated by reference to previous surveys and information supplied by the Water Authorities. All output figures are shown liveweight.

Table 5      Estimated Trout Production in England and Wales in 1982  
(tonnes per annum)

Survey data	<u>Table</u>	<u>Restocking</u>	<u>Total</u>
Survey data	4907	1536	6443
Estimated output for non-respondents	+728	+296	+1024
Trout sold to other farms	-400	-	-400
	<hr/> 5253 <hr/>	<hr/> 1832 <hr/>	<hr/> 7067 <hr/>

Regional Output

Table 6 presents the survey output data by Water Authority Region. There are 10 regional Water Authorities in England and Wales but the Northumbrian region has no trout farms and therefore does not appear in the table. A map showing the different Water Authority regions is given in Appendix II. Table I in Appendix III gives the regional distribution of total production in 1982 as estimated above. Tables 2 and 3 in the Appendix gives the breakdown by region for table and restocking trout separately.

Table 6      Survey data for Trout Production by Region 1981-1984  
(tonnes per annum)

	<u>1981</u>	<u>1982</u>	<u>1983*</u>	<u>1984*</u>
Anglian	410.1	459.9	470.0	493.3
North West	169.5	170.8	209.8	269.3
Southern	1153.6	1318.6	1579.1	1687.6
Severn Trout	262.1	351.5	391.1	536.7
South West	255.6	339.6	444.0	533.0
Thames	876.3	1025.3	1376.1	1548.3
Wales	353.7	416.5	620.3	853.5
Wessex	1093.7	1224.8	1329.0	1376.5
Yorkshire	1053.6	1136.0	1361.6	1382.0
	<hr/>	<hr/>	<hr/>	<hr/>
Total	5628.2	6443.0	7781.0	8680.2
	<hr/>	<hr/>	<hr/>	<hr/>

\* planned production.

There are now four major trout producing areas which are Southern, Thames, Yorkshire and Wessex. All of these are producing over 1,000 tonnes each per annum. The growth in output for the Thames area is particularly noticeable given that it will be the second largest in 1984 whereas in the mid 1970's output from this region was negligible. The figures show that in 1982 the four main regions of Southern, Thames, Yorkshire and Wessex produced 73% of total output.

#### Size Distribution

Table 7 shows the distribution of holdings according to size of production and also the combined output of holdings in each different category. The table shows the survey results for 1981, 1982 and 1984. Table 4 in the Appendix gives the estimated distribution of all holdings in 1982. The figures relate to table and restocking production combined.

Table 7     Distribution of holdings according to size of production  
(England and Wales)

Tonnes per holding	<u>1981</u>		<u>1982</u>		<u>1984*</u>	
	No.	Total tonnes	No.	Total tonnes	No.	Total tonnes
< 10	78	349	78	376	58	237
11 - 20	36	525	42	629	40	641
21 - 50	31	1048	38	1326	37	1274
51 - 100	13	927	11	812	25	1737
101+	10	2779	13	3300	17	4791
TOTAL	168	5628	182	6443	177	8680

\* planned production

The survey data shows that in 1982 the 13 largest farms, all of which were producing over 100 tonnes per annum, produced half of the total output of the industry in England and Wales. At the other end of the scale, two-thirds of all holdings (those producing less than 20 tonnes per annum) contribute only 15% of total output. The proliferation of small units is even more pronounced if we look at the estimated figures for all holdings for 1982. In this case, one-half of all holdings are in the smallest size category of less than 10 tonnes per annum having a combined output of 601 tonnes or 8% of the total. The reason why the total number of holdings given for 1984 is 177 is because a number of holdings plan to cease production. These were all small units where there is a much greater turnover in productive holdings compared with the larger operations. One should also be aware that by 1984 other units will probably come into production which were not in existence in 1982.

#### Market Outlets

Table trout producers were asked to record the extent to which they relied on different market outlets. These results are shown in Table 8 with a more detailed breakdown by region in Table 5 in the Appendix.



Table 8    Distribution of Table Trout according to Market Outlets in 1982  
(England and Wales)

	<u>Farm Gate</u>	<u>Local hotels &amp; restaurants</u>	<u>Local Retail</u>	<u>Wholesale</u>	<u>Processors</u>	<u>Other farms</u>	<u>Total</u>
Tonnes	537.8	533.1	183.8	1948.6	1303.8	399.6	4906.7
%	11.0	10.9	3.7	39.7	26.6	8.1	100.0

The table shows the dominance of the wholesale and processing outlets with two-thirds of total production going through these channels. This is to be expected given that the larger farms are dependent on such outlets. Perhaps more interesting is the fact that one-quarter of table trout produced is sold through the local outlets either at the farm gate, to local hotels and restaurants or to local retail outlets. Moreover, despite the increase in production of trout the percentage sold through these outlets appears to have increased in recent years. For instance, in 1979 we estimated that 20% was sold through the local outlets. The most significant increase has been in the area of farm gate sales whilst sales to local retail outlets has declined in importance. Perhaps, this is not surprising given the fall in the number of fishmonger shops during the 1970's. There is a considerable regional difference in the relative use of different outlets which is primarily a reflection on the relative numbers of different sizes of holdings in each area. The three regions of South-West, Severn-Trent and North-West all sell over two thirds of trout output through the local outlets.

