

The British Survey of Fertiliser Practice

Fertiliser Use on Farm Crops
1992



Fertiliser Manufacturers
Association



Ministry of
Agriculture
Fisheries
and Food



THE SCOTTISH OFFICE
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FOREWORD

The British Survey of Fertiliser Practice provides information on fertiliser use on the major crops grown in mainland Britain.

The Survey is organised and funded jointly by the Ministry of Agriculture, Fisheries and Food (MAFF) the Scottish Office Agriculture and Fisheries Department (SOAFD) and the Fertiliser Manufacturers' Association (FMA). The Survey has the full support of the Farmers' Unions in England, Scotland and Wales.

The Survey is carried out annually and based upon returns from a sample of approximately 1500 farms, a new sample being chosen each year. The survey design, statistical analysis and much of the reporting on results for the 1992 Survey were carried out at the University of Edinburgh; the farm interviews were undertaken by Farm Research Ltd.

The organisers gratefully acknowledge the cooperation of all farmers taking part in the Survey.

Fertiliser Manufacturers' Association
Ministry of Agriculture, Fisheries and Food
Scottish Office Agriculture and Fisheries Department

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Main Points

The overall application rates of fertiliser (kg/ha) on all crops and grass in Britain in 1992 were:

	<u>Nitrogen</u>	<u>Phosphate</u>	<u>Potash</u>
Straight	86	3	3
Compound	<u>39</u>	<u>34</u>	<u>42</u>
Total use	125	37	45

In general terms, farmers in Scotland make greater use of Compound N and less use of Straight N products than do farmers in England and Wales.

For England and Wales, the 1992 Survey indicated the following changes:

- a decline in the application of Nitrogen (N) on crops and grass, especially on grass
- a substantial reduction in the area of grassland receiving fertiliser and in the rate of nutrient application, leading to reductions in use of both Straight N and Compound N, and less use of Phosphate (P_2O_5) and Potash (K_2O) on grass
- a decrease in the rate of application of Straight N on tillage in 1992, to a level comparable with 1989 and 1990
- total use of P_2O_5 and K_2O was down in 1992 consistent with 1991 FMA and industry estimates of a decline in tonnage supply
- level of usage of P_2O_5 on tillage same as before.

For Scotland the 1992 Survey indicated the following:

- no change in total application of N on tillage or on grass
- no change in application of Straight N on grass, use similar to 1990 level
- levelling off in downward trend in application of Compound N on grass
- increase in use of P_2O_5 and K_2O on grass

Commentary on the 1992 Survey and on change over time is set out in the Report. The 1992 application rates are reported in detail in the Appendix.

About the Survey

The main purpose of the Survey is to estimate, for a range of crops and nutrients, the average rate of fertiliser and lime application used annually in agricultural production. The Survey provides the British fertiliser industry with information on which to base investment and planning decisions and is a major source of information for the British Agricultural Departments on both aggregate levels of fertiliser use and on average field application rates. Annual delivery and import statistics can be poor indicators of consumption, especially when stocks fluctuate in response to price changes. The Survey also helps the agricultural community understand variations in fertiliser practice.

History

The British Survey of Fertiliser Practice (BSFP) has its origins in surveys begun in 1942 under Dr Frank Yates. Conducted thereafter through Rothamsted Experimental Station as the Survey of Fertiliser Practice for England and Wales, it was re-designed in 1969 by Dr Brian Church as an annual survey to monitor changes in the pattern of fertiliser use. The survey was extended to Scotland in 1983. Publications with information on past survey results and trends include those by Yates and Boyd (1965), Church and Lewis (1977) and Chalmers, Kershaw and Leech (1990)⁺. The 1992 Survey marks a change in procedure, the management and design of the Survey passing to a research services team led by the Data Library at the University of Edinburgh.

Trends

We have included a run of past results in several tables because there is reason to believe that recent changes in agricultural policies and financing may be affecting fertiliser practice. We also do so because there are sometimes conflicting indications whether to regard the 1991 or the 1992 estimates as exceptional to general trends; and we have been wary of the effect that changes in management, and therefore method, might have had on survey results. We have included additional summary tables on the average field rates of nutrient fertiliser application in order to show changes in farmers' fertiliser practice as well as the overall rates of application that allow estimates of total tonnage sold.

Sampling

The 1992 British Survey of Fertiliser Practice involved the selection of a nationally representative random sample of approximately 1500 farm holdings in Great Britain (1254 from England and Wales and 248 from Scotland). The sampling design used closely resembled that employed by Rothamsted Experimental Station in previous years. As part of the selection process, in line with previous practice, farms with less than 20 hectares of crops and grass were excluded from the survey, the remainder were stratified according to four farm types and, for England and Wales, by four size groups.

Further details of sampling are given in the Technical Appendix, the major differences in 1992 being the redesign of some strata to assist comparability of farm type classification and to improve precision of estimation, and also to allow the use of replicate sampling to assist measurement of sampling error. The measures of sampling error are also included in the Technical Appendix and indicate similar reliability in the estimates when compared with earlier surveys.

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Chalmers, A G, Kershaw, C D & Leech, P K (1990) 'Fertiliser use on farm crops in Great Britain: results from the Survey of Fertiliser Practice, 1969-88' *Outlook on Agriculture* 19 pp 269-278

Church, B M & Lewis, D A (1977) 'Fertiliser use on farm crops, England & Wales: information from the Survey of Fertiliser Practice, 1942-1976' *Outlook on Agriculture* 9 pp 186-193

Yates, F & Boyd D A (1965) 'Two decades of Surveys of Fertiliser Practice' *Outlook on Agriculture* 4 pp 203-21.

Fieldwork

The farms in the sample were visited by Farm Research Ltd, the same agency used in previous years, to carry out interviews with farmers and farm managers between late May and August 1992, recording information on fertiliser use during the 1991-92 growing season. Information on about 17,000 fields was recorded on special field sheets, designed to be read automatically for transfer to the University of Edinburgh for processing by the University's Computing Service.

Confidentiality

Throughout the administration of the survey, strict safeguards have been applied to ensure both the accuracy and the confidentiality of information relating to individual farms. The Data Library at the University ensures that no other bodies - including the Sponsors (FMA, MAFF and SOAFD) - may identify individual farm data from the Survey.

Report Format and Definitions

This is the first time that results from the Survey have been integrated into a single report covering fertiliser practice in Great Britain. In earlier years the Surveys for England and Wales and for Scotland were run in parallel, with separate Reports of their findings. The convention adopted for the 1992 Survey has been to compile summary tables of British fertiliser practice into one Report by combining the equivalent tables for England and Wales and for Scotland. This allows commentary on change, and allows geographic contrast to be made on the different fertiliser usage.

Rates of fertiliser application for 1992 are set out in detail in the Appendix, together with an index to the tables. Appendix Tables are grouped and referenced by geographic coverage: Britain (GB), England and Wales (EW) and Scotland (SC). There are tables covering the major crop groups, grassland, product types, regions and farm types. There are separate tables for total use and for 'straight' and 'compound' products. Most tables contain estimates of the 'overall application rate'; the 'dressing cover' and the average field rate of application (these terms are defined below).

1. The term **Britain** is taken to cover mainland Britain, Anglesey and the Isle of Wight.
2. The survey year runs from 1 October 1991 to 30 September 1992, corresponding to the 1992 growing or harvest year. The recording period for fertiliser application varied for different crop and grass groups. Tillage is defined as all crops except grass, forestry and glasshouse crops.
3. The abbreviation **N** is used for Nitrogen; P_2O_5 for Phosphate; K_2O for Potash. The phrase **total use** includes both Straight and Compound products.
4. The **average field rate (of application)**, referred to as the '**average actual application rate**' in previous Reports, records the rate of nutrient used by farmers on those fields which (actually) received any dressing of the nutrient. Crop area which went without any application of the nutrient is excluded from the calculation of the average field rates of application. These field-specific application rates provide direct evidence on the level, variation and distribution in farming practice.
5. The term **dressing cover** is used to describe the proportion of crop area treated with any dressing of the fertiliser nutrient in question, and is stated as a percentage.
6. For each fertiliser-nutrient, the **overall application rate** is calculated using the ratio of the total quantity of nutrient used, in kilograms (kg), to the total extent of crop area, in hectares (ha). Arithmetically, this is equivalent to the sum obtained by multiplying the average field rate of application by the proportion of crop area that receives any nutrient dressing. The overall application rate of a nutrient on a crop must be less than or equal to the average field rate of application. Any change in an overall application rate is due either to a change in the (actual) field rate of application used on farms or to a change in the dressing cover, or to changes in both. When combined with knowledge of the national total crop area, these overall application rates provide the means to estimate the national tonnage of fertiliser used during the survey year.

The Survey collects information with which to estimate total crop area for a wide variety of crops (reported in the Appendix). Although these survey statistics on crop area can be used to estimate tonnage, the annual Agricultural Census, conducted by the agriculture departments, is a more reliable source than the BSFP, largely due to differences in sample size.

Overall Fertiliser Usage

The overall application rate of Nitrogen (N) on crops and grass in Britain was 125 kg/ha in 1992, as shown in Table 1. Total use of N on grassland was 106 kg/ha. On tillage the overall application rate in Britain was 146 kg/ha.

Table 1 Overall fertiliser usage in Britain 1992 (kg/ha)

	<u>tillage</u>	<u>grass</u>	<u>all crops and grass</u>
Straight N	123	51	86
Compound N	22	55	39
Total N	145	106	125
Total P	54	22	38
Total K	63	28	45

In England and Wales, the overall application rate dropped by 12% to 126 kg/ha following a steady increase in use since 1988 (see Table 2). The size of the fall compares with a 10% fall reported between 1987 and 1988 (from 147 to 133 kg/ha) ending an earlier period of relative stability. There was little change in Scotland in 1992 where the application rate remained fairly constant at 116 kg/ha which because of the greater variability in application rates and the smaller sample size used in Scotland, was not statistically different from the 1991 rate of 117 kg/ha.

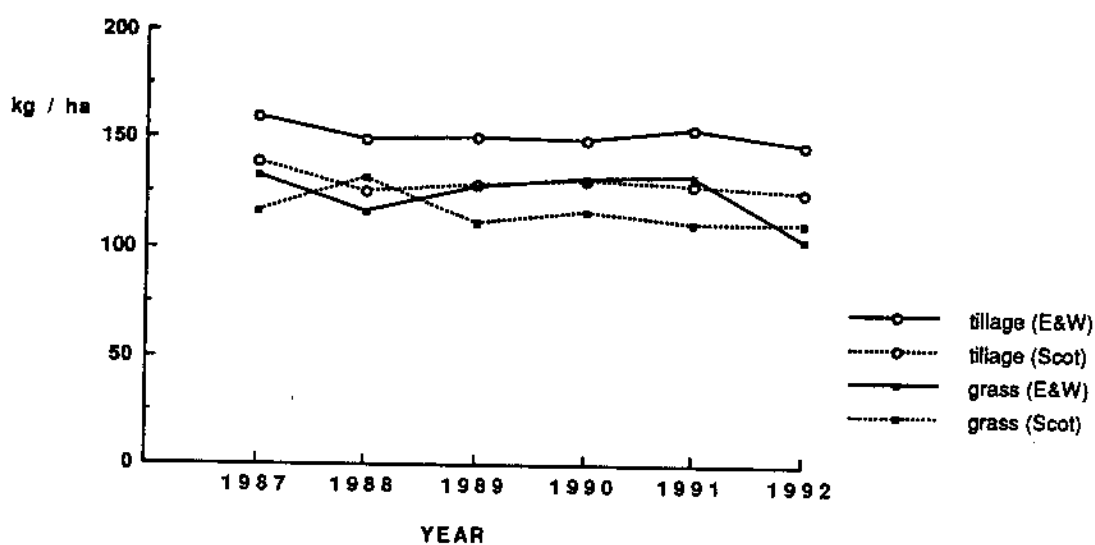
Table 2 Overall fertiliser usage 1987 - 1992 (kg/ha)

		<u>Total N</u>					
		<u>tillage</u>		<u>grass</u>		<u>all crops and grass</u>	
		<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>
1987		160	139	133	116	147	125
1988		149	125	116	132	133	129
1989		150	128	127	111	139	118
1990		149	131	132	116	141	122
1991		154	128	133	111	143	117
1992		147	125	104	111	126	116

<u>Straight N</u>						<u>Compound N</u>									
		<u>tillage</u>		<u>grass</u>		<u>all crops and grass</u>				<u>tillage</u>		<u>grass</u>		<u>all crops and grass</u>	
		<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>
1987		136	82	75	39	105	56	1987		25	57	58	77	41	69
1988		125	74	61	52	94	61	1988		24	51	55	80	39	68
1989		130	74	70	36	100	48	1989		20	54	57	81	39	70
1990		131	82	68	38	100	55	1990		18	49	64	78	41	67
1991		138	75	69	36	104	51	1991		16	53	64	75	39	67
1992		132	74	55	36	94	49	1992		15	51	49	75	32	67

<u>Total P₂O₅</u>						<u>Total K₂O</u>									
		<u>tillage</u>		<u>grass</u>		<u>all crops and grass</u>				<u>tillage</u>		<u>grass</u>		<u>all crops and grass</u>	
		<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>
1987		56	71	23	28	39	45	1987		63	70	33	31	48	47
1988		53	65	21	31	38	45	1988		63	66	30	34	47	47
1989		52	67	23	31	38	45	1989		60	73	34	36	48	51
1990		51	68	24	28	38	43	1990		62	74	36	35	49	50
1991		53	65	23	24	38	40	1991		62	72	35	31	49	47
1992		51	67	19	30	35	43	1992		59	72	26	34	43	48

Figure 1 Overall use of Nitrogen 1987 - 1992



Total N

Total N use on grassland in England and Wales was 104 kg/ha in 1992, 22% lower than the rate of 133 kg/ha reported in 1991, a fall similar in size to the 17% reduction experienced between 1987 and 1988 (see Table 2 and Figure 1). In Scotland, the overall application rate of 111 kg/ha on grass was unchanged in 1992.

On tillage the overall application rate in Britain was 145 kg/ha. In England and Wales, it was 147 kg/ha, lower than the 154 kg/ha reported for 1991 but only slightly lower than the rate for 1988 - 1990. In Scotland, there was a small (statistically insignificant) fall in the use of N on tillage, from 128 kg/ha to 125 kg/ha.

These changes in total use of N in England and Wales reflect reductions in the overall use of both Straight N and Compound N, and, for grassland especially, changes in the dressing cover. In general terms, fertiliser practice in Scotland makes greater use of Compound N and less use of Straight N products, compared with England and Wales.

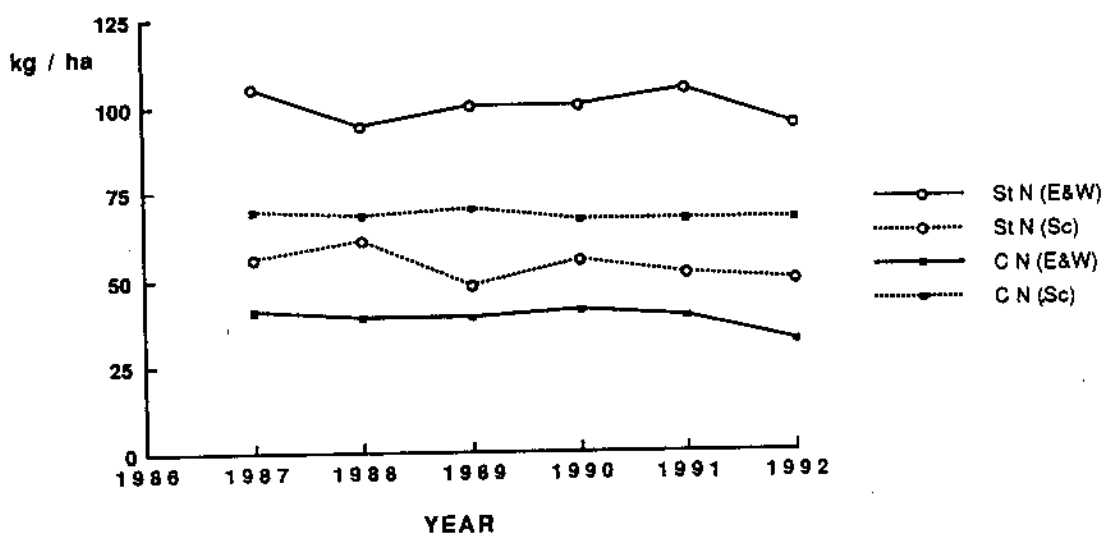
Straight N

The overall use of Straight N on crops and grass in Britain in 1992 was 86kg/ha. It was 94 kg/ha in England and Wales and 49 kg/ha in Scotland. This represented a reduction in England and Wales, from the 1991 rate of 104 kg/ha, similar to that reported between 1987 and 1988. The rate of use in Scotland also fell, from 51 kg/ha in 1991.

The overall use of Straight N on tillage in 1992 in Britain was 123kg/ha. It was 132 kg/ha in England and Wales, and 74 kg/ha in Scotland. The unexpectedly high level of 138 kg/ha in England and Wales reported for 1991 was not repeated in 1992.

The major change was the reduction in the overall use of Straight N on grassland in England and Wales, from 69 to 55 kg/ha in 1992. This is strong evidence of change with a fall in 1992 in the average field rate, from 139 to 133 kg/ha, and also a fall in the Straight N dressing cover, from 49% to 41% (shown in Tables 10 and 11, discussed below).

Figure 2 Overall use of Straight N and Compound N 1987 - 1992



There was no such change in Scotland, where the overall application rate of Straight N in 1992 on grass remained at 36 kg/ha.

Compound N

The overall rate of application of Compound N on crops and grass in Britain was 39 kg/ha. In England and Wales it fell to 32 kg/ha (see Table 2). In Scotland the much higher rate of application of 67 kg/ha was unchanged since 1990.

On tillage the overall application rate of Compound N in Britain was 22 kg/ha. In England and Wales it was 15 kg/ha, only slightly down but part of a downward trend since 1987. In Scotland in 1992, the much higher rate on tillage fell marginally, to 51 kg/ha.

The overall application rate of Compound N on grassland in Britain was 55 kg/ha (Table 1). There was no change in Scotland, where the rate remained at the higher level of 75 kg/ha, the same as in 1991. There was, however, a major reduction in Compound N on grassland in England and Wales, the overall application rate down from 64 to 49 kg/ha (Table 2). This was due to a fall in the field rate, from 106 to 93 kg/ha (Tables 10 and 11).