### CHAPTER III TROUT - OUTPUT, TRADE and CONSUMPTION in the UNITED KINGDOM.

The purpose of this chapter is to present data on the production of trout in the U.K. and to use these statistics, along with the relevant trade figures, to calculate consumption in recent years. In order to do this it is necessary to present and discuss the production data for Scotland and N.Ireland.

#### SCOTLAND.

Since 1979 Dr. Alan Munro and Mr. Ian Waddell of the Department of Agriculture and Fisheries for Scotland have conducted an annual survey of salmonid fish farming in Scotland. A postal survey is sent out in October/November each year and a 100% return rate is achieved. We are grateful to them for permission to quote from their reports. In the context of presenting the Scottish figures it is appropriate to make the point that the industry south of the border is handicapped by the absence of a comparable data collection system for England and Wales. Whilst at Reading we have been able to undertake three surveys since 1977 these have been on an ad hoc basis and there are at present no plans for future studies. Without doubt both the industry and Government would be able to plan more affectively for the future if they could base their decisions on sound data. The response rates achieved by the Reading surveys have not been as high as those for Scotland primarily because of the very large number of small operations. Never-the-less, the consistently high response rates of 75% suggest that there would be considerable support in the industry for a regular survey.

Table 9 gives the Scottish trout production figures for 1977-1982. The figures for 1977 and 1978 are from a survey undertaken in 1978 by Reading, the other figures being taken from the D.A.F. surveys. It is interesting to note that total production declined in 1982 though the quantity sold for restocking increased slightly.

Table 9 Trout Production in Scotland 1977-1982

(tonnes per annum)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Table	650	850	1229	1643	2161	1786
Restocking	50	50	50	74	100	132
TOTAL	<u>700</u>	<u>900</u>	<u>1279</u>	<u>1717</u>	<u>2261</u>	<u>1918</u>

The 1982 production of 1918 tonnes related to a total of 85 sites though it should be noted that there were 65 companies operating, some companies operating more than one site. Twenty-one of these sites made no contribution to this tonnage either because they were fry and fingerling producers or because they produced no output in that year. There were 22 sites producing less than 10 tonnes, 22 sites in the 10-25 tonne category. 8 in the 25-50 tonne category, 9 in the 51-100 tonne category and 3 sites each producing over 100 tonnes.

NORTHERN IRELAND.

Data on trout production in N.Ireland was kindly supplied by Mr. G.O'Neill of the Department of Agriculture's Movinagher Fish Farm. Table 10 gives the production data and number of farms for the years 1977 to 1982.

Table 10.      Trout Production in N. Ireland 1977-1982  
(tonnes per annum)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Tonnes	165	200	235	210	310	380
No. of farms	10	11	13	13	14	15

The figures relate entirely to table trout production. Two additional farms were in production supplying trout of all sizes for restocking purposes. The majority of the farms in N.Ireland are in the 20-40 tonne size range with only a few farms operating at a smaller scale and only two farms larger (60-70 tonnes).

### U.K. Production and Size Distribution.

Table 11 amalgamates the data on production of table trout for the three regions. The figures for England and Wales relate to estimated total production and are based on the results of the 1979 and 1982 surveys. As can be seen production has increased from just over 2,300 tonnes in 1977 to 7,400 tonnes in 1982. A reasonable estimate for table trout production in the U.K. for 1983 and 1984 would be 9,000 and 10,000 tonnes respectively.

Table 11     Estimated U.K. Table Trout Production 1977-1982

	(tonnes per annum)					
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
England and Wales	1500	2250	3100	4000	4500	5235
Scotland	650	850	1229	1643	2161	1786
N.Ireland	165	200	235	210	310	380
	—	—	—	—	—	—
TOTAL	<u>2315</u>	<u>3300</u>	<u>4564</u>	<u>5853</u>	<u>6971</u>	<u>7401</u>

Table 12 shows the size distribution and total output of trout farms in the U.K. for 1982. The figures relate to both table and restocking farms.

Table 12.     Size Distribution and Output of Trout Holdings in the U.K. in 1982.

	<u>England and Wales</u>		<u>Scotland</u>		<u>N. Ireland</u>		<u>U.K.</u>	
Tonnes per holding	No	Total tonnes	No	Total tonnes	No	Total tonnes	No	Total tonnes
< 10	121	601	22	111	3	20	146	732
11-20	48	723	19	275	5	85	72	1083
21-50	42	1446	11	377	6	170	59	1993
51-100	14	1047	9	710	3	185	26	1942
101+	15	3650	3	445	-	-	18	4095
Total	240	7467	64	1918	17	460	321	9845

U.K. Trade in Trout.

Table 13 presents the U.K. trade statistics for 1977 - 1982 showing imports, exports and net imports for all trout.

Table 13.     U.K. Trade in Trout 1977 -1982

	(tonnes per annum.)					
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Imports	1149	729	1087	746	998	1202
Exports	125	88	86	199	300	277
	—	—	—	—	—	—
Net Imports	<u>1024</u>	<u>641</u>	<u>1001</u>	<u>547</u>	<u>698</u>	<u>925</u>

Throughout the 1970's until 1978 there was a decline in net imports but since 1978 there has been considerable fluctuation with a rise in net imports to 925 tonnes in 1982. Table 14 gives a more detailed breakdown of the trade figures for the years 1980-1982 showing separate figures for fresh and frozen trout. These figures show a considerable rise in the importation of fresh trout from a figure of 99 tonnes in 1980 to 424 tonnes in 1982. Nearly half of this is supplied by Denmark, the rest being supplied primarily by the Irish Republic or Norway. Denmark also supplies the bulk of the frozen trout imports (92% in 1982). The small trade in exports of fresh and frozen trout appears to fluctuate considerably from year to year.

Table 14. U.K. Trade in Fresh and Frozen Trout 1980 - 1982.

	<u>1980</u>		<u>1981</u>		<u>1982</u>	
	tonnes	£	tonnes	£	tonnes	£
<u>Fresh trout-</u>						
imports	98.63	167,029	226.68	354,325	423.93	639,817
exports	<u>133.23</u>	<u>198,813</u>	<u>283,44</u>	<u>304,025</u>	<u>134,87</u>	<u>216,401</u>
net imports	(34.60)	(31,734)	(56.76)	50,300	289.06	423,416
<u>Frozen trout-</u>						
imports	647.36	1,151,524	771.28	1,244,754	778.76	1,206,235
exports	<u>65.96</u>	<u>148,540</u>	<u>16.15</u>	<u>35,979</u>	<u>142.34</u>	<u>253,068</u>
net imports	581.40	1,002,984	755.13	1,208,775	636.42	953,167
<u>All trout-</u>						
imports	745.99	1,318,553	997.96	1,599,079	1,202.69	1,846,052
exports	<u>199.19</u>	<u>347,353</u>	<u>299.59</u>	<u>340,004</u>	<u>277.21</u>	<u>469,469</u>
net imports	546.80	971,200	698.37	1,259,075	925.48	1,376,583

U.K. Trout Consumption.

Table 15 amalgamates the data from Tables 11 and 13 in order to calculate total consumption. One point to remember is that the production figures relate to table production only whereas in reality trout grown for sporting purposes is also consumed. This would add another 2,000 tonnes or so to total consumption.

Table 15.      U.K. Trout Consumption 1977-1982  
(tonnes per annum)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Production	2315	3300	4564	5853	6971	7401
Net imports	<u>1024</u>	<u>641</u>	<u>1001</u>	<u>547</u>	<u>698</u>	<u>925</u>
Consumption	<u>3339</u>	<u>3941</u>	<u>5565</u>	<u>6400</u>	<u>7669</u>	<u>8326</u>

Consumption has increased considerably from an estimated 3339 tonnes in 1977 to 8326 tonnes in 1982. It is interesting to compare the rate of increase in these years to that of the mid-1970's. For instance, in the five years 1974-78 consumption increased by less than 1,000 tonnes and as a consequence of the increase in home production there was an element of import substitution. In contrast, during the years 1978-1982 consumption increased by an estimated 4385 tonnes with imports fluctuating considerably from year to year.

Whilst the growth in consumption is dramatic it is necessary to point out that trout consumption represents a very small percentage of total fish consumption (2% in 1982). 1982 trout consumption of 8326 tonnes is equivalent to approximately 5 oz. per person per year and this compares with a total fish consumption of approximately 263 oz per person per year. Table 16 shows the trend in fish consumption in the home since 1977.

Table 16.      Fish Consumption in the Home per capita  
(oz per week)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fresh, processed and canned fish	2.97	3.07	3.28	3.42	3.50	3.40
Frozen fish and frozen convenience products	<u>1.20</u>	<u>1.18</u>	<u>1.26</u>	<u>1.40</u>	<u>1.42</u>	<u>1.65</u>
TOTAL	<u>4.17</u>	<u>4.25</u>	<u>4.53</u>	<u>4.82</u>	<u>4.92</u>	<u>5.05</u>

Source: National Food Survey.

These figures are very important for they show that since 1977 fish consumption has increased slightly each year showing a 22% increase

over the whole period. The 1982 consumption level is the highest recorded since 1972. The figures are shown so as to distinguish between frozen fish and frozen fish products from all other fish. The frozen sector is increasing in importance and accounts for one-half of the increase in consumption during the period.

CHAPTER IV. TROUT - AN ECONOMIC PROFILE OF THE INDUSTRY.

In earlier chapters production data for trout has been presented and elsewhere in this report there are summaries on the other major farmed species. The purpose of this chapter is to present an economic profile of the trout industry at an aggregate level. In our research we were concerned to establish the financial value of the output of the trout industry and the financial value of the inputs utilised in achieving that output.

The purpose of the postal survey was to establish as accurately as possible the size and structure of the fish farming industry particularly with regard to its biggest component - the trout sector. We believe that this has been achieved and, along with the data for Scotland and N.Ireland, we now have a comprehensive picture of the size, structure and growth of the trout sector during recent years. We realised at the outset of the research that, by applying the appropriate farm gate value to the figures for trout production identified by the surveys, it would be a simple matter of calculation to determine the financial value of the output of the industry. To calculate the value of inputs is not so easy.