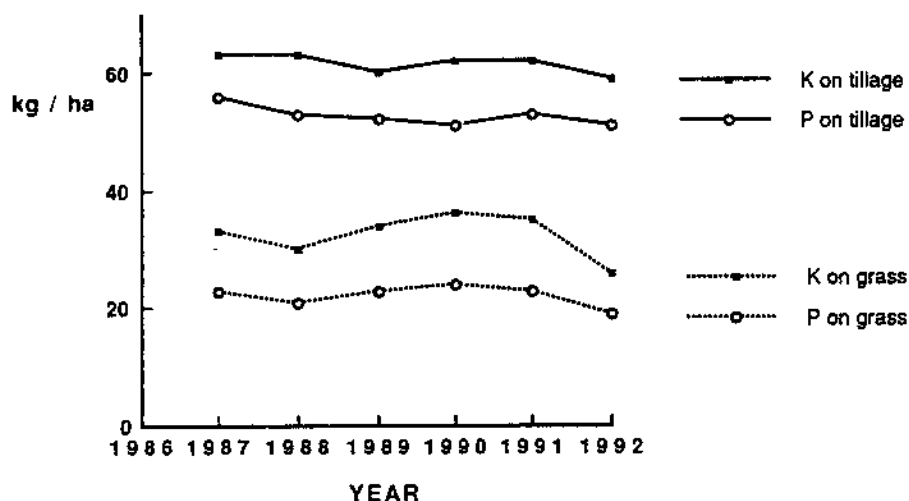
The large reductions in the use of both Straight N and Compound N on grassland in England and Wales between 1988 and 1989 (Table 2) was attributed, at the time, to changes in livestock numbers and to seasonal changes in the weather. The hot, dry weather in May/June 1992 followed by heavy rain in parts of the country may have had a similar effect, deterring farmers from applying N, although there were verbal reports from the Survey interviews, of farmers' intentions to cut back on fertiliser application generally.

P₂O₅ & K₂O

The rates for P₂O₅ and K₂O were the subject of special comment in the 1991 Report (E&W) as there was an inconsistency between the 1991 Survey estimates of use, which indicated stability in the overall use of P₂O₅ and K₂O, and the estimates of 1991 supply from the industry and FMA, who reported reductions of 8 to 10% in P₂O₅ and K₂O, respectively.

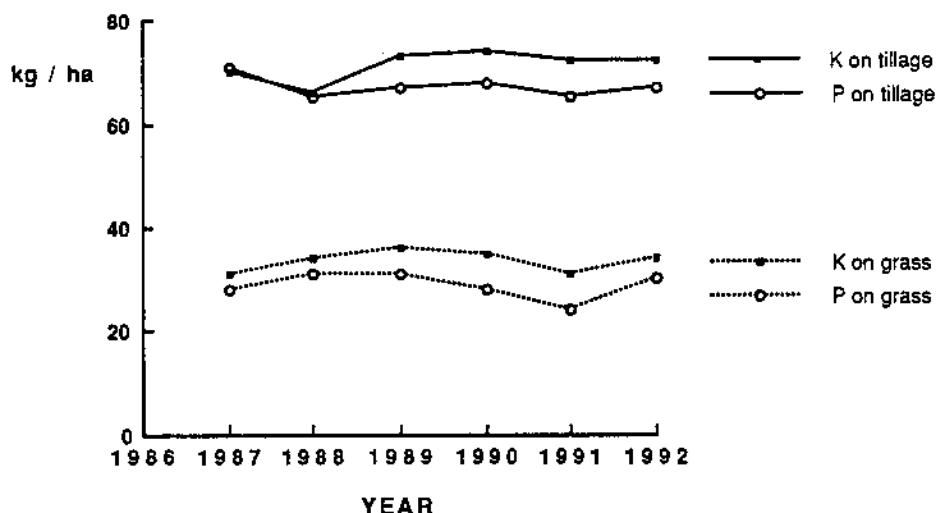
In 1992, in England and Wales, the overall application rates of P₂O₅ on all crops and grass was 35 kg/ha; the rate for K₂O was 43 kg/ha (Table 2), down by around 8% and 12%, respectively, in contrast to previous years when rates had been slowly rising (Figure 3). Overall rates of application tend to move in parallel, largely because of their combined application through PK Compounds

Figure 3 Overall use of P₂O₅ and K₂O in England and Wales 1987 - 1992



In Scotland there was an increase in the overall application rate of P₂O₅ on all crops and grass in 1992 (Table 4 and Figure 4). The overall application rate of K₂O also increased slightly. For Britain as a whole, the overall application rates of P₂O₅ and K₂O on all crops and grass were 38kg/ha and 45 kg/ha, respectively (Table 1).

Figure 4 Overall use of P₂O₅ and K₂O in Scotland 1987 - 1992



Use of P₂O₅ on tillage in 1992 fell back slightly in England and Wales, in Scotland the overall application rate of P₂O₅ increased. Use of K₂O on tillage in England and Wales was lower in 1992. In Scotland, however, the overall application rate was unchanged.

On grassland, use of P₂O₅ fell in England and Wales, an 18% drop down to 19 kg/ha from 23 kg/ha. But in Scotland, use of P₂O₅ increased, comparable to rates reported during the period 1987-90. The drop in the overall rate in England and Wales was partly due to a drop in the dressing cover, from (Table 11), and partly to a lower average field rate.

Changes in the use of K₂O on grassland follow a similar pattern to P₂O₅. In 1992 use of K₂O on grassland in Britain was 28 kg/ha. Use of K fell in England and Wales, down to 26 kg/ha from the 30 to 35 kg/ha reported in previous years - around a 14% drop. In Scotland, the rate increased to 34 kg/ha similar to rates in earlier years. Once again, part of the explanation for the decline in England and Wales reflects the fall in the extent of grassland receiving dressing, from 62% to 55%, and in a lower field application rate, down from 56 to 48 kg/ha.

Fertiliser Use on Major Tillage Crops

General changes in cropping patterns are set out in Table 3. The aggregate figures for both tillage and grass come from the annual Agricultural Censuses, the more detailed figures for cereals and other tillage are estimates derived from the survey. According to the Census the percentage of land used for tillage has remained unchanged for several years. The survey indicates a decrease in the proportion of this area used for spring cereals.

Table 3 Cropping patterns across crops and grass area 1988 - 1992 (%)

All Crops & Grass					Tillage						
(row %)					(row %)						
total grass		total tillage			Winter cereals		Spring cereals		other tillage		
E&W	Scot	E&W	Scot		E&W	Scot	E&W	Scot	E&W	Scot	
1988	52	61	48	39	1988	56	24	18	58	26	17
1989	53	62	47	38	1989	63	28	12	54	25	18
1990	53	63	47	37	1990	63	31	10	49	27	20
1991	53	63	47	37	1991	63	27	8	54	29	19
1992	53	63	47	37	1992	62	33	6	42	32	25

Estimates of fertiliser use for the major crops are given in Table 4. Table 5 contains the estimates of the average field rates of application on the main crop groups. Closer examination of changes for particular crops requires caution as these estimates are based on a fewer number of fields than for all crops and grass. More detail on the 1992 estimates is given in Section 1 of the Appendix Tables.

Information on 'sampling errors', which indicate whether apparent changes are real or attributable to sampling variation alone, is given in the Technical Appendix.

There is no over-riding single change in NPK use on the major tillage crops in 1992. In England and Wales application rates of Straight N and of K₂O were generally down, with fluctuations in the rates of Compound N and P₂O₅. In Scotland application rates of Straight N were also generally downward, with stable or increasing rates of Compound N application and fluctuations in the rates of P₂O₅ and K₂O.

N on cereals

Use of N on the major cereals (Winter wheat, Winter barley and Spring barley) was little changed in England and Wales in 1992 (see Tables 4 and 5). In Scotland, however, there was a sizeable decline in N use on Winter barley.

The overall application rate of Straight N on Winter wheat in Britain was 178 kg/ha (from Appendix Table GB1.2). In England and Wales (Table 4), it was slightly down in 1992, but, at 178 kg/ha, is higher than in 1989 and 1990. This reflected similar changes in the average field application rate. In Scotland the overall application rate was 176 kg/ha, significantly lower than the 1990 and 1991 levels.

The overall application rate of Compound N on Winter wheat remained low in England and Wales, at 6 kg/ha. However, this apparent stability masks an underlying increase (shown in Table 5) in the average field application rate in 1992 (increasing to 42 kg/ha, above even the 1990 high of 39 kg/ha) and a countervailing decline in the proportion of Winter wheat dressed with Compound N, falling from 21% (in 1990) down to 15% (in 1992). 77% of the compound N was applied from January to May with the other 23% being applied in the Autumn. The apparent switch to Straight products from Compounds in England and Wales reported in 1991 would seem to have ended, or to have been reversed.

In Scotland, there was a shift towards the use of Compound N on wheat away from Straight N products: the overall application rate of Compound N on Winter wheat rose to 21 kg/ha. 52% of this compound N was applied in Spring and 48% in the Autumn.

Table 4 Overall fertiliser usage on major tillage crops 1988-1992 (kg/ha)

Total N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	189	201	102	93	146	179	205	159	244	234	121
1989	181	195	91	91	142	182	202	173	231	251	119
1990	182	200	92	91	137	174	190	166	227	214	121
1991	186	202	89	89	138	179	191	148	227	227	122
1992	184	197	88	92	139	165	181	152	198	189	115

Straight N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	181	183	57	30	134	158	28	0	215	201	80
1989	174	179	46	23	130	156	29	1	207	212	79
1990	174	182	49	28	124	158	33	0	210	189	93
1991	180	185	48	21	130	156	31	0	212	192	93
1992	178	176	44	25	128	142	31	2	185	150	88

Compound N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	8	18	45	63	11	21	177	159	29	33	41
1989	7	16	45	68	12	27	173	172	23	39	40
1990	8	17	44	63	11	16	157	166	17	24	29
1991	6	17	41	68	8	24	160	148	15	36	28
1992	6	21	45	68	11	23	150	149	13	39	27

Total P₂O₅

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	54	71	40	56	54	68	221	159	59	62	65
1989	50	70	38	53	51	74	204	192	52	63	57
1990	49	73	35	55	51	69	206	169	51	61	61
1991	51	67	35	52	52	76	212	144	59	65	54
1992	50	76	35	53	54	81	188	182	53	63	59

Total K₂O

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	53	74	46	56	60	71	283	227	59	66	143
1989	48	77	46	57	60	77	259	286	49	68	140
1990	50	82	45	57	61	77	267	238	55	71	141
1991	51	80	46	56	61	90	277	193	54	76	141
1992	50	84	43	61	62	87	264	222	53	69	136

Table 5 Average field rates on major tillage crops 1988-1992 (kg/ha)

Total N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	191	203	104	93	141	179	208	159	248	234	123
1989	182	195	94	92	143	182	208	173	233	251	121
1990	184	200	97	92	139	174	193	166	228	220	122
1991	187	202	90	89	139	179	192	162	227	227	127
1992	187	200	90	93	140	165	193	156	199	189	122

Straight N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	185	189	88	63	139	160	96	0	223	206	102
1989	177	186	83	60	136	162	139	55	213	214	108
1990	177	183	86	60	132	158	108	52	212	196	112
1991	182	185	84	60	135	159	102	0	214	192	111
1992	182	183	87	56	135	145	114	86	189	160	107

Compound N

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	25	27	59	65	30	28	185	159	46	41	97
1989	28	30	60	70	36	32	189	172	49	43	87
1990	39	27	67	66	42	24	173	166	42	36	83
1991	36	33	59	69	42	35	179	162	41	46	99
1992	42	34	63	71	53	34	172	154	40	52	80

Total P₂O₅

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	64	78	45	56	62	71	224	159	64	67	73
1989	63	78	43	54	58	78	213	192	64	64	64
1990	63	74	44	55	60	74	208	169	62	66	68
1991	67	73	43	53	63	79	216	158	69	69	65
1992	68	78	44	55	64	81	201	187	68	64	77

Total K₂O

	<u>Winter wheat</u>		<u>Spring barley</u>		<u>Winter barley</u>		<u>main crop potatoes</u>		<u>oilseed rape</u>		<u>sugar beet</u>
	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>
1988	67	82	52	56	69	75	284	227	67	71	146
1989	66	84	51	58	68	82	271	286	65	69	145
1990	69	83	53	57	71	82	270	238	68	76	144
1991	71	83	50	57	74	91	285	211	70	80	145
1992	72	85	50	62	75	87	279	228	73	69	152

There was a slight drop in England and Wales in the overall rate of use of Straight N on Winter barley in 1992, down to 128 kg/ha (Table 4), although the average field application rate of Straight N on Winter barley remained steady in 1992 at 135 kg/ha (Table 5). The overall rate for Compound N increased, up from 8 kg/ha to 11 kg/ha but this was consistent with the level observed in the period 1988-1990. The average field application rate of Compound N increased significantly, to 53 kg/ha.

In Scotland there was also a major fall in the use of Straight N on Winter barley in 1992, down to 142 kg/ha from 156 kg/ha (Table 4). The overall rate for Compound N held at 23 kg/ha, as did the average field application rate of 34 kg/ha (Table 5). In Scotland, Spring barley is more widely grown and here too the overall rate of Compound N held, at 68 kg/ha.

Table 6: Application of N fertiliser on Winter wheat, Winter barley and Winter oilseed rape during the period August and January prior to harvest, 1988 - 1992 cropping seasons

<u>Dressing cover in August - January</u>							
	<u>Winter wheat</u>		<u>Winter barley</u>		<u>oilseed rape</u>		
%	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	
1988	28	*	31	*	64	*	
1989	18	*	25	*	52	*	
1990	10	*	16	*	45	*	
1991	11	*	12	*	49	*	
1992	8	51	10	72	50	86	

<u>overall application rate</u>							
	<u>Winter wheat</u>		<u>Winter barley</u>		<u>oilseed rape</u>		
kg/ha	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	
1988	6	*	7	*	29	*	
1989	4	*	5	*	23	*	
1990	2	*	3	*	19	*	
1991	3	*	3	*	22	*	
1992	3	11	3	18	22	35	

<u>average field rate</u>							
	<u>Winter wheat</u>		<u>Winter barley</u>		<u>oilseed rape</u>		
kg/ha	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	<i>E&W</i>	<i>Scot</i>	
1988	20	*	21	*	45	*	
1989	21	*	20	*	45	*	
1990	22	*	22	*	42	*	
1991	24	*	26	*	46	*	
1992	39	23	32	25	44	40	

* not available

Over the period 1988 - 1992 in England and Wales there has been a decline in the percentage of Winter wheat and Winter barley crop area receiving any N fertiliser during the first part of the cropping season (August to January in year prior to harvest), as shown in Table 6. This trend is consistent with advice which farmers have received from ADAS and other sources within the industry for a number of years. The advice concerns the uneconomical, in most cases, Autumn application of N to Winter cereals, not least because it increases the potential for nitrate leaching losses over Winter when crops have little need for N.

The overall application rate during this period has also been falling, although this levelled off in 1992 because of a larger than expected increase in the average field rate, due to an appreciable amount of top dressing in January, when suitable soil and weather conditions encouraged farmers to start spreading the first Spring N dressing earlier than usual. However, ADAS advise that applications of N in January are undesirable as there is an appreciable risk of subsequent leaching loss, compared with the recommended timing of the first split dressing between mid February and early March when Spring growth starts and N uptake by the crop begins to increase.

We are unable to present a comparable trend analysis for Scotland. The much higher dressing cover and the consequently higher overall application rates (despite lower average field rates) in Scotland may reflect greater use of Autumn N as an insurance against poor crop establishment in conditions of lower soil temperatures and higher rainfall.

Oilseed rape

The largest fall in the use of N on tillage was on oilseed rape, down in Britain to 196 kg/ha from 227 kg/ha in 1991, following a fall to 198 kg/ha in England and Wales and to 189 kg/ha in Scotland. Recommendations from ADAS/SAC on use of N on oilseed rape were reduced by up to 50 kg/ha in 1992, following the introduction of the new CAP support scheme for the crop. There was also an increase in the proportion of oilseed rape sown in Spring, rather than Autumn, requiring less N.

Overall use of Straight N on oilseed rape fell by 13% in England and Wales to 185 kg/ha, from 212 kg/ha in 1991. This reflected an 11% drop in the average field rate of application. Use of Compound N, continued to decline as a result of a continuing reduction in the area of oilseed rape receiving Compound N, down from 41% in 1990 to 32% in 1992. There was also a continuation of the downward trend in the average field rate of Compound N.

The larger fall (21%) in the use of Straight N on oilseed rape occurred in Scotland, the overall rate of 150 kg/ha down from around 190 kg/ha in the previous two years, although this was accompanied by a continuing shift towards use of Compound N, increasing to 39 kg/ha.

Sugar beet

The 1992 Survey indicates a reduction in the use of N on sugar beet in England and Wales down to 115 kg/ha. Table 5 indicates a 4% drop in the field rate of Straight N (down from 111 to 107 kg/ha) and a 4% drop in the field rate of Compound N (down to 80 kg/ha from 83 kg/ha in 1990). This may be seen as an outcome of an ongoing promotional campaign to highlight to farmers the adverse effect of excessive N input on sugar quality. However, the average field rate for total N is, at 122 kg/ha is very similar to rates applied in the period 1988 - 1990 (Table 5).

Potatoes

Overall total use of N on main crop potatoes in Britain was 172 kg/ha (from Appendix Table GB 1.1). In England and Wales total use fell to 181 kg/ha, 5% below the fluctuating level observed in previous years. However, the average field rate of application was little changed at 193 kg/ha. In Scotland, total N use increased to 152 kg/ha in 1992, even though the field rate fell slightly to 156 kg/ha.

The overall application rate of Straight N on main crop potatoes in England and Wales in 1992 was 31 kg/ha, but with a much higher average field rate at 114 kg/ha. The area receiving Straight N has been falling, from 31% in 1990 down to 26% in 1992. (There is no significant application of Straight N on main crop potatoes in Scotland.)

In England and Wales, the overall use of Compound N on main crop potatoes fell in 1992, to 150 kg/ha from 160 kg/ha. in 1991. This drop was due both to a decline in the dressing coverage, falling to 87% in 1992 and to a reduction in the application field rate, falling back to the 1990 rate of 172 kg/ha. In Scotland the overall rate of application of Compound N increased to 149 kg/ha in 1992.