One method of arriving at the value of inputs used in trout production would have been to incorporate questions concerning financial costs of labour, feed, fish purchases etc. on the postal survey. This idea was rejected on the grounds that the inevitable complexity and length of such a survey would automatically reduce the response rate. Moreover, the inclusion of questions on financial matters would also serve to reduce the response rate. Given the necessity of a high response in order to accurately assess the size and structure of the industry it was felt to be essential to continue the policy of previous surveys and design a relatively simple one-sheet questionnaire thereby precluding the use of detailed financial questions.

Ideally, a representative sample of fish farms, both geographically and in terms of size of farm, should have been visited in order to collect the detailed information on production costs. Unfortunately the resources available were insufficient to enable a survey similar to that undertaken in 1978 to be carried out. Nevertheless, it did prove possible to visit a small number of fish farms in fairly close proximity to Reading. Nine farms were contacted and six agreed to co-operate. These farms had all



been included in the previous economic survey and the purpose of the visits was to ascertain how the costs and returns had changed since the previous study was undertaken. Financial data was taken from the audited accounts in conjunction with interviews with the owner or manager. Apart from anything else these visits provided valuable contact with those actively engaged in the industry, a means of contact that was particularly helpful in what was otherwise a 'desk-type' research project.

Costing data was obtained for seven units with one co-operator providing information relating to two farms. The figures were invaluable in providing guidelines for estimating aggregate input costs for the industry, although all of the farms visited had increased production so dramatically since 1978 as to make direct comparison with the earlier figures difficult. One farm had increased production from 25 to 195 tonnes per annum. Only one of the farms was in the same size category as before (above 100 tonnes per annum) and even so had nearly doubled production (220 to 400 tonnes per annum). In consequence their costs of production in 1982 as compared to their costs in 1978 reflected the advantage of economies of scale as well as the pressures of inflation, technological change and increased efficiency in management. Thus despite the passage of four years during which inflation has averaged more than 10% per annum many of the farms were operating on similar unit production costs to those of 1978, that is, costs had declined in real terms.

Another characteristic of the farms visited was the policy changes that had taken place since the previous survey. Primarily the change was that of increased diversification which in one case involved buying and selling other fish products in order to reduce the overheads on the fish farm. One farm was increasingly producing all of its own fish stock requirements from its own hatchery and another was selling a large proportion of its output to the restocking market whereas previously it had primarily supplied the table market. These changes are indicative of the adaptation that has taken place in the fish farming industry during recent years.

In the 1978 economic survey there were four farms in the 100 tonnes plus per annum group and coincidentally four of the seven costed in 1982 were producing over 100 tonnes each per annum. In comparing the results for the two time periods we found that 'variable costs' (fish purchases, feed, transport and marketing costs) had increased by 12% whereas 'fixed costs' (labour, power and fuel, machinery repairs and property maintenance, administrative and general costs) had increased by only 6%. Average returns

were 57.3 pence per pound in 1982 compared to 51.6 pence per pound in 1978, an increase of 11%. The average size of the farms in 1978 was 167 tonnes whereas the average size in 1982 was 290 tonnes. This big differential probably has little significance for the variable costs because by definition it is unlikely that there would be economies of scale relating to these cost items, and it is unlikely that there would be significant economies in terms of purchasing power available to farmers of more than say 250 tonnes output per annum which was not available to farms producing over 100 tonnes of fish per annum. The size differential does affect our interpretation of the fixed costs because of the effect of economies of scale particularly relating to labour costs. Thus the relatively low figure of 6% noted above is an unreliable guide to the increase in fixed costs in the industry since 1978. Consequently, where no other means of calculation has been possible, we have adopted the method of inflating the 1978 figures using the relevant component of the Retail Price Index.

Table 17 presents our estimate of total output in £ value and total inputs for the trout sector in the U.K. and it covers both the table and restocking markets. The rest of this chapter is taken up with a discussion of the main items and how they have been calculated. It should be noted that these are, and can only be, 'best estimates' but they should serve as a guideline for those concerned with the overall significance and size of the industry

Table 17.                      U.K. Trout - Output/Input 1982.

<u>Output</u>	<u>£.M</u>
Fish	15 . 1
<u>Less Variable Inputs</u>	
Fish	1 . 4
Food	5 . 6
Transport and Marketing	0 . 7
Other variable inputs	0 . 3
	<hr/>
Total Variable Inputs	8 . 0
Gross Margin	7 . 1
<u>Less Fixed Inputs</u>	
Labour	2 . 6
Power and Fuel	0 . 4
Maintenance and Repairs	0 . 5
Administration and Insurance	0 . 8
Depreciation	1 . 4
	<hr/>
Total Fixed Inputs	5 . 6
Net Margin	1 . 5

Value of Output.

In order to calculate the value of the output of the trout industry it is necessary to obtain an accurate average price for trout sales. Although prices do fluctuate according to supply we estimate average prices during 1982 to be something in the region of £1.00 per pound for farm-gate sales, 0.85p for local retail and hotel and restaurant sales and 0.60 for wholesale and processing sales. These are average figures for England and Wales with some farmers consistently obtaining higher returns and others lower returns at these outlets. We know from the postal survey the quantity of trout sold through different outlets (see Table 8) and, by adjusting these percentages so as to exclude the trout sold to other farms, we can calculate an average weighted price:

Table 18      Calculation of average trout price in 1982.

	<u>% trout sold</u> <u>through outlet</u>	<u>Av. Price</u> <u>£. p</u>	<u>Weighted Av.</u> <u>Price.</u>
Farm Gate	11.94	1.00	} } } } } 68.75
Local retail, hotels and restaurants	15.91	0.85	
Wholesale	43.22	0.60	
Processors	28.93	0.60	
	<hr/> 100.00		

To calculate a price for restocking trout is more hazardous since they are sold more by length and appearance than by weight. Nevertheless, after consultation with contacts in the industry we have estimated an average price for 1982 to be in the order of 85 pence per pound. Utilising the data shown in Table 4 this gives an average weighted price for all trout in 1982 of 73 pence per pound. This has been calculated based on proportions of trout sold to different outlets in England and Wales. Because we do not have a similar breakdown for Scotland and N.Ireland and given the smaller quantities produced by these countries it would seem to be a reasonable assumption to apply this average price of 73 pence per pound to all trout produced in the U.K.

## Value of Inputs.

### Fish.

In presenting the table on aggregate output and input of the trout sector it may seem inappropriate to include fish as an input given that the majority of fish supplies are not imported. Unfortunately it has not been possible to calculate the value of the output of the egg, fry and fingerling suppliers and incorporate this into the total output calculation. Therefore these supplies are shown as an input in the table and calculated on the basis of data from the 1978 survey. At that time each pound of market trout cost 6.4 pence in terms of fish purchases and we have used a figure of 7.0 pence for 1982. This relatively small increase takes into account the fact that we are now including restocking farms which tend to operate their own hatcheries and growing-on facilities thereby having little or no outlay on fish purchases. The figure seems high compared to say a budgeted figure for a hypothetical farm buying-in fingerlings at 700 to the lb. (£25 per 1,000) and buying 4,000 fish to sell out 3,500 (12½% mortality) to the tonne. This works out at 4.5 pence per pound of trout produced. Two factors are important. First, the assumed mortality rate is crucial to the calculation and mortality rates vary tremendously from farm to farm and through time. Secondly, and more importantly, the figure of 7.0 pence includes within it an element for those farms which are buying-in fish of all sizes up to and including market weight. Thus, in effect the value of the 400 tonnes of trout sold from farm to farm referred to previously (see Table 5) and excluded from total output is included here.

### Feed

Feed is one of the most significant inputs in an intensive industry like trout production and on the more efficient, larger farms may well constitute over 50% of the total production costs. In 1978 we estimated that the average food conversion ratio for the industry was 1.75:1 and there is no reason to alter this as an assumption for 1982. (On the seven farms visited in 1982 the f.c.r. varied from 1.5:1 to 2.0:1.) Assuming average food costs of £340 per tonne total food costs would be £595 per tonne of trout produced. The price farmers pay for trout feed depends upon many considerations including the category and quality of the feed, transport costs, size of order and

whether pigmented or not. Thus the figure of £340 is to cover the whole range of feed types and prices. (Feed prices were stable in 1982 but rose considerably in the autumn of 1983.)

There is data available on fish feed sales in the U.K. and this gives a cross check on the value of feed used in the industry. Trout feed sales in 1982 were 16,206 tonnes though in relation to our input-output table this would have to be reduced slightly to allow for fish feed utilised in the production of the purchased fish. The relationship between fish feed sales and fish output per calendar year is not a straightforward one probably because of changing levels of stocks of both fish and feed at the farm level. Thus, the 1981 sales of fish feed were 16,710 tonnes, slightly higher than 1982 sales despite considerable less production according to our figures (8199 tonnes trout produced in 1981 and 9365 in 1982). Consequently the information on fish feed sales does not enable us to make valid calculations of aggregate food conversion ratios for the industry. Our estimate of 1.75 remains therefore as the 'best' estimate available.

#### Marketing and Transport Costs; Other Costs.

The remaining variable costs have been split into the two categories of 'marketing and transport' costs and 'other' costs, the latter covering such miscellaneous items as casual labour, veterinary and medical costs. The figures given have been calculated by inflating the 1978 cost figures for each size group and then calculating a weighted average figure according to the distribution of farm sizes in 1982. The general rise in retail prices between 1978 and 1982 was 63% and this figure was used to inflate the 'other' costs. The rise in the transport component of the Retail Price Index was 66% and this figure was used for the marketing and transport costs.

#### Labour Costs.

The postal survey included a section on labour but unfortunately it is difficult to interpret some of the results obtained. Whilst the majority of respondents completed the labour section it is not possible in many cases to determine how much of the labour related to trout production only. For instance, some farms produce eggs, fry and fingerlings for sale and the labour relating to this activity should be excluded. Probably of more significance are those farms operating a fishery, agricultural farm or other business and labour is shared between the different activities. In these cases many respondents may not have separated out the labour relevant to

trout production and even those that tried to do so may have found it a difficult judgement to make. Nevertheless, for what it is worth, the survey data for those farms selling either table or restocking trout was as follows: full-time manual = 319; part-time manual = 168 and managerial (both full and part-time) = 91. The 1982 Scottish survey recorded 194 employees in the trout sector of whom 73 were part-time staff. In N. Ireland there were 32 full-time and 11 part-time workers engaged in trout production. Both the Scottish and N.Irish figures include the specialist egg, fry and fingerling producers whereas these have been excluded from the English and Welsh data (but not where such suppliers also sell some full-size table or restocking fish).