FYM

During this same period, 1989 - 1992, the proportion of main crop potatoes area which was dressed with farmyard manure (FYM) increased (see Table 7), and this increase may have had an effect on the use of N fertiliser products. In England and Wales the area of main crop potatoes dressed with FYM increased from 32% (1990) to 38% (1991) and 40% (1992). In Scotland, the extent of FYM dressed cover on main crop potatoes remained around 50%.

Other than a major increase in the use of FYM on oil seed rape in Scotland, no consistent changes have occurred on major crops.

Table 7 Use of farmyard manure on major crop groups 1988-1992 (percentage of crop area dressed with FYM)

	Winter wheat		Spring barley		Winter barley		main crop potatoes		oilseed rape		sugar beet
	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W
1988	11	14	19	35	13	14	35	24	8	7	27
1989	12	16	27	36	16	17	32	50	5	6	32
1990	12	14	20	37	16	18	32	60	7	9	29
1991	11	29	28	39	16	33	38	49	9	16	27
1992	11	15	25	35	11	17	40	51	9	23	33

P₂O₅ & K₂O

In England and Wales the average field rates of P₂O₅ on oilseed rape held steady at 68 kg/ha, but the overall rate of application fell back to 53 kg/ha, from 59 kg/ha in 1991 (Tables 4 and 5). In Scotland, there was no significant change, with an overall application rate of 63 kg/ha.

The overall rate for use of P₂O₅ on main crop potatoes dropped in England and Wales, from 212 kg/ha in 1991 to 188 kg/ha in 1992: the average field rates also dropped, from 216 to 201 kg/ha. In Scotland the overall rate appears to have recovered to 182 kg/ha, almost back to the high reported in 1989.

There is some evidence for a recovery in the use of P₂O₅ on sugar beet with the overall application rate back up to 59 kg/ha, and indication of a possible fall in the use of K₂O for sugar beet. The average field rates for P₂O₅ and K₂O have both increased, from 65 to 77 kg/ha for P₂O₅ and from 145 to 152 kg/ha for K₂O, but the area of dressing cover for sugar beet has been falling: from 89% in 1990 to 76% in 1992 for P₂O₅, and from around 97% in 1990/91 to 89% in 1992 for K₂O. (There is no significant production of this crop in Scotland.)

The use of K₂O on oilseed rape remained firm in England and Wales at 53 kg/ha, there is some evidence of a decrease in Scotland, back to 69 kg/ha (Table 4).

The use of P₂O₅ and K₂O on cereals has shown no substantial change in recent years, although rates fluctuated more widely in Scotland (Table 4).

Fertiliser Use on Grassland

The total use of N on grassland in Britain was 106 kg/ha (Table 1). In England and Wales the overall rate fell from 133 kg/ha, in 1991, to 104 kg/ha in 1992, abruptly ending the recovery in usage since the sharp fall reported in 1988 (see Table 2). In Scotland the overall application of N on grassland remained at 111 kg/ha.

The decline in England and Wales in the overall application rate is the result of both a reduction in the dressing cover (Table 8) and a fall in the average field rate of application of N on grass (Table 9). There may be no simple reasons for this decline in the use of both Straight N and Compound N on grassland. They are sizeable and comparable to the large fall reported in 1988, which in the 1988 Survey Report (E&W) were attributed to changes in livestock numbers and to seasonal changes in the weather affecting grass production. The hot, dry weather in May/June 1992 followed by heavy rain in parts of the country may have had a similar effect, deterring farmers from applying N. Sources at ADAS have not identified any other, agronomic, factors to account for the large drop between 1991 and 1992 in NPK use on grassland in England and Wales. Nevertheless, there were reports from the Survey of farmer's intentions to reduce fertiliser application more generally for financial reasons. Other factors suggested include falling land prices, uncertainties associated with the removal of land from agricultural production and pressures on farmers to conform to the 'greening' in public policy.

The sharp decline in the use of N on grassland in England and Wales is attributable, in part, to a reduction in the proportion of grassland receiving Straight N products (Figure 5).

Figure 5 Dressing cover of Straight and Compound N on grassland 1988- 92 (%)

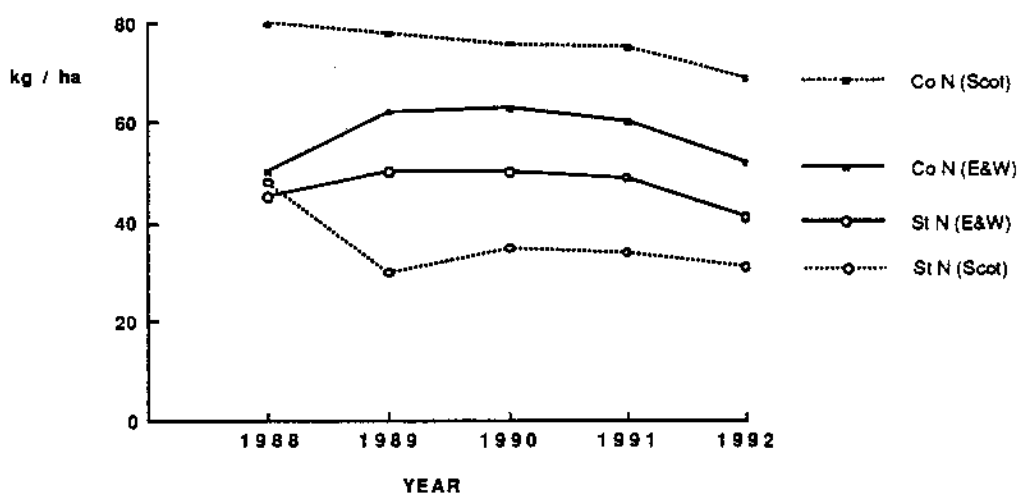


Table 8

Dressing cover on grassland 1988-92

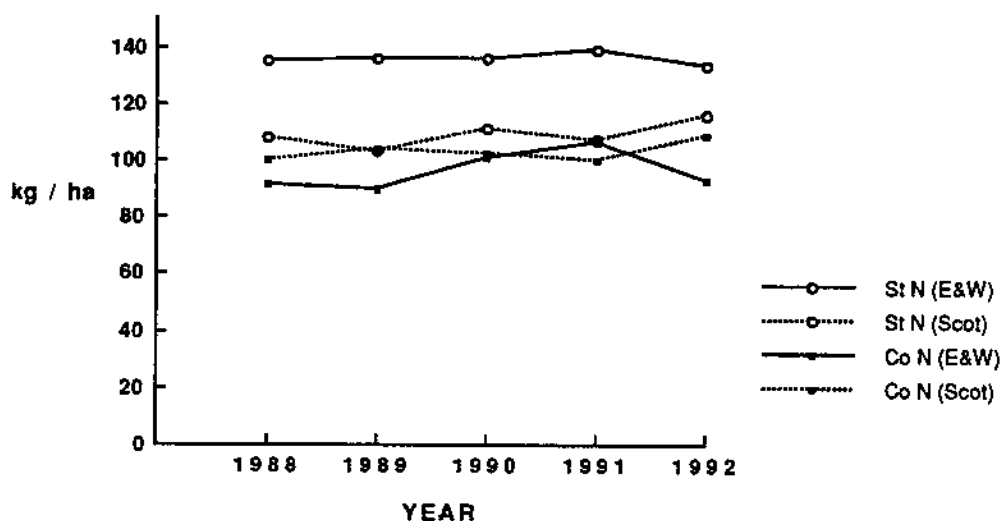
%

	Straight N		Compound N		Total N		Total P		Total K	
	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot
1988	*45	48	*50	80	80	92	62	82	62	79
1989	*50	30	*62	78	85	90	65	81	66	78
1990	50	35	63	76	85	87	65	76	66	75
1991	49	34	60	75	82	83	62	75	64	73
1992	41	31	52	69	75	83	55	75	55	71

* based on a summary of figures published in earlier Reports

The fall in the overall rate of Straight N in England and Wales from 69 kg/ha in 1991 to 55 kg/ha (Table 2), was due to a fall in the dressing cover, from 49% to 41 % of grassland area (see Table 8 and Figure 5) and to a fall in the average field-specific rate, from 139 kg/ha to 133 kg/ha (see Table 9 and Figure 6). In Scotland the overall application of Straight N on grassland steadied at 36 kg/ha (Table 2).

Figure 6 Average field rate of Straight and Compound N 1988 -1992



The decline in the use of Compound N on grassland in England and Wales, from 64 down to 49 kg/ha (Table 2 and Figure 5) was also due to a fall in dressing cover (Table 8) and a fall in the average field rate (Table 9 and Figure 6). In Scotland the overall application of Compound N on grassland remained at 75 kg/ha.

Table 9 Average field rates of N on grassland 1988-1992

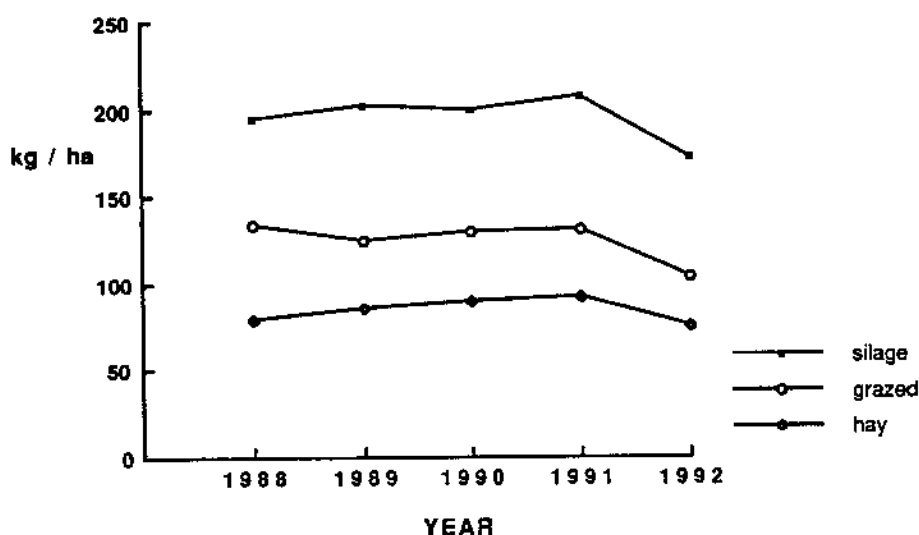
	Straight N		Compound N	
	E&W	Scot	E&W	Scot
1988	*135	108	*91	100
1989	*136	103	*90	104
1990	136	111	101	102
1991	139	107	106	100
1992	133	116	93	109

* based on a summary of figures published in earlier Reports

Application rates of fertiliser nutrients on grassland vary widely according to grass sward, management system, and intended use for the grass. Details of fertiliser application on the three principle uses of grass (silage, grazing, and hay) are given in Section 2 of the Appendix Tables.

The fall in the overall application rate across all three major uses of grass in England and Wales is evident in Figure 7.

Figure 7 Nitrogen use by grass utilisation in England and Wales, 1988 - 1992



Nearly all farm grassland is grazed to some extent, although the proportion of grass used for grazing purposes in England and Wales fell in 1992, to 94% from 97% (Table 10). Table 10 also shows NPK use on grazed grass in 1992 compared with previous years*.

Table 10 Grassland utilisation and overall fertiliser use 1988 - 1992

	Grass utilisation %						Total N (kg/ha)					
	grazed ¹		silage ²		hay ²		grazed ¹		silage ²		hay ²	
	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot
1988	96	98	27	24	13	9	133	112	194	196	79	100
1989	97	98	28	22	12	9	125	88	202	177	86	108
1990	97	99	31	24	11	8	129	89	199	182	90	104
1991	97	99	29	22	12	9	131	87	207	196	92	83
1992	94	98	28	23	12	9	103	111	172	206	75	108

	Total P (kg/ha)						Total K (kg/ha)					
	grazed ¹		silage ²		hay ²		grazed ¹		silage ²		hay ²	
	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot	E&W	Scot
1988	20	26	31	46	20	28	29	22	61	68	23	29
1989	22	25	34	42	20	37	21	22	70	73	26	42
1990	23	20	33	44	22	33	34	20	68	69	26	39
1991	22	17	33	46	22	25	35	17	74	74	28	29
1992	18	30	30	49	16	33	25	34	54	71	20	43

The overall application rate of N on grassland used for grazing in England and Wales fell by 23% to 103 kg/ha from 131 kg/ha (Table 10). This was for two reasons. First, the proportion of this grassland receiving N fell to 74% in 1992 from 83% in 1991, having already fallen from 85% in 1990. Second, the average field rate also fell, to 136 kg/ha from 159 (Table 11), with a noticeable fall in the higher rates of application. Rates greater than 250 kg/ha were applied to only 12% of grassland, compared to 16% in 1990 and 19% in 1991.

* The format of the questionnaires was simplified in 1992 in a way that precludes a more detailed comparison of fertiliser rates for the 'rotational' and 'continuous' categories of grazing specified in the 1989 - 1991 Surveys. Still earlier Surveys categorised fertiliser usage in terms of 'paddock', 'strip' and 'set stock' grazing.

¹ may also be cut

² may also be grazed

Table 11 Grassland utilisation and average field rates 1988 - 1992

Grass utilisation %							Total N (kg/ha)						
grazed ¹		silage ²		hay ²			grazed ¹		silage ²		hay ²		
E&W	Scot	E&W	Scot	E&W	Scot		E&W	Scot	E&W	Scot	E&W	Scot	
1988	96	98	27	24	13	9	1988	141	126	203	198	98	107
1989	97	98	28	22	12	9	1989	148	103	221	177	100	109
1990	97	99	31	24	11	8	1990	152	111	213	183	103	108
1991	97	99	29	22	12	9	1991	159	112	229	196	104	98
1992	94	98	28	23	12	9	1992	136	107	186	210	105	114

Total P (kg/ha)							Total K (kg/ha)						
grazed ¹		silage ²		hay ²			grazed ¹		silage ²		hay ²		
E&W	Scot	E&W	Scot	E&W	Scot		E&W	Scot	E&W	Scot	E&W	Scot	
1988	34	33	39	49	32	35	1988	46	29	74	74	65	39
1989	34	34	44	46	31	43	1989	51	31	88	79	39	49
1990	36	30	42	47	35	38	1990	53	31	84	72	40	44
1991	36	24	44	49	34	33	1991	54	26	91	77	42	38
1992	33	35	41	54	31	38	1992	45	32	69	77	39	42

Grassland cut for silage is dressed heavily with N. In 1992, the overall application rate in England and Wales fell back by about a fifth to 172 kg/ha, following an increase during the period 1988-1991 (Table 10). This fall was partly because the dressing cover, usually very high at 95%, fell in 1992 to 92%, but it was also because there was also a reduction in the average field rate of application, down to 186 kg/ha in 1992 (Table 11). The overall application rate of N on grassland cut for silage is now higher in Scotland than in England and Wales, having increased in 1992 to 206 kg/ha, the average field-specific rate increasing to 210 kg/ha.

In England and Wales, grassland which is used for silage but not grazed receives a still higher dressing of N, but the average field-specific application rate has been falling, from 237 kg/ha in 1990 down to 229 in 1991, and to 220 kg/ha in 1992.

The average field rate of N on grassland used for hay is much lower. In England and Wales the average field rate has remained relatively stable at 105 kg/ha (Table 11), but with the dressing cover falling by a fifth, to 71% in 1992 from around 88% in the previous two years, the overall rate has fallen, from 92 kg/ha in 1991 to 74 kg/ha in 1992 (Table 10). In Scotland, the overall application rate is higher, the 1992 rate is 111 kg/ha.

Tables 10 and 11 also indicate major reductions in overall P₂O₅ and K₂O use in 1992, for grazed grass and grass cut for silage or hay. These reductions in the overall application rates of N, P₂O₅ and K₂O were accompanied by large decreases in the dressing cover on grassland, the proportion of grassland receiving the nutrient (see Table 8).

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June 1993

Sampling design and sampling error estimation

The 1992 British Survey of Fertiliser Practice followed a very similar sampling design to that used by Rothamsted Experimental Station in previous years, resulting in a nationally representative sample with high precision estimates. Although 'random' sampling is involved, the design used was much better than that which would have been obtained by a 'simple random sampling scheme'.

As in past years, farms with less than 20 hectares of crops and grass were excluded from the survey; the remainder were stratified according to four size groups and four farm types in order to capture the variability in fertiliser practice across Britain. This produced sixteen stratification cells for England and Wales and four farm type stratification cells for Scotland. The farm holdings within each cell were ordered according to the 'county-parish-holding number' to allow a high degree of implicit geographic stratification in the final 'systematic' selection of farms to the sample by MAFF and SOAFD. The fraction of farm holdings sampled from within each cell varied in proportion to the total area of crops and grass so that the larger crop areas were well represented in the survey sample, a 'variable fraction stratification' scheme set out below.

Technical Table 1: Sampling Characteristics for British Survey of Fertiliser Practice 1992

	farm holdings in population in 1991	total crops & grass in 1991	target sampling fraction	target sample size	achieved sample size	achieved sample fraction
<i>England & Wales</i>		column %	%			%
Livestock (MAFF groups 1 - 7)						
crops & grass area						
20-50 ha	17880	6.28	0.49	90	89	0.50
51-100 ha	20183	13.96	0.97	198	197	0.97
101-200 ha	9279	12.14	1.85	172	170	1.83
200+ ha	2531	7.67	4.29	110	107	4.22
Crops & mixed (MAFF groups 8+9+13)						
crops & grass area						
20-50 ha	2261	0.81	0.51	12	12	0.51
51-100 ha	5030	3.73	1.05	54	53	1.05
101-200 ha	7010	9.74	1.96	138	133	1.89
200+ ha	4972	17.49	4.97	248	243	4.88
Horticulture (MAFF groups 10+11+12)						
crops & grass area						
20-50 ha	1405	0.44	*0.99	14	13	0.92
51-100 ha	739	0.51	*2.16	16	15	2.02
101-200 ha	382	0.52	*3.89	16	16	3.89
200+ ha	315	1.21	*10.85	36	34	10.79
			*double sampling			
Part-time (MAFF group 14)						
crops & grass area						
20-50 ha	22105	6.65	0.42	96	89	0.40
51-100 ha	4940	3.16	0.90	46	44	0.89
101-200 ha	355	0.44	2.25	8	7	1.97
200+ ha	12	0.02	.	0	0	.
<i>Scotland</i>						
LFA cattle & sheep (SOAFD group 1 to 3)	4573	4.21	1.50	69	68	1.48
Other livestock (SOAFD group 5+7+82)	3482	6.15	1.55	54	54	1.55
Crops/horticulture/mixed (SOAFD group 4+6+81+83)	5242	3.33	1.90	100	95	1.81
Part-time (SOAFD group 9)	3719	1.55	0.67	25	24	0.64
Total for Great Britain	116,415	100%		1,502	1,464	

Results from the Survey were derived by employing 'sampling weights' obtained from the inverse of the achieved sampling fraction in each stratification cell.

Technical Table 2: Summary Sampling Characteristics

	farm holdings in population in 1991	total crops & grass in 1991 (million hectare)	target sample size	achieved sample size	achieved sampling fraction (%)
<i>England & Wales</i>	99,399	8.7	1,254	1,222	1.23
<i>Scotland</i>	17,016	1.5	248	241	1.42
<i>Great Britain</i>	116,415	10.2	1,502	1,464	1.25

Achieved sample

Some non-response is inevitable in all voluntary sample surveys. Consequently, not all the 1502 farms in the target sample for the 1992 Survey were successfully surveyed: some were found, on inspection, to be farms that should have been excluded from the survey (invalid), in some instances the interviewers were unable to make contact with the farm managers, and some farmers refused to take part in the survey. Overall, returns were obtained for 1464 farms: 1255 of these responses were from the 'main' sample and 209 responses were from a 'reserve' sample. The reserve sample was constructed by selecting, within each stratification cell, the farm having the next (adjacent) 'county-parish-holding number' to each member of the main sample, enhancing the extent of similarity and exchangeability. The use of a reserve sample, adopted in previous surveys, is a strategy designed to reduce bias from the non-response to the main sample; any over-sampling created thereby is discounted subsequently through the use of sampling weights. The use of a reserve sample also means that there can be no one simple 'response rate', although the net response rate (excluding the farms discovered to be invalid) of 87% to the main sample is the most appropriate for comparison with other surveys.

Technical Table 3: Response to Main and Reserve Samples

				%
issued from Main Sample	1502			
response to Main Sample	1255		crude response rate	83.6
non-response	247	of which 58 invalid	net response rate	86.9
issued from Reserve Sample	247			
response to Reserve Sample	209		crude response rate	84.6
non-response	38	of which 11 invalid	net response rate	88.6
achieved sample size	1464		achieved rate	97.5

Sampling errors

Despite best endeavours to ensure that the application rates contained in the main Report are as accurate as possible, survey results can only be estimates and therefore subject to a degree of sampling error. Ideally estimates from a survey would be both unbiased and reliable. Cross-checks with sources outside the survey and rigorous attention to survey practice help ensure a lack of bias. Reliability is easier to assess. By reliable is meant that the results obtained from the selected sample are very similar to the results that would have been obtained had the sampling scheme provided a different set of farms to survey - this notion is the basis of all random sampling. An indication of the reliability of a survey estimate is given by its 'standard error'.

**Technical Table 4 Standard errors for application rates for the major crops in 1992
England & Wales**

	standard error for overall application rate (kg/ha)					standard error for average field rates (kg/ha)					fields in sample
	total	str't	comp	total	total	total	str't	comp	total	total	
	N	N	N	P ₂ O ₅	K ₂ O	N	N	N	P ₂ O ₅	K ₂ O	
Winter wheat	.5	.5	.2	.1	.8	.8	.7	2.1	.2	.7	3594
oilseed rape	.6	1.3	.6	.5	2.3	.5	1.0	.9	.4	.7	742
Winter barley	1.3	1.3	.3	.8	1.2	1.4	1.0	1.8	.4	.5	442
Spring barley	2.4	2.7	.6	1.3	.3	2.5	1.8	.4	.2	.5	1395
m c potatoes	2.8	3.0	1.0	5.3	4.7	2.8	5.2	1.3	4.9	4.3	186
sugar beet	3.0	1.8	1.2	2.9	3.6	1.8	1.3	.7	2.7	3.0	465
all tillage crops	.3	.7	.4	.1	.1	.7	.5	.6	.3	.2	9262
all grass	1.2	.2	1.1	.2	.5	.9	1.7	.5	.7	1.4	5327

Scotland

	standard error for overall application rate (kg/ha)					standard error for average field rates (kg/ha)					fields in sample
	total	str't	comp	total	total	total	str't	comp	total	total	
	N	N	N	P ₂ O ₅	K ₂ O	N	N	N	P ₂ O ₅	K ₂ O	
Winter wheat	1.9	1.9	2.3	1.5	1.3	2.1	2.3	1.3	1.6	1.5	244
oilseed rape	4.3	4.9	4.8	1.0	.8	4.2	4.8	4.9	1.0	.8	93
Winter barley	3.4	3.2	2.5	2.3	1.1	3.4	3.8	2.7	2.3	1.1	107
Spring barley	0.7	.7	1.6	.4	.2	.7	1.9	.8	.2	.2	466
m c potatoes	2.2	.	.	6.6	3.4	2.2	.	.	8.2	2.8	52
all tillage crops	2.0	1.5	.7	.6	.6	1.5	3.6	2.8	.9	.6	1305
all grass	2.0	4.0	2.7	1.5	1.3	1.4	4.5	3.3	.9	.6	1093

Standard errors which are small relative to the size of the estimates, indicate reliable estimates; standard errors which are relatively large show up poorly determined survey estimates. This is especially important for estimates of application rates for specialised crops as these are based upon only a small number of fields: the corresponding standard errors tend to be larger the fewer the number of fields, indicating less precision. But by itself, the number of fields in the sample growing a particular crop is only a rough guide to the size of the standard error. The sizes of standard errors for the application rates in the Survey actually depend upon the number of farms and fields in the sample, the sampling fraction, the variability in application rates across Britain's farms and upon the combined effectiveness of the sampling design and estimation methods. Note, for example, that the standard errors for estimates of application rates in Scotland are not very much larger than those for England and Wales, despite smaller sample size.

The use of standard errors is best illustrated through examples. In 1992, in England and Wales, for example, the estimated overall application rate of total Nitrogen use on Winter wheat was 184 kg/ha. The low value of the corresponding standard error of 0.5 kg/ha, relative to the 184 kg/ha indicates very high reliability (good precision), a 'relative error' near to 0.27% (the ratio 0.5 to 184, as percentage). However, the application of Nitrogen on sugar beet provides another example with less, but also good, precision: the estimated overall application rate was 115 kg/ha, with a corresponding standard error of 3.0 kg/ha, a 'relative error' of 2.6%. The application of N on kale and cow cabbage is estimated with much less precision: 81 kg/ha with a corresponding standard error of 10.9 kg/ha (not shown in above Table), with a much larger 'relative error' of 13.4% - due, in part, to the small number (33) of fields of kale and cow cabbage represented in the Survey. Note that the estimates of the average field rates of application are more reliable, despite the small number of fields involved: for kale and cow cabbage, for example, 'the relative error' was down to 5.7% (the estimate of 109 kg/ha had a corresponding standard error of 6.2 kg/ha).

Another way of expressing the reliability is to construct a 95% Confidence Interval. This is derived by creating a lower and upper bound, of length 2 times the standard error, about the survey estimate. The example for Winter wheat N would have a narrower Confidence Interval: with lower bound 183 (184 - 2 x 0.5) and an upper bound of 185 (184 + 2 x 0.5). On 95% of

occasions such an interval will enclose the 'true value'; this gives confidence to believe that the true value lies in the narrow range 183 to 185 kg/ha. The comparable 95% Confidence Interval for the overall application rate of N on kale and cow cabbage would be much wider.

Assessing estimates of change

This same approach can be adopted in order to assess the statistical significance of an apparent change over time in a given dressing-crop application rate. Sometimes, differences observed between years should be attributed to sampling variation. The rule of thumb is to take note of differences only when they are nearly three or more times the size of the standard error of one year's estimate.

For example, the overall application rate of Straight N on sugar beet in 1992 was estimated at 88 kg/ha, an apparent fall from 93 kg/ha in 1991. The difference is 5 kg/ha. The standard error in 1992 was 1.8 kg/ha. The observed difference of 5 kg/ha is less than 3 times 1.8 (= 5.4) kg/ha, although not by much, and therefore could well be attributable to sampling variation alone - indicating not much evidence of real world change.

Strictly, the standard error of the difference between survey estimates obtained from two independent samples is the square root of the sum of the squared standard errors for each of the two estimates. This applies to the comparison across two or more years. The approximation used above, only taking note of differences greater than three times standard error, assumes that the standard error of each estimate was the same. A comparison with earlier Reports would suggest that such an assumption does not hold, as the 1992 standard errors reported are generally less than those reported for earlier years, despite only minor changes in the sampling design. What has changed is the method of estimating the standard errors (see below). We believe that the standard errors reported in 1992 are the more accurate measures of sample survey variability.

Estimating the standard error

It is not straightforward to obtain correct standard errors for a complex survey design. The 'classical' approach to estimating standard errors from such a complex survey design is to use complex formulae, appropriate to each statistic of interest, from the standard texts. With sufficient farms and fields in the sample, statistical theory provides methods to assess the reliability of estimates using the variability in the sample and knowledge of the sampling scheme used - the explicit stratification and clustering described above. This approach, in part developed at Rothamsted Experimental Station¹, and used for previous surveys has an advantage in terms of precision of standard error estimation, but it may be regarded as having unwanted bias, in that it fails to measure the gain in precision (reliability) obtained from the implicit stratification in the systematic selection. It also fails to measure sources of non-sampling variation. It is computationally complex and is difficult to extend to a wide variety of estimators.

The approach taken for 1992 British Survey of Fertiliser Practice was to build replication into the sampling design and use approximate sampling variance estimation to derive the standard errors. The simplest method of replication, the one adopted for the 1992 Survey, is to select two half-samples, each using exactly the same sampling scheme. The survey estimates are computed twice, once for each half sample. Calculation of the standard error is based on the difference between the values obtained in each half sample. This approach has the advantage that it takes account of the gain in reliability from the implicit stratification in the systematic selection (from the geographically ordered list). It is also computationally simple and applicable to a wide variety of survey statistics. The principal disadvantage of this approach is some loss of precision in the estimated standard errors; although on average the standard errors are small and a good guide to the reliability of the survey results, one or more of the standard errors reported may occasionally under- (or over-) estimate. The extent of this drawback can be reduced by increasing the number of replicates used. This was, in effect, what was done, post-survey, by systematically sub-dividing the two design replicates to produce four working replicates. The formula used to derive the standard errors reported here makes use of the variation across these four working replicates.

¹ Yates, F (1981) *Sampling Methods for Censuses and Surveys* (4th Edition) London: Charles Griffin

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Table GB1.1 Total fertiliser use in Britain 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	40	100	68	70	18	154	53	58	154	36	40	97
Winter wheat	2145	98	76	72	11	188	69	74	186	52	53	3838
Spring barley	530	99	91	94	31	92	51	58	91	47	55	908
Winter barley	784	99	86	85	12	143	67	77	142	57	65	1502
Oats	110	96	89	89	21	101	58	64	97	52	57	255
Rye	19	97	70	72	23	135	61	83	131	43	60	53
Early potatoes	22	99	94	99	67	205	198	274	204	186	270	66
Maincrop potatoes	94	95	95	95	43	181	197	263	172	187	251	238
Sugar beet	183	94	76	89	33	122	77	152	115	59	136	465
Oilseed rape	468	99	83	78	12	197	67	72	196	55	56	835
Linseed	141	82	57	59	12	66	48	57	54	27	33	380
Forage maize	12	62	36	33	83	79	37	47	48	13	16	34
Turnips (stock)	44	90	84	86	47	72	104	88	65	88	75	127
Kale and cow cabbage	14	90	76	79	47	104	62	70	93	47	55	47
Other roots/green crops	45	84	83	78	41	104	84	108	87	70	84	147
Peas	131	7	58	65	11	31	60	79	2	35	52	307
Beans	148	11	58	49	8	49	70	65	5	41	32	335
Vegetables (brassicae)	47	97	85	84	18	198	80	158	192	68	133	155
Vegetables (other)	38	74	77	84	16	124	102	132	92	78	111	145
Small fruit	11	51	36	54	15	67	35	75	34	13	40	54
Top fruit	40	71	57	59	36	103	31	43	73	17	25	106
Other tillage	105	65	55	54	38	115	52	67	75	29	36	318
All tillage	5171	92	78	77	17	158	69	81	145	54	63	10412
Temporary grass	993	93	70	72	44	181	45	68	169	32	49	1730
Permanent grass	4353	73	57	56	38	125	34	42	91	19	24	4690
All grass	5347	77	60	59	39	138	36	48	106	22	28	6420
All crops & grass	10518	84	69	68	28	149	55	67	125	38	45	16832

*Estimated area under crop

Table GB1.2 Use of 'straight' fertiliser in Britain in 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	40	90	.	.	138	30	75	124	.	.	97
Winter wheat	2145	97	7	5	182	87	90	178	6	5	3838
Spring barley	530	46	1	1	69	96	104	32	.	1	908
Winter barley	784	95	5	4	137	91	95	130	4	4	1502
Oats	110	72	1	2	92	80	70	66	1	1	255
Rye	19	92	1	4	119	60	75	109	1	3	53
Early potatoes	22	22	3	5	102	60	224	22	2	11	66
Maincrop potatoes	94	20	.	6	113	8	242	22	.	14	238
Sugarbeet	183	82	4	24	107	110	99	88	4	24	465
Oilseed rape	468	97	7	5	183	93	97	178	6	5	835
Linseed	141	67	5	7	65	85	107	43	4	7	380
Forage maize	12	28	.	1	96	.	75	26	.	1	34
Turnips (stock)	44	9	1	1	81	120	75	7	1	1	127
Kale and cow cabbage	14	44	2	5	95	120	92	42	2	5	47
Other roots/green crops	45	31	8	3	98	101	139	30	8	5	147
Peas	131	1	4	15	54	64	94	1	3	14	307
Beans	148	2	12	6	80	100	93	1	12	5	335
Vegetables (brassicae)	47	73	.	.	122	75	162	90	.	1	155
Vegetables (other)	38	52	.	6	106	.	151	55	.	10	145
Small fruit	11	33	1	19	70	60	92	23	1	17	54
Top fruit	40	40	4	6	78	48	62	31	2	4	106
Other tillage	105	38	1	4	121	102	109	45	1	4	318
All tillage	5171	79	5	5	156	89	98	123	5	5	10412
Temporary grass	993	64	2	3	148	86	97	94	2	3	1730
Permanent grass	4353	33	2	1	122	82	90	41	2	1	4690
All grass	5347	39	2	2	130	83	92	51	2	1	6420
All crops & grass	10518	59	4	3	147	87	97	86	3	3	16832
All grass	5347	39	2	2	130	83	92	51	2	1	6420
All crops & grass	10518	59	4	3	147	87	97	86	3	3	16832

*Estimated area under crop

Table GB1.3 Use of compound fertiliser in Britain in 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	40	51	67	69	59	53	58	30	36	40	97
Winter wheat	2145	20	69	68	40	67	71	8	46	48	3838
Spring barley	530	87	91	93	69	51	58	59	46	54	908
Winter barley	784	27	81	81	47	65	76	13	53	61	1502
Oats	110	50	88	88	61	58	64	31	51	56	255
Rye	19	40	69	71	56	61	81	22	42	57	53
Early potatoes	22	95	91	96	191	201	271	181	184	259	66
Maincrop potatoes	94	90	95	91	166	196	260	150	187	237	238
Sugarbeet	183	33	72	73	80	75	153	27	54	112	465
Oilseed rape	468	40	76	74	44	64	69	18	49	51	835
Linseed	141	26	52	52	40	44	50	10	23	26	380
Forage maize	12	34	36	32	65	37	46	22	13	15	34
Turnips (stock)	44	81	84	86	71	103	87	58	86	74	127
Kale and cow cabbage	14	64	74	74	81	61	68	52	45	51	47
Other roots/green crops	45	65	76	77	88	81	103	57	62	79	147
Peas	131	6	54	54	28	59	70	2	32	38	307
Beans	148	10	45	44	41	62	61	4	28	27	335
Vegetables (brassicae)	47	87	85	83	118	80	158	102	68	132	155
Vegetables (other)	38	44	77	77	83	102	131	36	78	101	145
Small fruit	11	29	35	35	40	34	66	11	12	23	54
Top fruit	40	51	54	55	83	29	39	42	16	22	106
Other tillage	105	39	54	52	75	51	62	29	28	32	318
All tillage	5171	35	73	73	64	68	79	22	49	57	10412
Temporary grass	993	66	68	71	114	44	65	75	30	46	1730
Permanent grass	4353	54	56	55	93	32	41	51	18	22	4690
All grass	5347	56	58	58	98	34	46	55	20	27	6420
All crops & grass	10518	46	65	65	85	53	64	39	34	42	16832