In summary, the data we have gives us a good indication of how many employees derive at least part of their income from the trout industry. It is not particularly illuminating with regards to the number of labour equivalents or standard man days taken up by the industry. In consequence it is necessary to estimate a figure and we have used a figure of £2.5m. At an average wage of £5,500 per annum this is equivalent to 455 employees.

#### Depreciation.

Depreciation is one of the most significant cost items and also a very difficult figure to calculate. The figure shown in the table is based on the 1978 data which was the first and only attempt at estimating depreciation costs on farms as distinct from calculating a depreciation charge for a hypothetical budgeted situation. One would need to refer back to the first report to appreciate some of the difficulties involved in such an exercise. The figure of £1.4m has been calculated by inflating the 1978 figures by 42% this being the rate of increase for agricultural machinery prices during the relevant period.

#### Other Fixed Costs Inputs.

The remaining fixed cost inputs are power and fuel, maintenance and repairs and administration and insurance. These three categories are shown separately in the table and calculated using the relevant component of the Retail Price Index for the first category and the general rise in retail prices for the other two categories. Together these items account for an estimated £1.7m.

Summary.

From a total of £15.1m an estimated £1.5m is left over after making the deductions shown. Two margins are given in the table. The gross margin is calculated by deducting the variable inputs from total output. The net margin is the gross margin less those fixed inputs shown. It does not take into account either rent or interest charges and both these items would have to be included if one was intending to estimate 'profit' or some kind of return on capital.

In conclusion we may note two points. First the net margin of £1.5m represents 10% of total output whereas the equivalent margin for the agricultural industry as a whole has been 19-22% for the years 1978-81. Secondly, £15.1m output is fairly insignificant compared to £10,382m which was the estimated 1982 output of the agricultural industry at the time of writing. Nevertheless, if you also include the very significant contribution of salmon (say £8.6m in 1982), shellfish, eels and other farmed species then the total output of the fish farming industry must be something in the order of £25 m for 1982.



## CHAPTER V A SUMMARY OF OTHER MAJOR FARMED SPECIES IN THE U.K.

### Introduction.

The previous chapter has outlined an economic profile of the trout industry showing the value of output and major inputs. This chapter describes the current situation for the other major farmed species in the U.K. Detailed economic profiles for these species are not presented for several reasons. First, in some sectors, notably eels and marine fish, there are only a few commercial producing units and consequently there are problems of confidentiality in presenting such data. Secondly, apart from trout farming, the economics of commercial fish production has received little research attention and empirical investigation. There would be considerable practical difficulties in undertaking such an examination for many species. For instance, it would be difficult to obtain access to the necessary data in the highly competitive salmon sector. In the shellfish industry one would have to overcome the conceptual problem of accurately defining shellfish cultivation as distinct from harvesting from natural stocks. Practical difficulties would also be encountered in any investigation into the economics of sport fish production (salmonid and carp). Nevertheless, it has proved possible to draw together production data and other information on these other species and it is hoped that the presentation of this information in this chapter will enable the reader to form as full a picture as possible of the current state of fish farming in the U.K.

### Salmon.

Salmon production in the U.K. is restricted to Scotland and therefore covered by the D.A.F.S. Survey. Table 19 shows the production of salmon, no. of sites and numbers employed for the three years 1980-1982.

Table 19. SALMON PRODUCTION IN SCOTLAND 1980-1982.

	<u>1980</u>	<u>1981</u>	<u>1982</u>
Smolts - '000s	1418	1539	1686
Salmon and Grilse - tonnes	598	1133	2152
Labour - full-time	152	205	232
part-time	31	56	65
Sites	45	62	83

A higher percentage of grilse was harvested in 1982 compared to

previous years and thus it was forecast that the 1983 production of salmon would be down compared to previous years. The 1982 figures were based on the returns of 41 companies, many operating more than one site. It is unlikely that there are any operations in existence not included in the survey.

Salmon production has increased considerably in recent years and it is informative to estimate the value of output of this sector of the fish farming industry. The D.A.F. Survey does not cover price information as it is primarily concerned with production data and manpower employed. Nevertheless, by examining market prices and contacting those engaged in the industry, we have estimated on-farm prices for salmon to be £2.00 per pound and for grilse to be £1.30 per pound. These are average prices for 1982 and obviously are only rough guidelines given that prices vary considerably from farm to farm, are dependent upon size and quality and also fluctuate through time.

Table 19 shows that production in 1982 was 2152 tonnes. This was made up of 595 tonnes of grilse and 1,557 tonnes of salmon. Thus if we apply the figures quoted above the value of grilse output is £1.7m (595 tonnes x £2,867/tonne) and the value of salmon output is £6.9m (1557 tonnes x £4,410/tonne) giving a total value of £8.6m. Thus salmon production is of considerable significance in terms of value of output and, together with trout, dominates the U.K. fish farming industry.