*Estimated area under crop

Table GB3.1 Product type as percentage of all product used by crop group

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	column % all crops & grass
Calcium Ammonium Nitrate	2.7	1.9	.1	2.3	2.3	1.5	1.9	.4	.4	.5	1.5	.5	1.3
Urea	2.9	10.7	1.5	2.0	13.8	2.4	8.6	2.7	1.9	2.7	1.1	2.6	6.3
Ammonium Nitrate	17.2	47.4	3.2	18.0	44.7	18.5	37.8	31.8	28.5	27.2	25.8	29.2	34.4
Other Straight N	1.5	5.3	.4	2.1	4.6	1.7	4.1	3.1	.9	3.5	3.6	3.2	3.8
Triple Super Phosphate	.1	1.6	.0	.8	1.6	2.3	1.4	.7	.8	.4	1.0	.5	1.1
Single Super Phosphate	0.0	.0	0.0	0.0	0.0	.4	.0	.8	.1	.0	0.0	.4	.2
Other Straight P	.1	.0	0.0	.4	.3	.1	.1	.5	.2	.2	0.0	.3	.2
Muriate of Potash	.3	1.0	1.4	1.0	1.1	2.7	1.1	.5	.6	.6	0.0	.6	.9
Other Straight K	.0	.0	0.0	10.8	0.0	.8	.7	0.0	0.0	.0	0.0	.0	.4
NP	.1	.4	2.4	.1	.4	1.9	.6	3.3	2.0	1.9	1.2	2.5	1.3
NK	3.5	.8	1.0	1.9	1.0	1.4	1.2	1.4	2.0	10.2	2.4	5.8	3.0
PK	4.8	20.8	5.5	35.8	13.8	20.7	18.6	2.4	3.1	3.2	7.7	2.9	12.5
Very High N	.8	.7	.3	2.1	.6	4.9	1.1	24.8	16.1	21.2	35.6	22.6	9.5
High N	30.5	.9	.4	.4	1.2	7.6	3.8	20.6	32.1	16.8	12.7	19.4	9.9
High P	.4	.8	2.0	1.6	.7	2.9	1.0	.2	.2	.0	0.0	.1	.7
High K	8.3	1.3	54.0	9.6	1.3	13.1	6.7	.8	2.2	3.7	.5	2.3	5.0
Low N	3.3	5.1	13.3	.6	6.8	9.6	5.8	.5	.9	.5	4.4	.6	3.7
Low P	2.9	.3	2.8	4.2	.1	2.3	1.0	1.2	5.0	6.4	1.1	4.0	2.2
Equal NPK	20.6	.9	10.0	0.0	5.9	3.0	3.7	.7	1.8	.4	1.5	.6	2.5
Unknown	.1	.2	1.8	6.1	.1	2.1	.8	3.5	1.2	.5	0.0	1.8	1.2
Total prod ('000 tonnes)	283	2165	229	196	361	292	3526	973	148	1117	34	2272	5798

Source: 1992 British Survey of Fertiliser Practice

Table GB1.3 Use of compound fertiliser in Britain in 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	40	51	67	69	59	53	58	30	36	40	97
Winter wheat	2145	20	69	68	40	67	71	8	46	48	3838
Spring barley	530	87	91	93	69	51	58	59	46	54	908
Winter barley	784	27	81	81	47	65	76	13	53	61	1502
Oats	110	50	88	88	61	58	64	31	51	56	255
Rye	19	40	69	71	56	61	81	22	42	57	53
Early potatoes	22	95	91	96	191	201	271	181	184	259	66
Maincrop potatoes	94	90	95	91	166	196	260	150	187	237	238
Sugarbeet	183	33	72	73	80	75	153	27	54	112	465
Oilseed rape	468	40	76	74	44	64	69	18	49	51	835
Linseed	141	26	52	52	40	44	50	10	23	26	380
Forage maize	12	34	36	32	65	37	46	22	13	15	34
Turnips (stock)	44	81	84	86	71	103	87	58	86	74	127
Kale and cow cabbage	14	64	74	74	81	61	68	52	45	51	47
Other roots/green crops	45	65	76	77	88	81	103	57	62	79	147
Peas	131	6	54	54	28	59	70	2	32	38	307
Beans	148	10	45	44	41	62	61	4	28	27	335
Vegetables (brassicae)	47	87	85	83	118	80	158	102	68	132	155
Vegetables (other)	38	44	77	77	83	102	131	36	78	101	145
Small fruit	11	29	35	35	40	34	66	11	12	23	54
Top fruit	40	51	54	55	83	29	39	42	16	22	106
Other tillage	105	39	54	52	75	51	62	29	28	32	318
All tillage	5171	35	73	73	64	68	79	22	49	57	10412
Temporary grass	993	66	68	71	114	44	65	75	30	46	1730
Permanent grass	4353	54	56	55	93	32	41	51	18	22	4690
All grass	5347	56	58	58	98	34	46	55	20	27	6420
All crops & grass	10518	46	65	65	85	53	64	39	34	42	16832

*Estimated area under crop

Table GB3.1 Product type as percentage of all product used by crop group

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	column % all crops & grass
Calcium Ammonium Nitrate	2.7	1.9	.1	2.3	2.3	1.5	1.9	.4	.4	.5	1.5	.5	1.3
Urea	2.9	10.7	1.5	2.0	13.8	2.4	8.6	2.7	1.9	2.7	1.1	2.6	6.3
Ammonium Nitrate	17.2	47.4	3.2	18.0	44.7	18.5	37.8	31.8	28.5	27.2	25.8	29.2	34.4
Other Straight N	1.5	5.3	.4	2.1	4.6	1.7	4.1	3.1	.9	3.5	3.6	3.2	3.8
Triple Super Phosphate	.1	1.6	.0	.8	1.6	2.3	1.4	.7	.8	.4	1.0	.5	1.1
Single Super Phosphate	0.0	.0	0.0	0.0	0.0	.4	.0	.8	.1	.0	0.0	.4	.2
Other Straight P	.1	.0	0.0	.4	.3	.1	.1	.5	.2	.2	0.0	.3	.2
Muriate of Potash	.3	1.0	1.4	1.0	1.1	2.7	1.1	.5	.6	.6	0.0	.6	.9
Other Straight K	.0	.0	0.0	10.8	0.0	.8	.7	0.0	0.0	.0	0.0	.0	.4
NP	.1	.4	2.4	.1	.4	1.9	.6	3.3	2.0	1.9	1.2	2.5	1.3
NK	3.5	.8	1.0	1.9	1.0	1.4	1.2	1.4	2.0	10.2	2.4	5.8	3.0
PK	4.8	20.8	5.5	35.8	13.8	20.7	18.6	2.4	3.1	3.2	7.7	2.9	12.5
Very High N	.8	.7	.3	2.1	.6	4.9	1.1	24.8	16.1	21.2	35.6	22.6	9.5
High N	30.5	.9	.4	.4	1.2	7.6	3.8	20.6	32.1	16.8	12.7	19.4	9.9
High P	.4	.8	2.0	1.6	.7	2.9	1.0	.2	.2	.0	0.0	.1	.7
High K	8.3	1.3	54.0	9.6	1.3	13.1	6.7	.8	2.2	3.7	.5	2.3	5.0
Low N	3.3	5.1	13.3	.6	6.8	9.6	5.8	.5	.9	.5	4.4	.6	3.7
Low P	2.9	.3	2.8	4.2	.1	2.3	1.0	1.2	5.0	6.4	1.1	4.0	2.2
Equal NPK	20.6	.9	10.0	0.0	5.9	3.0	3.7	.7	1.8	.4	1.5	.6	2.5
Unknown	.1	.2	1.8	6.1	.1	2.1	.8	3.5	1.2	.5	0.0	1.8	1.2
Total prod ('000 tonnes)	283	2165	229	196	361	292	3526	973	148	1117	34	2272	5798

Source: 1992 British Survey of Fertiliser Practice

Table GB3.2 Use of product type by crop group

	row %												
	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	all crops & grass
Calcium Ammonium Nitrate	9.9	54.0	.3	5.8	10.5	5.5	86.0	5.3	.8	7.3	.7	14.0	77.4
Urea	2.2	63.7	.9	1.1	13.7	1.9	83.6	7.1	.8	8.4	.1	16.4	362.8
Ammonium Nitrate	2.4	51.4	.4	1.8	8.1	2.7	66.7	15.5	2.1	15.2	.4	33.2	1997.6
Other Straight N	2.0	52.6	.4	1.9	7.7	2.2	66.8	14.1	.6	18.0	.6	33.2	218.0
Triple Super Phosphate	.7	56.9	.1	2.4	9.3	10.8	80.1	10.8	1.9	6.7	.5	19.9	62.3
Single Super Phosphate	0.0	4.2	0.0	0.0	0.0	11.8	16.1	82.3	1.1	.6	0.0	83.9	9.7
Other Straight P	2.1	2.9	0.0	8.8	10.6	1.6	26.0	50.4	3.0	20.6	0.0	74.0	9.5
Muriate of Potash	1.7	41.9	6.2	3.8	7.2	14.9	75.7	9.8	1.7	12.8	0.0	24.3	52.9
Other Straight K	.1	3.3	0.0	84.6	0.0	9.9	97.9	0.0	0.0	2.1	0.0	2.1	25.0
NP	.2	9.8	7.1	.4	1.7	7.1	26.4	41.4	3.9	27.8	.5	73.6	78.0
NK	5.7	10.3	1.3	2.2	2.0	2.4	23.9	7.9	1.7	66.0	.5	76.1	173.2
PK	1.9	62.3	1.7	9.7	6.9	8.4	90.8	3.2	.6	4.9	.4	9.2	722.6
Very High N	.4	2.6	.1	.8	.4	2.6	6.8	43.7	4.3	42.9	2.2	93.2	552.6
High N	15.1	3.2	.1	.2	.7	3.9	23.2	35.0	8.3	32.7	.8	76.8	574.8
High P	2.6	43.1	11.5	8.2	6.5	21.6	93.5	4.2	.9	1.4	0.0	6.5	39.1
High K	8.1	9.4	42.9	6.5	1.7	13.3	81.8	2.7	1.1	14.3	.1	18.2	288.7
Low N	4.3	50.9	14.0	.5	11.3	12.9	93.9	2.4	.6	2.4	.7	6.1	217.3
Low P	6.4	4.6	5.1	6.4	.2	5.4	28.2	9.0	5.8	56.7	.3	71.8	126.9
Equal NPK	40.4	13.1	15.8	0.0	14.6	6.1	90.1	4.9	1.8	2.9	.4	9.9	144.7
Unknown	.4	7.2	5.8	17.2	.3	9.0	40.1	49.1	2.6	8.3	0.0	59.9	69.3
Total product	4.88	37.34	3.95	3.38	6.23	5.04	60.81	16.78	2.55	19.27	0.55	39.19	5902.4

EW1.1 Total fertiliser use in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	37	100	65	67	20	150	52	56	150	33	37	90
Winter wheat	1929	99	73	69	11	187	68	72	184	50	50	3594
Spring barley	196	98	79	86	25	90	44	50	88	35	43	442
Winter barley	686	99	83	83	11	140	64	75	139	54	62	1395
Oats	74	96	85	85	16	103	58	63	99	50	54	207
Rye	15	97	61	64	30	117	55	72	113	33	46	47
Early potatoes	19	99	93	99	69	213	204	277	211	190	273	60
Maincrop potatoes	65	94	94	95	40	193	201	279	181	188	264	186
Sugar beet	183	94	76	89	33	122	77	152	115	59	136	465
Oilseed rape	378	99	79	73	9	199	68	73	198	53	53	742
Linseed	138	81	56	58	12	66	48	57	53	27	33	371
Forage maize	12	62	36	33	83	79	37	47	48	13	16	34
Turnips (stock)	13	67	50	55	35	67	50	47	45	25	26	41
Kale and cow cabbage	8	81	56	61	64	109	51	61	88	29	38	33
Other roots/green crops	28	86	79	77	53	104	76	118	90	60	91	105
Peas	115	8	58	64	10	32	62	81	2	35	52	285
Beans	143	11	58	49	8	49	71	66	6	41	32	331
Vegetables (brassicae)	25	94	82	84	25	190	76	175	179	62	147	114
Vegetables (other)	32	69	72	80	14	131	90	127	90	65	102	126
Small fruit	9	50	31	53	19	79	42	88	39	13	46	51
Top fruit	33	67	52	54	36	82	27	40	56	14	22	95
Other tillage	89	64	55	54	40	111	51	67	71	28	36	293
All tillage	4224	91	74	72	15	162	69	82	147	51	59	9107
Temporary grass	687	92	67	70	46	189	44	71	174	29	49	1374
Permanent grass	3404	71	53	52	39	127	32	42	90	17	22	3953
All grass	4091	75	55	55	40	139	34	48	104	19	26	5327
All crops & grass	8315	83	65	64	27	152	54	67	126	35	43	14434

*Estimated area under crop

EW1.2 Use of 'straight' fertiliser in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	37	89	0	0	135	30	75	120	0	0	90
Winter wheat	1929	98	8	6	182	87	90	178	7	5	3594
Spring barley	196	50	1	3	87	92	104	44	1	3	442
Winter barley	686	95	5	4	135	91	95	128	5	4	1395
Oats	74	83	2	2	97	80	70	81	2	2	207
Rye	15	89	2	5	113	60	75	101	1	4	47
Early potatoes	19	25	3	6	102	60	224	26	2	13	60
Maincrop potatoes	65	27	0	5	114	8	255	31	0	12	186
Sugar beet	183	82	4	24	107	110	99	88	4	24	465
Oilseed rape	378	98	8	6	189	91	97	185	7	6	742
Linseed	138	67	5	7	64	85	107	43	4	8	371
Forage maize	12	28	0	1	96	.	75	26	0	1	34
Turnips (stock)	13	27	2	0	80	120	.	22	3	0	41
Kale and cow cabbage	8	47	3	9	106	120	92	50	3	9	33
Other roots/green crops	28	35	4	4	113	86	116	39	3	5	105
Peas	115	1	5	14	54	64	99	1	3	14	285
Beans	143	2	13	6	80	100	93	1	13	5	331
Vegetables (brassicae)	25	72	0	1	140	75	162	101	0	1	114
Vegetables (other)	32	51	0	8	117	.	151	60	0	12	126
Small fruit	9	42	2	24	70	60	92	29	1	22	51
Top fruit	33	42	5	7	71	48	62	29	2	4	95
Other tillage	89	38	1	5	124	102	109	47	1	5	293
All tillage	4224	82	6	6	160	89	97	132	6	6	9107
Temporary grass	687	69	3	4	149	82	95	103	2	3	1374
Permanent grass	3404	36	2	1	127	75	91	45	1	1	3953
All grass	4091	41	2	2	133	77	92	55	1	2	5327
All crops & grass	8315	62	4	4	151	86	96	94	4	4	14434

*Estimated area under crop

EW1.3 Use of compound fertiliser in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	37	47	64	67	63	52	56	30	33	37	90
Winter wheat	1929	15	66	64	42	65	69	6	43	44	3594
Spring barley	196	71	78	84	63	43	49	45	34	41	442
Winter barley	686	21	79	79	53	62	74	11	49	58	1395
Oats	74	33	83	83	54	58	62	18	48	52	207
Rye	15	25	60	62	49	54	68	12	32	42	47
Early potatoes	19	94	90	95	196	209	275	185	188	261	60
Maincrop potatoes	65	87	94	92	172	201	273	150	188	252	186
Sugar beet	183	33	72	73	80	75	153	27	54	112	465
Oilseed rape	378	32	71	68	40	65	69	13	46	47	742
Linseed	138	25	51	51	40	45	50	10	23	26	371
Forage maize	12	34	36	32	65	37	46	22	13	15	34
Turnips (stock)	13	41	49	55	55	45	47	23	22	26	41
Kale and cow cabbage	8	53	53	52	71	47	56	38	25	29	33
Other roots/green crops	28	59	75	75	86	76	114	51	57	86	105
Peas	115	6	53	53	28	61	73	2	32	38	285
Beans	143	10	45	43	41	62	61	4	28	27	331
Vegetables (brassicae)	25	79	81	83	99	76	174	78	62	145	114
Vegetables (other)	32	36	72	72	84	90	124	31	65	90	126
Small fruit	9	21	29	29	49	41	85	10	12	25	51
Top fruit	33	44	48	50	59	24	35	26	12	17	95
Other tillage	89	37	53	51	66	49	62	24	26	32	293
All tillage	4224	25	68	67	62	66	79	15	45	53	9107
Temporary grass	687	63	64	68	113	42	68	71	27	46	1374
Permanent grass	3404	50	52	51	89	30	40	45	16	21	3953
All grass	4091	52	54	54	93	33	46	49	17	25	5327
All crops & grass	8315	38	61	61	83	52	64	32	31	39	14434

*Estimated area under crop

Table EW1.4 Use of lime in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)					All	Average field rate of CaO equivalent (tonne/ha)					All	Fields in sample
		ground limestone	ground chalk	magnesian limestone	sugar beet waste	other		ground limestone	ground chalk	magnesian limestone	sugar beet waste	other		
Spring wheat	36	1.0	.	.	1.4	1.3	3.6	2.5	.	.	4.3	1.2	2.7	90
Winter wheat	1929	5.1	.8	.6	.4	.2	7.0	2.7	2.2	2.3	3.7	2.5	2.6	3594
Spring barley	193	6.6	.	3.4	.	1.9	12.0	2.4	.	2.8	.	1.2	2.4	442
Winter barley	680	7.8	1.8	1.9	.1	.	11.5	2.4	2.2	2.3	1.4	.	2.3	1395
Oats	73	.7	1.3	.	.	.9	2.9	2.5	2.7	.	.	2.5	2.6	207
Rye	14	1.6	.	4.5	.	.	6.1	2.5	.	2.5	.	.	2.5	47
Early potatoes	18	2.2	.	.	.	.	2.2	2.6	.	.	.	.	2.6	60
Main crop potatoes	64	.6	.4	.	.	.	1.0	2.5	2.5	.	.	.	2.5	186
Sugar beet	183	8.2	1.4	6.9	3.0	.1	19.5	2.4	1.7	2.3	4.2	2.5	2.6	465
Oilseed rape	377	8.1	1.9	1.0	.	.1	11.1	2.4	2.7	2.7	.	2.5	2.5	742
Linseed	137	2.9	1.5	.9	.2	.3	5.9	2.8	2.0	2.1	6.2	2.5	2.6	371
Forage maize	12	19.0	1.1	.	.	.	20.2	2.5	3.8	.	.	.	2.6	34
Turnips (stock)	13	4.9	.	3.9	.	.	8.9	3.8	.	2.7	.	.	3.3	41
Kale and cow cabbage	7	11.2	.	1.6	.	.	12.9	2.6	.	4.1	.	.	2.8	33
Other roots/green crops	27	7.7	.	3.5	.	.8	12.0	2.5	.	3.2	.	2.5	2.7	105
Peas	115	.8	4.7	1.6	.	.	7.1	2.4	2.9	1.4	.	.	2.5	285
Beans	143	10.0	.7	.	.	.	10.6	2.2	2.0	.	.	.	2.2	331
Vegetables (brassicae)	25	16.6	.	3.0	.	.	19.6	3.0	.	2.7	.	.	2.9	114
Vegetables (other)	27	5.5	8.5	1.2	.	.	15.2	2.6	3.3	3.6	.	.	3.1	126
Small fruit	8	.	.	.	.	.	.	.	.	.	.	.	.	51
Top fruit	32	2.4	.3	.	.	.	2.7	2.5	1.9	.	.	.	2.4	95
Other tillage	75	7.0	1.3	1.7	.	1.8	11.8	2.6	2.1	2.7	.	2.5	2.5	293
All tillage	4200	5.9	1.2	1.3	.3	.2	9.0	2.5	2.4	2.4	3.9	2.0	2.5	9107
Temporary grass	687	4.0	1.5	1.3	.2	1.0	8.0	2.2	2.5	2.6	4.5	1.6	2.3	1374
Permanent grass	3345	3.1	.3	1.3	.	.5	5.1	2.3	2.4	2.2	.	3.7	2.4	3953
All grass	4033	3.3	.5	1.3	.0	.6	5.6	2.3	2.5	2.3	4.5	3.1	2.4	5327
All crops & grass	8233	4.6	.9	1.3	.2	.4	7.4	2.5	2.4	2.3	3.9	2.7	2.5	14434

*Estimated area under crop

Table EW1.5 Percentage of crop area by field application rate - N (England and Wales 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Spring wheat	.	.	2	6	21	21	36	12	2	.	.	90	
Winter wheat	1	.	1	2	3	10	43	34	3	1	1	3594	
Spring barley	2	2	8	23	29	17	13	5	1	.	.	442	
Winter barley	1	.	2	3	8	18	25	38	4	.	1	1395	
Oats	4	1	9	7	29	21	14	13	1	.	.	207	
Rye	3	.	9	7	15	17	38	4	6	1	.	47	
Early potatoes	1	.	.	4	1	7	25	46	10	.	5	60	
Maincrop potatoes	6	.	1	1	4	12	36	29	7	2	1	186	
Sugar beet	6	.	5	7	12	13	38	15	1	.	2	465	
Oilseed rape	1	.	2	2	3	6	32	42	9	1	1	742	
Linseed	19	2	17	31	27	3	1	.	.	.	.	371	
Forage maize	38	4	16	8	20	9	.	5	.	.	.	34	
Turnips (stock)	33	1	23	25	9	7	.	.	2	.	.	41	
Kale and cow cabbage	19	.	18	20	7	20	14	1	.	.	.	33	
Other roots/green crops	14	2	7	22	11	12	12	14	4	1	.	105	
Peas	92	5	2	1	1	.	.	.	.	.	.	285	
Beans	89	7	1	1	1	1	1	.	.	.	.	331	
Vegetables (brassicae)	6	1	9	5	9	13	22	12	10	4	8	114	
Vegetables (other)	25	.	3	11	17	9	11	12	6	4	1	126	
Small fruit	50	4	16	6	11	5	3	2	2	.	.	51	
Top fruit	33	2	13	27	9	4	4	3	2	.	2	95	
Other tillage	25	.	9	17	11	6	15	9	6	1	.	293	
All tillage	9	1	2	4	6	7	13	31	22	3	1	9107	
Temporary grass	8	1	4	8	9	8	9	15	13	11	12	3	1374
Permanent grass	29	1	12	16	9	6	6	8	5	4	4	1	3953
All grass	25	1	11	14	9	6	7	9	7	5	5	2	5327
All crops & grass	17	1	7	9	7	7	10	20	14	4	3	1	14434

Source: 1992 British Survey of Fertiliser Practice

Table EW1.6 Percentage of crop area by field application rate - P₂O₅ (England and Wales 1992)

kg/ha												Fields in sample	row %	
	0	25	50	75	100	125	150	200	250	300	400+			
Spring wheat	35	14	9	30	11	90	3594
Winter wheat	27	2	11	33	21	4	.	1	.	.	.	.	442
Spring barley	21	10	43	19	6	1	.	.	.	.	.	.	1395
Winter barley	17	3	16	36	26	2	1	.	.	.	.	.	207
Oats	15	7	19	40	14	5	1	.	.	.	.	.	47
Rye	39	6	20	23	12	.	.	.	.	.	.	.	60
Early potatoes	7	.	.	11	2	2	3	32	26	6	2	8	186	
Maincrop potatoes	6	3	1	3	3	1	8	34	19	11	10	1	465	
Sugar beet	24	3	18	30	9	6	3	4	1	2	.	.	742	
Oilseed rape	21	1	12	36	24	4	.	1	.	.	.	.	371
Linseed	44	6	26	17	5	1	.	.	.	.	.	.	34
Forage maize	64	13	9	11	2	.	.	.	.	.	.	.	41
Turnips (stock)	50	8	27	5	6	1	3	1	.	.	.	.	33
Kale and cow cabbage	44	1	33	12	2	6	2	.	.	.	.	.	105
Other roots/green crops	21	7	23	20	12	9	3	.	.	1	4	.	285	
Peas	42	2	5	38	9	2	1	.	.	.	.	.	331
Beans	42	2	13	27	8	2	1	3	.	1	.	.	114	
Vegetables (brassicae)	18	1	17	38	5	8	4	6	.	.	2	.	126	
Vegetables (other)	31	2	9	10	26	9	2	9	2	2	.	.	51	
Small fruit	69	7	14	6	4	.	.	.	.	.	.	.	95
Top fruit	48	19	26	7	.	.	.	.	.	.	.	.	293
Other tillage	36	14	18	19	7	4	.	2	.	.	.	.	9107
All tillage	26	3	15	31	18	3	1	2	1	.	.	.	1374	
Temporary grass	33	14	28	17	5	2	.	.	.	.	.	.	3953
Permanent grass	47	22	21	7	3	.	.	.	.	.	.	.	5327
All grass	45	21	22	8	3	1	.	.	.	.	.	.	14434
All crops & grass	35	12	18	20	11	2	.	1	.	.	.	.

Source: 1992 British Survey of Fertiliser Practice

Table EW1.7 Percentage of crop area by field application rate - K₂O (England and Wales 1992)

kg/ha	row %											Fields in sample	
	0	25	50	75	100	125	150	200	250	300	400+		
Spring wheat	33	8	12	29	17	1	.	.	.	.	.	.	90
Winter wheat	31	2	12	23	22	6	1	2	.	.	.	.	3594
Spring barley	14	6	45	21	11	3	.	.	.	.	.	.	442
Winter barley	17	2	11	27	30	11	2	1	.	.	.	.	1395
Oats	15	4	16	37	17	10	1	.	.	.	.	.	207
Rye	36	.	11	23	22	7	.	.	.	.	.	.	47
Early potatoes	1	.	.	.	2	1	12	23	22	30	8	60	
Maincrop potatoes	5	.	3	.	2	1	4	15	29	36	5	186	
Sugar beet	11	2	4	6	12	15	9	21	13	2	3	2	465
Oilseed rape	27	1	10	30	21	6	2	1	1	.	.	.	742
Linseed	42	6	20	18	9	1	3	1	.	.	.	.	371
Forage maize	67	9	8	13	1	2	.	.	.	.	.	.	34
Turnips (stock)	45	4	37	6	7	.	.	1	.	.	.	.	41
Kale and cow cabbage	39	1	27	12	15	3	4	.	.	.	.	.	33
Other roots/green crops	23	4	20	7	14	11	8	4	.	2	2	4	105
Peas	36	2	3	21	26	6	2	5	.	.	.	.	285
Beans	51	.	12	20	13	2	.	2	.	.	.	.	331
Vegetables (brassicae)	16	2	.	9	4	.	4	39	10	6	10	.	114
Vegetables (other)	22	4	2	7	16	5	12	16	12	3	.	.	126
Small fruit	47	.	8	5	23	10	.	5	.	1	.	.	51
Top fruit	46	11	26	11	2	4	1	.	.	.	.	.	95
Other tillage	37	11	14	16	11	3	.	5	2	.	.	.	293
All tillage	27	2	13	22	21	7	2	3	1	1	1	.	9107
Temporary grass	30	7	21	16	10	7	3	5	1	1	.	.	1374
Permanent grass	48	19	18	6	5	2	1	1	.	.	.	.	3953
All grass	45	17	19	7	5	3	1	2	.	.	.	.	5327
All crops & grass	36	10	16	15	13	5	1	2	1	1	.	.	14434

Table EW2.1 Average fertiliser practice by grassland utilisation in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Grazed - not mown	2229	67	48	45	27	114	28	29	78	13	13	2567
Grazed - mown	1516	86	66	69	61	162	39	61	139	26	42	2232
All grazings	3745	75	55	55	41	136	33	45	103	18	25	4799
Cut for seed grazed	3	100	51	60	0	106	57	77	106	29	47	11
Cut for seed not grazed	6	100	82	82	0	153	55	63	153	46	52	21
All cut for seed	10	100	71	75	0	136	56	67	136	40	50	32
Cut for silage grazed	1044	92	73	77	66	182	41	67	168	30	52	1497
Cut for silage not grz.	101	98	72	81	38	220	43	90	216	31	73	222
All cut for silage	1146	92	73	77	64	186	41	69	172	30	54	1719
Cut for hay grazed	458	72	52	52	48	104	30	38	75	16	20	720
Cut for hay not grz	46	69	47	51	18	115	39	50	79	18	26	97
All cut for hay	504	71	51	52	45	105	31	39	75	16	20	817
All mowings	1661	86	66	69	58	165	39	62	142	26	43	2569
All grass	4027	75	56	56	40	139	34	47	105	19	26	5325

*Estimated area under crop

Table EW2.2 Percentage of grass area by field application rate - N (England and Wales 1992)

kg/ha	0	< 25	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Grazed - not mown	34	1	14	17	8	5	5	6	3	3	3	2	2567	
Grazed - mown	14	1	7	10	11	8	8	13	11	9	8	1	2232	
All grazings	26	1	11	14	9	6	6	9	6	5	5	2	4799	
Cut for seed grazed	.	.	.	11	30	30	17	13	.	.	.	.	11	
Cut for seed not grazed	.	.	.	.	14	.	39	31	15	.	.	.	21	
All cut for seed	.	.	.	4	20	11	31	25	10	.	.	.	32	
Cut for silage grazed	8	.	4	8	9	9	9	16	13	12	11	2	1497	
Cut for silage not grz.	2	.	.	14	3	1	9	14	17	13	24	3	222	
All cut for silage	7	.	3	8	8	9	9	15	14	12	12	2	1719	
Cut for hay grazed	29	1	14	14	14	6	6	7	5	3	1	.	720	
Cut for hay not grz.	31	3	5	15	10	8	8	11	5	.	3	.	97	
All cut for hay	29	1	13	14	14	6	6	8	5	2	1	.	817	
All mowings	14	1	6	10	10	8	8	13	11	9	8	1	2569	
All grass	25	1	11	14	9	6	7	9	7	5	5	2	5325	

Table EW2.3 Percentage of grass area by field application rate - P₂O₅ (England and Wales 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Grazed - not mown	53	23	18	4	1	.	.	.	.	.	.	.	2567
Grazed - mown	34	20	27	13	5	1	.	.	.	.	.	.	2232
All grazings	45	22	22	8	3	1	.	.	.	.	.	.	4799
Cut for seed grazed	48	.	8	43	.	.	.	.	.	.	.	.	11
Cut for seed not grazed	17	.	24	59	.	.	.	.	.	.	.	.	21
All cut for seed	28	.	18	53	.	.	.	.	.	.	.	.	32
Cut for silage grazed	26	20	30	16	6	2	.	.	.	.	.	.	1497
Cut for silage not grz.	27	16	23	24	8	1	1	1	.	.	.	.	222
All cut for silage	27	19	29	17	6	1	.	.	.	.	.	.	1719
Cut for hay grazed	49	21	23	5	2	.	.	.	.	.	.	.	720
Cut for hay not grz.	53	8	24	14	1	.	.	.	.	1	.	.	97
All cut for hay	49	20	23	6	2	.	.	.	.	.	.	.	817
All mowings	33	19	27	14	5	1	.	.	.	.	.	.	2569
All grass	45	21	22	8	3	1	.	.	.	.	.	.	5325

Table EW2.4 Percentage of grass area by field application rate - K₂O (England and Wales 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Grazed - not mown	53	23	18	4	1	.	.	.	.	.	.	.	2567
Grazed - mown	34	20	27	13	5	1	.	.	.	.	.	.	2232
All grazings	45	22	22	8	3	1	.	.	.	.	.	.	4799
Cut for seed grazed	48	.	8	43	.	.	.	.	.	.	.	.	11
Cut for seed not grazed	17	.	24	59	.	.	.	.	.	.	.	.	21
All cut for seed	28	.	18	53	.	.	.	.	.	.	.	.	32
Cut for silage grazed	26	20	30	16	6	2	.	.	.	.	.	.	1497
Cut for silage not grz.	27	16	23	24	8	1	1	1	.	.	.	.	222
All cut for silage	27	19	29	17	6	1	.	.	.	.	.	.	1719
Cut for hay grazed	49	21	23	5	2	.	.	.	.	.	.	.	720
Cut for hay not grz.	53	8	24	14	1	.	.	.	.	1	.	.	97
All cut for hay	49	20	23	6	2	.	.	.	.	.	.	.	817
All mowings	33	19	27	14	5	1	.	.	.	.	.	.	2569
All grass	45	21	22	8	3	1	.	.	.	.	.	.	5325

Table EW2.5 Average fertiliser practice on grass in England and Wales 1992

Years in continuous grass	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
1	133	92	70	75	24	193	47	75	178	33	56	349
2	184	90	65	68	40	196	45	72	178	30	49	387
3	192	95	72	75	48	175	39	61	166	28	46	316
4	168	84	53	56	50	166	44	61	140	24	34	264
5	144	90	79	80	55	168	40	66	153	32	53	197
6	88	90	81	80	49	183	46	69	165	37	55	127
7	60	99	75	79	58	147	33	55	145	25	44	84
8	46	83	51	52	36	157	28	34	131	14	18	60
9 or more	2949	70	51	50	39	122	30	39	86	15	20	3461

Source: 1992 British Survey of Fertiliser Practice

Table EW2.6 Percentage of grass area by field application rate - N

kg/ha	Application Rate (kg/ha)											400+	Fields in sample	row %	
	0	25	50	75	100	125	150	200	250	300					
Years in continuous grass															
1	8	1	5	11	10	7	6	12	17	8		12	5	349	
2	9	1	4	7	11	6	6	16	13	13		11	4	387	
3	5	.	6	12	6	10	9	15	17	7		12	2	316	
4	15	.	4	16	8	4	12	9	11	12		7	1	264	
5	9	2	3	14	9	9	9	14	9	11		8	3	197	
6	10	1	3	6	7	7	8	25	15	6		13	.	127	
7	1	.	5	15	17	14	9	16	8	10		3	3	84	
8	17	.	5	15	10	9	2	16	9	5		12	.	60	
9 or more	29	1	13	16	8	6	6	7	5	4		3	1	3461	
Not stated	34	.	4	6	14	8	15	5	3	8		3	.	80	

Source: 1992 British Survey of Fertiliser Practice

Table EW3.1 Product type as percentage of all product used by crop group

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	column % all crops & grass
Calcium Ammonium Nitrate	.9	1.0	.0	1.6	.7	1.0	1.0	.3	.3	.3	1.7	.4	.7
Ammonium Nitrate + Urea	.	.	.	.	.	.	.	.	.	.	.	.	.
Urea	2.9	8.7	1.4	1.3	13.5	1.8	7.3	3.2	1.9	2.1	.7	2.5	5.5
Ammonium Nitrate	25.0	48.3	3.1	15.7	46.5	20.9	39.5	36.7	32.2	29.9	23.5	32.7	36.9
Other Straight N	2.3	3.3	.5	1.8	3.1	1.2	2.7	1.3	.8	.8	1.5	1.0	2.1
Triple Super Phosphate	.4	1.9	.0	.8	2.1	2.7	1.7	.7	.8	.5	1.1	.6	1.3
Single Super Phosphate	.	.0	.	.	.	.	.0	.1	.1	.0	.	.0	.0
Other Straight P	.1	.0	.	.5	.	.0	.1	.4	.3	.1	.	.2	.1
Muriate of Potash	.8	1.2	1.2	1.0	1.4	3.6	1.4	.6	.8	.7	.	.6	1.1
Other Straight K	.0	.0	.	10.9	.	1.1	.9	.	.	.1	.	.0	.6
N P	.2	.5	2.2	.2	.5	.5	.6	3.9	2.7	2.2	1.3	2.9	1.5
N K	5.0	.7	1.2	2.1	.5	1.0	1.0	2.0	2.7	13.1	2.7	7.8	3.6
P K	9.9	25.4	6.9	38.1	17.2	28.2	23.8	2.7	3.4	3.5	5.4	3.2	15.9
Very High N	2.1	.8	.3	2.3	.7	2.8	1.1	23.6	13.4	19.6	40.4	21.2	8.8
High N	30.1	1.1	.4	.5	.7	8.0	2.6	19.8	33.9	15.3	13.3	18.3	8.6
High P	.8	1.0	.6	1.7	1.0	.7	1.0	.3	.3	.0	.	.1	.7
High K	5.8	1.4	52.9	10.2	1.0	12.0	6.7	.8	1.2	4.3	.5	2.6	5.1
Low N	3.0	3.4	14.2	.6	6.8	5.0	4.4	.5	.9	.7	4.9	.7	3.0
Low P	2.8	.2	3.3	4.4	.1	2.8	1.0	.7	2.2	5.7	1.2	3.4	1.9
Equal NPK	7.6	.7	9.6	.	4.1	3.5	2.1	.6	.5	.4	1.7	.5	1.5
Unknown	.3	.3	2.2	6.5	.1	3.1	1.1	1.8	1.7	.7	.	1.2	1.1
Total prod (000 tonnes)	97	1612	182	184	253	196	2525	627	106	799	30	1562	4087