#### Marine Fish.

Commercial production of marine fish is in the very early stages with the first significant production occurring in 1982 (30 tonnes of Turbot). The White Fish Authority has undertaken the necessary research and development work for Turbot and Dover Sole and is now also engaged on research into the farming techniques for Halibut. These are all high value fish species and, apart from Dover Sole, have declined in tonnage in terms of the wild catch in recent years. These two factors indicate good prospects for the successful commercial production of these species in the future. Production of Turbot in 1983 will probably be of the order of 60 tonnes with commercial production of Dover Sole fry for the first time, probably for the export market.

There is no commercial investment in cultivation of round fish though there is a small project concerned with rearing cod in cages.

Shellfish.

Mussels.

The majority of mussels landed in the U.K. are taken from natural beds rather than grown by cultivated methods. Annual production in the U.K. was just over 2,500 tonnes in 1981 with some 400 tonnes in England and Wales and 150 tonnes in Scotland grown by cultivated methods. In Scotland there are five companies involved in mussel cultivation whereas in England and Wales it is estimated that some 20-30 men are active mussel cultivators. The landings of mussels fluctuate considerably from year to year as the data for England and Wales presented in the table below shows:

Table 20.      Output of Mussels in the U.K. 1979-1981.

	<u>1979</u>	<u>1980</u>	<u>1981</u>
	tonnes	tonnes	tonnes
Total landings.	4,691	8,619	2,369
Cultivated production	n.a.	(600)	(400)

Source: M.A.F.F.

Oysters.

Both native oysters (Ostrea edulis) and pacific oysters (Crassostrea gigas) are produced in Britain. In 1981 combined production of these two species in England and Wales was 577 tonnes, of which 134 tonnes were cultivated. It has been estimated that in a 'normal' year some 300-350 men are employed either full-time or part-time with native oyster fisheries. Of these some 100-140 are engaged in cultivation. There are probably also some 25-50 cultivators of Pacific oysters in England and Wales. In Scotland there are a dozen or so companies involved in commercial production primarily producing pacific oysters.

Eels.

The 1980's saw the emergence of the eel industry from the research and

development stage with a big increase in production in 1982 despite the exit of several companies from the industry. In 1982 production was estimated to be something of the order of 200 tonnes which was more than the cumulative output of the previous five years. At the end of 1982 there were three companies in operation with most of the output going to European countries. Three sites previously in operation had been closed primarily because of the recession in those industries which were supplying the warm water rather than poor returns in the eel market. Indeed current prospects are believed to be quite good particularly for the supply of quality fingerlings to European countries and behind the Iron Curtain.

#### Carp.

Table 3 in chapter 1 has already given some indication of the extent of carp production. Altogether some 37 respondents to the postal survey indicated that they were involved in carp production, the majority raising carp for the restocking market. If one includes non-respondents then there are probably at least 50 farms producing carp. Although some are carp specialists the majority produce carp along with other coarse, ornamental or salmonid fish. It appears that only a few farms are selling carp to the table market ( say 10-12) and that home produced sales to this market are of the order of 25-30 tonnes per annum.

#### Coarse, Ornamental and other fish; Fisheries.

Chapter I has summarised the number of these fish farms and there is little further information to add. One point to note with regard to fisheries is that many farms have seen this as a means of diversification. The survey was not designed to cover fisheries and there are probably hundreds of small fisheries in existence.

#### Summary.

In concluding this report, we present Table 21 which presents our estimate of the value of U.K. farmed fish production in 1982. The table shows the estimated output for six different sectors in decreasing order of importance. This report has already presented the figures for the value of the output of the trout and salmon sectors and we have observed that they are based on accurate and reliable data. The figures for the other four sectors are based on the information given in this chapter. The difficulties in

obtaining data for some of these sectors, notably shellfish and the coarse and ornamental sector (including carp) have already been mentioned and consequently we must assume that there is a considerable margin of error associated with these particular estimates. Nevertheless, given that trout and salmon together account for over 90% of total output, we can say that the table not only shows the relative importance of the different sectors but also that the figure of just over £25m is a reliable estimate of the total output of the industry.

Table 21.      Output of U.K. Farmed Fish in 1982.

	£.M.
Trout	15.1
Salmon	8.6
Coarse and Ornamental	0.6
Eels	0.6
Shellfish	0.3
Marine	<u>0.1</u>
Total	<u>25.3</u>

STRICTLY CONFIDENTIALTROUT

1. Please give estimates for the following if applicable for 1982.

	<u>Nos. Purchased</u>	<u>Nos. Sold</u>
	'000	'000
Eggs		
Fry		
Fingerlings		

2. Please give estimates of your actual and planned production in tonnes for the following years.

	<u>Actual</u>		<u>Planned</u>	
	1981	1982	1983	1984
Table - Rainbow trout				
Restocking - Rainbow trout				
Brown trout				
Other trout				

3. What percentage of
- table
- trout do you sell through the following outlets?

Farm Gate	Local Hotels & Restaurants	Local retail	Wholesale	Processing Companies
%	%	%	%	%

OTHER FISH

4. Please list any other fish species produced on your farm during 1982.

Species	Quantity Produced	Market Outlet
Carp		
Other Coarse		
Ornamentals		
Others - please specify		

GENERAL

5. Is the fish farm part of an agricultural holding? YES/NO
6. Do you operate a fishery? YES/NO
7. How many people are employed on the fish farm?