Table EW3.2 Use of product type by crop group

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	row % all crops & grass
Calcium Ammonium Nitrate	4.0	51.3	.5	9.9	3.8	9.3	78.8	7.9	.8	11.3	1.1	21.2	100.0
Urea	1.5	66.5	1.1	1.2	13.9	1.7	85.9	6.7	.7	6.5	.1	14.1	100.0
Ammonium Nitrate	1.7	53.0	.4	2.0	7.9	2.6	67.7	14.8	2.1	15.0	.5	32.3	100.0
Other Straight N	2.0	55.3	.4	2.1	5.6	2.1	67.6	12.2	.7	19.0	.6	32.4	100.0
Triple Super Phosphate	.7	59.1	.1	2.5	9.7	11.1	83.1	7.9	1.5	6.9	.6	16.9	100.0
Single Super Phosphate	0.0	41.2	0.0	0.0	0.0	0.0	41.2	42.5	10.6	5.7	0.0	58.8	100.0
Other Straight P	1.5	5.5	0.0	16.5	0.0	1.8	25.2	48.2	5.6	21.1	0.0	74.8	100.0
Muriate of Potash	1.8	44.4	4.7	4.1	7.7	15.0	77.7	9.0	1.8	11.5	0.0	22.3	100.0
Other Straight K	.1	3.3	0.0	85.7	0.0	8.7	97.9	0.0	0.0	2.1	0.0	2.1	100.0
NP	.3	12.8	6.8	.5	2.2	1.7	24.3	41.0	4.8	29.3	.7	75.7	100.0
NK	3.3	7.5	1.5	2.6	.9	1.3	17.0	8.7	2.0	71.8	.6	83.0	100.0
PK	1.5	62.9	1.9	10.8	6.7	8.5	92.3	2.6	.6	4.3	.2	7.7	100.0
Very High N	.6	3.5	.2	1.2	.5	1.5	7.4	41.4	4.0	43.9	3.4	92.6	100.0
High N	8.3	5.0	.2	.2	.5	4.5	18.7	35.2	10.2	34.7	1.1	81.2	100.0
High P	2.9	60.2	4.0	11.5	9.1	4.6	92.3	5.9	1.2	.6	0.0	7.7	100.0
High K	2.7	10.7	45.9	9.0	1.2	11.2	80.6	2.4	.6	16.3	.1	19.4	100.0
Low N	2.3	44.7	21.1	.9	14.1	8.0	91.1	2.6	.8	4.3	1.2	8.9	100.0
Low P	3.4	4.8	7.5	10.3	.3	6.9	33.2	5.6	2.9	57.8	.5	66.8	100.0
Equal NPK	12.0	18.7	28.3	0.0	17.0	11.1	87.1	6.2	.8	5.1	.8	12.9	100.0
Unknown	.6	10.7	8.6	25.5	.4	13.1	59.1	24.8	3.8	12.3	0.0	40.9	100.0
Total product (100%=4,541,000 tonnes)	2.33	41.58	4.07	4.32	6.30	4.58	63.20	14.80	2.40	18.87	0.70	36.80	100.0

Table EW3.3 Product use in England and Wales by month of application

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	row % Total Product 000 tonnes
Calcium Ammonium Nitrate	1	8	31	32	16	4	6	0	1	2	0	0	45
Urea	1	14	33	39	7	3	1	0	1	0	0	0	314
Ammonium Nitrate	1	9	27	39	13	5	4	2	1	0	0	0	1731
Other Straight N	8	8	34	34	12	2	2	1	0	0	0	0	197
Triple Super Phosphate	6	10	12	7	4	1	0	5	26	18	6	3	59
Single Super Phosphate	0	0	6	53	0	0	0	0	41	0	0	0	0
Other Straight P	20	0	0	0	13	8	1	0	5	1	36	16	5
Muriate of Potash	7	12	24	6	5	3	4	4	12	7	10	6	49
Other Straight K	6	19	5	6	0	2	0	0	7	22	14	18	24
NP	1	15	51	19	6	1	0	7	0	0	0	0	59
NK	0	5	8	6	29	37	11	3	1	0	0	0	145
PK	3	6	6	3	1	1	0	4	31	33	9	4	650
Very High N	0	3	22	31	15	12	9	6	1	0	0	0	359
High N	0	5	25	43	15	6	4	1	1	1	0	0	352
High P	3	26	22	9	4	0	0	0	13	14	2	3	27
High K	2	16	45	22	5	1	1	0	4	2	0	0	210
Low N	1	8	25	10	3	0	1	6	25	15	3	1	122
Low P	0	4	32	17	17	17	7	5	0	0	0	0	79
Equal NPK	1	27	26	15	7	2	0	5	8	9	0	0	61
Unknown	8	19	19	15	10	1	2	0	9	10	4	3	46
All fertilisers	2	9	24	28	11	5	3	3	7	6	2	1	4545

Table EW4.1 Average fertiliser practice on tillage and grassland by MAFF Region 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Wessex												
All tillage	265	93	74	75	21	159	61	73	147	45	54	611
All grass	442	61	38	40	27	160	37	52	97	14	21	668
All crops & grass	707	73	52	53	25	159	50	63	116	26	33	1279
Anglia												
All tillage	1640	91	68	64	13	161	66	77	147	44	49	3500
All grass	532	62	37	39	24	163	38	53	100	14	21	887
All crops & grass	2172	84	60	58	16	161	61	73	135	37	42	4387
Northern												
All tillage	3155	91	68	64	13	161	66	77	146	45	49	6770
All grass	999	69	50	52	36	137	34	45	94	17	23	1420
All crops & grass	4155	86	64	61	19	156	60	71	134	38	43	8190
North East												
All tillage	5059	91	69	65	14	161	67	80	147	46	52	10792
All grass	1346	70	52	54	38	145	36	48	102	19	26	1759
All crops & grass	6404	87	65	63	19	159	62	74	137	40	47	12551
North Mercia												
All tillage	7149	91	70	67	14	161	68	81	147	47	54	15248
All grass	1731	73	52	55	43	153	35	51	112	18	28	2225
All crops & grass	8880	88	66	64	20	160	63	76	140	41	49	17473
South Mercia												
All tillage	9503	91	70	68	14	161	68	82	147	48	56	20360
All grass	2006	74	52	54	41	148	34	49	109	18	26	2603
All crops & grass	11508	88	67	65	19	159	63	77	141	42	51	22963
East Midlands												
All tillage	12657	91	71	68	14	162	68	82	148	48	56	27145
All grass	2290	74	51	53	41	148	34	49	109	17	26	3014
All crops & grass	14947	88	68	66	18	160	64	78	142	44	52	30159
South East												
All tillage	16429	91	71	69	14	162	68	82	148	49	57	35225
All grass	2681	73	50	51	39	146	35	49	107	17	25	3566
All crops & grass	19110	89	68	66	18	160	65	79	142	44	52	38791
South West												
All tillage	20342	91	72	70	14	162	68	82	148	49	57	43647
All grass	3154	75	53	53	40	147	35	50	110	19	27	4263
All crops & grass	23495	89	69	67	18	161	65	78	143	45	53	47910
Wales												
All tillage	24566	91	72	70	14	162	68	82	148	49	57	52754
All grass	4091	75	55	55	40	139	34	48	104	19	26	5327
All crops & grass	28657	89	70	68	18	160	64	78	141	45	53	58081

*Estimated area under crop

Table EW5.1 Average fertiliser practice on dairy farms in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	4											9
Winter wheat	152	100	84	78	21	174	63	73	174	53	57	310
Spring barley	38	99	89	89	42	83	42	50	82	38	45	91
Winter barley	101	100	87	86	30	129	62	75	128	54	65	207
Oats	8	79	77	76	32	108	58	68	85	44	51	21
Rye	4	87	34	34	66	92	72	92	80	25	31	12
Early potatoes	1											5
Maincrop potatoes	4	92	92	92	90	167	114	240	154	105	221	10
Sugar beet	3											9
Oilseed rape	19	100	85	79	23	199	66	77	199	56	61	44
Linseed	7	31	69	61	47	56	63	64	17	43	39	22
Forage maize	8	54	38	40	96	70	34	44	38	13	18	20
Turnips (stock)	3	100	66	91	58	79	35	39	79	23	36	10
Kale and cow cabbage	3	94	51	51	73	118	66	78	111	34	40	15
Other roots/green crops	6	100	80	80	87	128	77	121	128	61	96	22
Peas	7	10	67	80	40	48	67	89	5	45	70	23
Beans	4	33	73	56	46	27	59	63	9	43	35	17
Vegetables (brassicae)	1											3
Vegetables (other)	0											1
Small fruit	0											1
Top fruit	4											5
Other tillage	27	77	72	67	66	83	39	42	64	28	28	59
All tillage	403	93	82	79	35	141	59	72	131	48	57	916
Temporary grass	291	99	76	80	63	237	45	80	235	34	65	530
Permanent grass	1052	88	62	64	59	181	37	54	159	23	35	1292
All grass	1344	90	65	67	60	194	39	61	175	25	41	1822
All crops & grass	1746	91	69	70	54	182	44	64	165	30	45	2738

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table EW5.2 Average fertiliser practice on cattle & sheep farms in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	4											
Winter wheat	148	98	85	78	23	172	65	72	169	55	56	9
Spring barley	28	95	88	88	35	82	41	46	78	36	40	262
Winter barley	98	98	85	85	20	132	61	69	130	52	58	74
Oats	23	94	78	81	16	94	52	55	88	40	44	174
Rye	2											53
Early potatoes	0											7
Maincrop potatoes	1											1
Sugar beet	2											6
Oilseed rape	17	100	87	87	7	191	66	85	191	58	74	5
Linseed	7	57	42	42	20	50	51	50	29	21	21	34
Forage maize	2											22
Turnips (stock)	5	58	51	50	32	55	74	55	32	38	27	5
Kale and cow cabbage	2	76	76	76	47	110	51	53	83	38	40	16
Other roots/green crops	8	77	91	81	34	94	63	67	73	57	55	7
Peas	4											32
Beans	11	3	62	40	22	75	65	69	3	40	28	8
Vegetables (brassicae)	0											22
Vegetables (other)	0											1
Small fruit	0											0
Top fruit	4											1
Other tillage	9	88	87	87	64	80	41	49	70	35	43	9
All tillage	374	92	83	80	25	142	60	68	130	50	54	20
Temporary grass	177	92	72	72	40	120	37	47	111	27	34	768
Permanent grass	1352	68	57	54	35	86	27	30	59	15	16	319
All grass	1529	71	59	56	36	91	28	33	65	17	18	1470
All crops & grass	1902	75	64	60	34	103	37	42	78	23	25	1789
												2557

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table EW5.3 Average fertiliser practice on other livestock/mixed farms in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	5	100	56	56	25							
Winter wheat	214	98	71	70	24	162	21	53	162	12	30	11
Spring barley	24	100	69	95	51	184	66	70	180	47	49	444
Winter barley	88	100	71	78	18	83	46	49	83	31	47	58
Oats	8	100	59	58	17	144	63	76	144	45	59	189
Rye	0					105	59	77	105	35	45	25
Early potatoes	3											1
Maincrop potatoes	3											6
Sugar beet	14	92	50	89	65							11
Oilseed rape	43	100	66	63	23	103	41	101	95	20	89	33
Linseed	13	92	56	56	25	174	66	73	174	43	46	89
Forage maize	1					67	41	52	61	23	29	35
Turnips (stock)	1											2
Kale and cow cabbage	2											5
Other roots/green crops	2											4
Peas	8	0	53	47	25							8
Beans	15	1	37	43	27		44	70	0	24	33	21
Vegetables (brassicae)	1					115	67	58	2	25	25	52
Vegetables (other)	1											4
Small fruit	0											6
Top fruit	1											3
Other tillage	13	59	39	39	35							5
All tillage	458	92	67	70	28	129	61	92	76	24	36	43
Temporary grass	71	87	47	49	31	160	65	76	147	44	53	1055
Permanent grass	181	53	27	29	20	188	57	92	163	27	45	188
All grass	252	62	32	34	23	131	43	47	69	11	13	235
All crops & grass	710	81	55	57	26	153	48	65	95	16	22	423
						158	62	73	129	34	42	1478

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table EW5.4 Average fertiliser practice on cropping / horticultural farms in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	21	100	60	64	9	152	54	52	152	32	33	57
Winter wheat	1234	98	72	67	5	190	69	72	187	50	48	2437
Spring barley	85	97	69	79	7	102	49	57	99	34	45	201
Winter barley	355	100	85	82	1	142	67	77	142	57	63	776
Oats	20	100	96	94	1	116	67	69	116	64	65	88
Rye	8	100	61	66	0	140	44	72	140	27	47	26
Early potatoes	13	99	90	98	60	200	186	258	198	168	253	47
Maincrop potatoes	56	94	93	94	34	194	206	282	182	192	266	158
Sugar beet	156	95	79	90	27	125	80	152	119	63	136	410
Oilseed rape	261	99	81	75	4	199	68	72	197	55	54	544
Linseed	97	83	49	53	5	69	51	62	57	25	33	284
Forage maize	1											4
Turnips (stock)	2											9
Kale and cow cabbage	1											7
Other roots/green crops	9	93	83	83	36	104	103	185	97	85	154	37
Peas	86	9	51	60	7	29	61	76	3	31	46	223
Beans	93	9	55	44	3	75	71	72	7	39	31	227
Vegetables (brassicae)	22	96	81	84	19	193	76	179	185	62	150	104
Vegetables (other)	27	74	75	84	7	132	92	130	97	69	110	115
Small fruit	4	63	49	70	9	80	45	96	50	22	66	43
Top fruit	20	50	28	32	10	63	27	46	31	7	15	74
Other tillage	33	58	45	47	13	144	66	98	83	30	46	157
All tillage	2606	90	73	71	7	169	73	88	152	53	62	6028
Temporary grass	96	87	63	68	19	184	48	76	161	30	52	275
Permanent grass	234	72	39	38	6	135	48	65	97	19	25	541
All grass	329	76	46	47	10	151	48	69	116	22	32	816
All crops & grass	2935	89	70	68	8	167	71	86	148	49	59	6844

*Estimated area under crop

NOTE Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table EW5.5 Average fertiliser practice on part-time+ farms in England and Wales 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3											4
Winter wheat	180	99	70	68	13	195	67	71	193	47	48	141
Spring barley	22	100	96	96	30	77	38	38	77	37	37	18
Winter barley	45	98	85	85	11	153	61	71	151	52	60	49
Oats	15	100	97	97	30	94	56	59	94	54	57	20
Rye	1											1
Early potatoes	1											1
Maincrop potatoes	1											1
Sugar beet	8											8
Oilseed rape	39	100	71	61	19	232	71	70	232	50	42	31
Linseed	14											8
Forage maize	1											3
Turnips (stock)	1											1
Kale and cow cabbage	0											0
Other roots/green crops	3											6
Peas	10	0	100	100	0	.	69	105	0	69	105	10
Beans	20	31	79	79	3	15	76	53	5	60	42	13
Vegetables (brassicae)	2											2
Vegetables (other)	3											4
Small fruit	4											3
Top fruit	4											2
Other tillage	6	22	19	19	39	140	64	68	31	12	13	14
All tillage	384	89	75	73	19	167	63	72	148	48	53	340
Temporary grass	53	69	32	37	45	125	37	54	86	12	20	62
Permanent grass	585	52	41	43	29	79	27	32	41	11	14	415
All grass	638	53	40	42	30	84	28	34	45	11	14	477
All crops & grass	1021	67	53	54	26	126	47	54	84	25	29	817

* Estimated area under crop

+ Part-time is defined as less than 250 Standard Man Days input per annum

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

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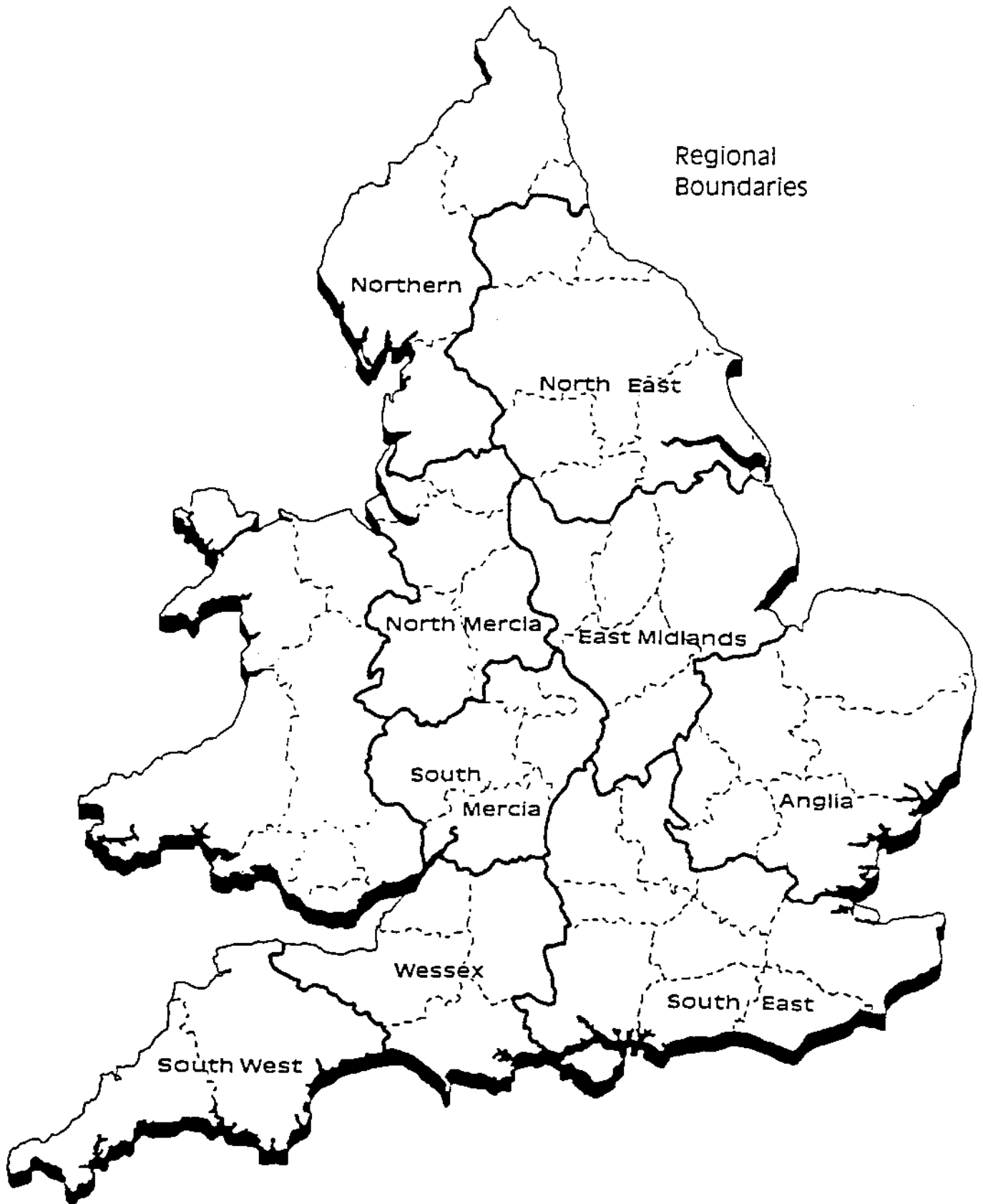