	<u>Manual</u>		<u>Managerial</u>
	paid	unpaid/family	
Full-time			
Part-time (give hrs per wk)			

WATER AUTHORITIES IN ENGLAND AND WALES



Appendix III

Table 1

Estimated Total Trout Production in 1982.

	<u>Tonnes.</u>
Anglian	554.9
North West	219.8
Southern	1686.6
Severn Trent	389.5
South West	382.6
Thames	1145.3
Wales	458.5
Wessex	1424.8
Yorkshire	1205.0
	<hr/>
Total	7467.0

N.B. The total of 7467 includes 400 tonnes sold between farms.



Table 2     Survey data for Table Trout Production by Region 1981-1984.

	<u>1981</u>	<u>1982</u>	<u>1983*</u>	<u>1984*</u>	<u>(1982+)</u>
Anglian	215.0	230.0	241.5	246.0	(320.0)
North West	147.5	147.0	154.0	199.0	(185.0)
Southern	965.0	1110.5	1347.5	1447.5	(1355.5)
Severn Trent	82.8	180.7	247.7	333.8	(203.7)
South West	152.1	246.7	326.0	407.0	(274.7)
Thames	559.8	654.3	921.0	1069.7	(754.3)
Wales	196.5	233.5	409.0	619.0	(264.5)
Wessex	929.5	1018.0	1085.5	1145.0	(1185.0)
Yorkshire	959.0	1092.0	1261.0	1282.0	(1092.0)
Total	<u>4207.2</u>	<u>4906.7</u>	<u>5993.2</u>	<u>6749.0</u>	<u>(5634.7)</u>

Table 3     Survey data for Restocking Trout Production by Region 1981-1984

	<u>1981.</u>	<u>1982</u>	<u>1983*</u>	<u>1984*</u>	<u>(1982+)</u>
Anglian	195.1	229.9	228.5	247.3	(234.9)
North West	22.0	25.8	55.8	70.3	( 34.8)
Southern	188.6	208.1	231.6	240.1	(331.1)
Severn Trent	179.3	170.8	143.4	202.9	(185.8)
South West	103.5	92.9	118.0	126.0	(107.9)
Thames	316.5	371.0	455.1	478.6	(391.0)
Wales	157.2	183.0	211.3	234.5	(194.0)
Wessex	164.2	206.8	243.5	231.5	(239.8)
Yorkshire	94.6	44.0	100.6	100.0	(113.0)
Total	<u>1421.0</u>	<u>1536.3</u>	<u>1787.8</u>	<u>1931.2</u>	<u>(1832.3)</u>

\* planned production

+ estimated total output for all holdings

Table 4. Estimated Distribution of all holdings according  
to size of production in 1982.

<u>Tonnes per holding</u>	<u>No</u>	<u>Total tonnes.</u>
<10	121	601
11 - 20	48	723
21 - 50	42	1446
51 - 100	14	1047
101+	15	3650
Total	<u>240</u>	<u>7467</u>

Table 5     Distribution of Table Trout according to Market Outlets in 1982

(England and Wales)

	Farm Gate	Local hotels & restaurants	Local Retail	Wholesale	Processors	Other Farms	Total
<b>Anglian</b>							
tonnes	52.1	29.0	9.6	134.3	5.0	-	230.0
%	22.6	12.6	4.2	58.4	2.2	-	100.0
<b>North West</b>							
tonnes	41.6	44.9	6.5	16.3	31.7	-	141.0
%	29.5	31.8	4.6	11.6	22.5	-	100.0
<b>Southern</b>							
tonnes	20.3	14.0	19.3	98.5	735.9	222.5	1110.5
%	1.8	1.3	1.8	8.9	66.3	20.0	100.0
<b>Severn Trent</b>							
tonnes	56.5	60.6	10.9	52.7	-	-	180.7
%	31.3	33.5	6.0	29.2	-	-	100.0
<b>South West</b>							
tonnes	52.9	114.1	13.4	47.2	5.0	14.1	246.7
%	21.4	46.3	5.4	19.1	2.0	5.7	100.0
<b>Thames</b>							
tonnes	206.2	125.2	64.0	184.5	2.4	72.0	654.3
%	31.5	19.1	9.8	28.2	0.4	11.0	100.0
<b>Wales</b>							
tonnes	35.1	26.7	32.7	107.5	32.0	-	233.5
%	15.0	11.2	14.0	46.0	13.7	-	100.0
<b>Wessex</b>							
tonnes	39.0	97.0	19.3	773.2	18.5	71.0	1018.0
%	3.8	9.5	1.9	75.9	1.8	7.0	100.0
<b>Yorkshire</b>							
tonnes	34.1	22.1	8.1	534.4	473.3	20.0	1092.0
%	3.1	2.0	0.7	48.9	43.3	1.8	100.0
<b>Total</b>							
tonnes	537.8	533.1	183.8	1948.6	1303.8	399.6	4906.7
%	11.0	10.9	3.7	39.7	26.6	8.1	100.0

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