Table SC1.1 Total fertiliser use in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3											7
Winter wheat	216	98	98	98	15	200	78	85	197	76	84	244
Spring barley	335	100	98	98	35	93	55	62	92	53	61	466
Winter barley	98	100	100	100	17	165	81	87	165	81	87	107
Oats	37	97	97	97	31	97	58	66	94	57	64	48
Rye	4											6
Early potatoes	3											6
Maincrop potatoes	29	97	97	97	51	156	187	228	152	182	222	52
Sugarbeet	0	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	90	100	100	100	23	189	64	69	189	63	69	93
Linseed	3											9
Forage maize	0	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	31	100	99	99	52	74	116	97	74	114	96	86
Kale and cow cabbage	7	100	98	100	27	100	69	75	100	67	75	14
Other roots/greencrops	17	81	89	79	22	104	95	92	84	85	72	42
Peas	15	7	61	71	18	26	47	69	2	29	49	22
Beans	5											4
Vegetables (brassicae)	22	100	89	83	11	207	84	140	207	75	116	41
Vegetables (other)	6	100	100	100	30	99	144	153	99	144	153	19
Small fruit	2											3
Top fruit	7	86	82	82	34	181	40	53	155	33	43	11
Other tillage	16	69	55	55	28	137	62	63	94	34	35	25
All tillage ∇	+ 578	97	97	97	27	129	69	75	125	67	72	1305
Temporary grass	306	96	78	78	38	165	48	62	159	37	49	356
Permanent grass	949	79	74	69	34	121	38	43	96	28	30	737
All grass	+1090	83	75	71	35	134	41	48	111	30	34	1093
All crops & grass ∇	+1668	88	82	80	32	132	52	59	116	43	48	2398

∇ Estimates on this row were 'post-stratified' using figures from the 1992 Agricultural Census for Scotland

* Estimated area under crop

+ Obtained directly from 1992 Agricultural Census

Table SC1.2 Use of 'straight' fertiliser in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3				183	149	75	176	.	.	7
Winter wheat	216	96	.	.	56	120	.	25	.	.	244
Spring barley	335	44	.	.	145	.	.	142	.	.	466
Winter barley	98	98	.	.	74	.	.	37	.	.	107
Oats	37	50	.	.							48
Rye	4										6
Early potatoes	3				86	.	225	2	.	19	6
Maincrop potatoes	29	3	.	8	.	.	.	.	.	.	52
Sugarbeet	.	.	.	.	160	150	.	150	1	.	.
Oilseed rape	90	94	1	.							93
Linseed	3										9
Forage maize	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	31	1	1	1	86	120	75	1	1	1	86
Kale and cow cabbage	7	40	.	.	81	.	.	32	.	.	14
Other roots/greencrops	17	25	14	2	66	108	225	17	16	4	42
Peas	15	.	.	23	.	.	68	.	.	15	22
Beans	5	.	.	.	.	.	.	.	.	.	4
Vegetables (brassicae)	22	76	.	.	103	.	.	78	.	.	41
Vegetables (other)	6	57	.	.	59	.	.	33	.	.	19
Small fruit	2	.	.	.	.	.	.	.	.	.	3
Top fruit	7	34	.	.	119	.	.	40	.	.	11
Other tillage	16	35	.	.	99	.	.	35	.	.	25
All tillage ∇	+ 578	59	1		125	114	98	74	1		1305
Temporary grass	306	52	1	3	144	110	100	75	1	3	356
Permanent grass	949	24	4	.	96	93	75	23	3	.	737
All grass	+ 1090	31	3	1	116	94	93	36	3	1	1093
All crops & grass ∇	+ 1668	41	2	1	121	96	94	49	2	1	2398

∇ Estimates on this row were 'post-stratified' using figures from the 1992 Agricultural Census for Scotland

* Estimated area under crop

+ Obtained directly from 1992 Agricultural Census

Table SC1.3 Use of compound fertiliser in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3										7
Winter wheat	216	61	98	98	34	78	85	21	76	83	244
Spring barley	335	95	98	98	71	54	62	68	53	61	466
Winter barley	98	69	100	100	34	81	87	23	81	87	107
Oats	37	84	97	97	67	58	66	56	57	64	48
Rye	4										6
Early potatoes	3										6
Maincrop potatoes	29	97	97	89	154	187	228	149	182	203	52
Sugarbeet	0	.	.	.	.	.	.	.	.	.	0
Oilseed rape	90	75	100	100	52	62	69	39	62	69	93
Linseed	3										9
Forage maize	0	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	31	99	99	99	74	115	96	73	114	95	86
Kale and cow cabbage	7	76	98	100	89	69	75	68	67	75	14
Other roots/greencrops	17	75	79	79	89	88	87	67	70	68	42
Peas	15	7	61	61	26	47	55	2	29	33	22
Beans	5										4
Vegetables (brassicae)	22	96	89	83	135	84	140	129	75	116	41
Vegetables (other)	6	81	100	100	81	144	153	66	144	153	19
Small fruit	2										3
Top fruit	7	82	82	82	141	40	53	115	33	43	11
Other tillage	16	55	55	55	107	62	63	59	34	35	25
All tillage ∇	+ 578	81	96	97	63	69	74	51	66	72	1305
Temporary grass	306	73	78	78	115	47	59	84	36	46	356
Permanent grass	949	68	70	69	106	35	43	73	25	29	737
All grass	+ 1090	69	72	71	109	38	47	75	28	33	1093
All crops & grass ∇	+ 1668	74	81	80	91	51	59	67	41	47	2398

∇ Estimates on this row were 'post-stratified' using figures from the 1992 Agricultural Census for Scotland

* Estimated area under crop

+ Obtained directly from 1992 Agricultural Census

Table SC1.4 Use of lime in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)					Average field rate of CaO equivalent (tonne/ha)					Fields in sample		
		ground limestone	ground chalk	magnesian limestone	sugar beet waste	other	All	ground limestone	ground chalk	magnesian limestone	sugar beet waste		other	All
Spring wheat	3	.	.	13.3	.	.	13.3	.	.	2.7	.	.	2.7	7
Winter wheat	216	4.3	.	5.3	.	.	9.6	2.5	.	2.5	.	.	2.5	244
Spring barley	334	8.7	.	13.1	.	1.1	22.9	2.4	.	2.4	.	1.2	2.3	466
Winter barley	98	7.1	.	16.2	.	.	23.3	2.4	.	2.7	.	.	2.6	107
Oats	36	1.0	.	7.7	.	.7	9.4	2.5	.	1.9	.	6.2	2.3	48
Rye	4	.	.	.	.	.	.	.	.	.	.	.	.	6
Early potatoes	2	.	.	.	.	.	.	.	.	.	.	.	.	6
Main crop potatoes	29	.	.	1.7	.	.	1.7	.	.	2.1	.	.	2.1	52
Sugar beet	0	.	.	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	90	2.9	.	12.7	.	.	15.5	2.5	.	2.6	.	.	2.6	93
Linseed	3	.	.	.	.	.	.	.	.	.	.	.	.	9
Forage maize	0	.	.	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	30	8.0	.	11.4	.	.	19.4	3.1	.	2.6	.	.	2.8	86
Kale and cow cabbage	6	.	.	14.2	.	.	14.2	.	.	2.7	.	.	2.7	14
Other roots/green crops	17	3.5	.	21.2	.	.	24.7	3.1	.	2.9	.	.	2.9	42
Peas	15	7.0	.	8.6	.	.	15.6	2.1	.	3.1	.	.	2.7	22
Beans	4	.	.	.	.	.	.	.	.	.	.	.	.	4
Vegetables (brassicae)	21	2.8	.	20.8	.	43.7	67.3	2.4	.	3.6	.	3.5	3.5	41
Vegetables (other)	6	5.4	.	19.8	.	.	25.2	2.4	.	2.3	.	.	2.4	18
Small fruit	2	.	.	.	.	.	.	.	.	.	.	.	.	3
Top fruit	6	.	.	3.5	.	.	3.5	.	.	2.7	.	.	2.7	11
Other tillage	13	4.7	.	7.2	.	.	11.9	2.5	.	2.7	.	.	2.6	23
All tillage	944	5.7	.	10.9	.	1.4	18.0	2.4	.	2.6	.	3.0	2.6	1302
Temporary grass	306	1.3	.	4.4	.	.2	5.9	2.1	.	2.6	.	6.2	2.6	356
Permanent grass	949	3.7	.	4.2	.	.1	8.0	3.2	.	2.5	.	1.2	2.8	737
All grass	1255	3.1	.	4.3	.	.1	7.5	3.1	.	2.5	.	3.2	2.8	1093
All crops & grass	2199	4.2	.	7.1	.	.7	12.0	2.7	.	2.6	.	3.0	2.6	2395

*Estimated area under crop

Table SC1.5 Percentage of crop area by field application rate - N (Scotland 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Spring wheat	.	.	.	.	.	.	5	43	24	28	.	.	7
Winter wheat	2	.	1	1	2	2	3	35	49	5	.	1	244
Spring barley	.	2	3	16	38	30	8	2	1	.	.	.	466
Winter barley	.	.	.	1	4	5	34	36	16	.	3	.	107
Oats	3	.	11	15	48	1	15	4	.	.	.	2	48
Rye	.	.	.	.	.	.	.	87	13	.	.	.	6
Early potatoes	.	.	.	.	.	.	52	48	.	.	.	.	6
Maincrop potatoes	3	.	.	.	6	10	31	37	12	2	.	.	52
Sugar beet	.	.	.	.	.	.	.	.	.	.	.	.	.
Oilseed rape	.	.	1	3	5	13	4	26	23	18	6	.	93
Linseed	.	.	37	38	13	12	.	.	.	.	.	.	9
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	.	2	18	50	16	5	4	3	.	3	.	.	86
Kale and cow cabbage	.	1	9	17	24	18	4	27	.	.	.	.	14
Other roots/green crops	19	.	17	23	9	2	10	9	9	2	.	.	42
Peas	93	5	.	2	.	.	.	.	.	.	.	.	22
Vegetables (brassicae)	.	.	.	.	.	3	6	26	55	10	.	.	41
Vegetables (other)	.	.	19	24	26	7	.	5	15	.	4	.	18
Small fruit	44	.	56	.	.	.	.	.	.	.	.	.	3
Top fruit	14	.	4	3	15	3	.	20	24	17	.	.	11
Other tillage	19	.	13	15	1	.	29	9	.	8	5	.	23
All tillage	4	1	3	10	18	14	10	18	17	4	1	.	1302
Temporary grass	4	1	7	11	11	11	9	11	11	12	11	.	356
Permanent grass	21	.	6	19	12	12	7	10	6	5	2	.	737
All grass	17	.	6	17	12	12	8	10	7	7	4	.	1093
All crops & grass	11	1	5	14	15	13	9	14	12	5	3	.	2395

Source: 1992 British Survey of Fertiliser Practice

Table SC1.6 Percentage of crop area by field application rate - P₂O₅ (Scotland 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Flds in sample	row %
Spring wheat	.	.	52	15	33	.	.	.	.	.	.	.	7
Winter wheat	2	.	7	34	47	8	1	1	.	.	.	.	244
Spring barley	2	3	33	53	8	1	.	.	.	.	.	.	466
Winter barley	.	.	9	28	52	6	1	1	2	.	.	.	107
Oats	3	2	38	48	4	.	.	6	.	.	.	.	48
Rye	.	.	10	.	90	.	.	.	.	.	.	.	6
Early potatoes	.	.	.	.	.	.	44	56	.	.	.	.	6
Maincrop potatoes	3	.	.	.	.	27	30	30	10	.	.	.	52
Sugar beet	.	.	.	.	.	.	.	.	.	.	.	.	.
Oilseed rape	.	.	20	55	22	1	.	1	.	.	.	.	93
Linseed	.	13	75	12	.	.	.	.	.	.	.	.	9
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	1	.	3	6	33	19	19	15	1	3	.	.	86
Kale and cow cabbage	2	1	21	21	55	.	.	.	.	.	.	.	14
Other roots/green crops	11	3	18	9	24	6	16	10	2	1	.	.	42
Peas	39	2	29	25	4	.	.	.	.	.	.	.	22
Beans	40	.	.	60	.	.	.	.	.	.	.	.	4
Vegetables (brassicae)	11	.	15	31	7	33	3	1	.	.	.	.	41
Vegetables (other)	.	.	.	.	19	1	24	56	.	.	.	.	18
Small fruit	44	27	29	.	.	.	.	.	.	.	.	.	3
Top fruit	18	18	36	12	17	.	.	.	.	.	.	.	11
Other tillage	35	10	29	11	7	.	.	.	7	.	.	.	23
All tillage	4	2	20	39	24	4	2	3	1	.	.	.	1302
Temporary grass	22	18	31	17	5	3	1	4	.	.	.	.	356
Permanent grass	26	23	31	10	5	3	1	.	.	.	.	.	737
All grass	25	22	31	11	5	3	1	1	.	.	.	.	1093
All crops & grass	16	13	27	23	13	4	1	2	1	.	.	.	2395

Source: 1992 British Survey of Fertiliser Practice

Table SC1.7 Percentage of crop area by field application rate - K₂O (Scotland 1992)

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Spring wheat	.	.	15	.	85	.	.	.	.	.	.	.	7
Winter wheat	2	1	3	27	49	13	3	3	.	.	.	.	244
Spring barley	2	2	23	46	22	3	1	.	.	.	.	.	466
Winter barley	.	.	3	19	64	5	5	2	1	.	.	.	107
Oats	3	2	23	48	9	9	.	6	.	.	.	.	48
Rye	.	.	.	.	30	70	.	.	.	.	.	.	6
Early potatoes	.	.	.	.	.	.	.	.	44	37	19	.	6
Maincrop potatoes	3	.	.	.	.	3	8	6	45	21	12	2	52
Sugar beet	.	.	.	.	.	.	.	.	.	.	.	.	.
Oilseed rape	.	1	13	51	27	3	4	.	.	.	.	.	93
Linseed	.	13	75	.	12	.	.	.	.	.	.	.	9
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	1	.	3	15	46	14	8	11	1	.	.	.	86
Kale and cow cabbage	.	1	17	27	25	30	.	.	.	.	.	.	14
Other roots/green crops	21	1	19	5	38	8	2	.	1	4	.	1	42
Peas	29	.	6	38	14	13	.	.	.	.	.	.	22
Beans	40	.	.	60	.	.	.	.	.	.	.	.	4
Vegetables (brassicae)	17	.	.	.	6	26	20	31	.	.	.	.	41
Vegetables (other)	.	.	.	.	19	20	5	41	.	16	.	.	18
Small fruit	44	27	.	29	.	.	.	.	.	.	.	.	3
Top fruit	18	18	24	24	.	17	.	.	.	.	.	.	11
Other tillage	35	8	20	18	7	.	.	12	.	.	.	.	23
All tillage	3	2	13	33	32	8	3	3	2	1	.	.	1302
Temporary grass	22	15	24	17	8	4	2	6	1	.	.	.	356
Permanent grass	31	20	27	11	8	2	1	1	.	.	.	.	737
All grass	29	18	26	12	8	3	2	2	1	.	.	.	1093
All crops & grass	18	11	20	21	18	5	2	2	1	.	.	.	2395

Source: 1992 British Survey of Fertiliser Practice

Table SC2.1 Average fertiliser practice by grassland utilisation in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Grazed - not mown	821	77	67	62	24	103	35	32	79	23	20	622
Grazed - mown	384	98	90	91	57	181	48	70	179	44	63	429
All grazings	1206	84	75	71	34	132	40	47	111	30	34	1051
Cut for seed grazed	0	.	.	.	.	.	.	.	.	.	.	0
Cut for seed not grazed	0	.	.	.	.	.	.	.	.	.	.	0
All cut for seed	0	.	.	.	.	.	.	.	.	.	.	0
Cut for silage grazed	275	99	91	92	66	208	52	77	207	48	71	293
Cut for silage not grz.	9	100	100	100	61	203	63	57	203	63	57	12
All cut for silage	284	99	92	92	65	208	53	76	206	49	71	305
Cut for hay grazed	109	97	87	87	35	113	38	50	110	33	44	136
Cut for hay not grz	4	.	.	.	.	.	.	.	.	.	.	7
All cut for hay	113	97	86	85	34	113	38	50	111	33	43	143
All mowings	398	98	90	90	57	181	49	69	179	44	63	448
All grass	1255	83	74	71	34	133	40	48	111	30	34	1093

*Estimated area under crop

Table SC2.2 Percentage of grass area by field application rate - N

kg/ha	0	25	50	75	100	125	150	200	250	300	400+	Fields in sample	row %
Grazed not mown	23	.	8	23	13	12	5	8	4	3	1	.	622
Grazed mown	1	.	1	5	11	13	14	15	13	13	12	1	429
All grazings	16	.	6	18	12	12	8	11	7	6	4	.	1051
Cut for seed grazed	.	.	.	.	.	.	.	.	.	.	.	.	.
Cut for seed not grazed	.	.	.	.	.	.	.	.	.	.	.	.	.
All cut for seed	.	.	.	.	.	.	.	.	.	.	.	.	.
Cut for silage grazed	1	.	.	1	9	8	15	17	14	18	16	1	293
Cut for silage not grz.	.	.	.	10	.	6	.	14	31	39	.	.	12
All cut for silage	1	.	.	1	8	8	14	17	15	19	15	1	305
Cut for hay grazed	3	.	4	17	17	27	12	9	10	.	1	.	136
Cut for hay not grz.	.	.	.	.	26	25	50	.	.	.	.	.	7
All cut for hay	2	.	4	16	17	27	13	9	10	.	1	.	143
All mowings	1	.	1	5	11	13	14	15	14	14	11	1	448
All grass	17	.	6	17	12	12	8	10	7	7	4	.	1093

Source: 1992 British Survey of Fertiliser Practice

Table SC3.1 Product type as percentage of all product used by crop group in Scotland

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	ar tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	column % all crops & grass
Calcium Ammonium Nit	2.5	5.5	.	.	6.6	.	3.7	.2	.1	.1	.	.1	2.0
Ammonium Nitrate + Urea	.	.	.	.	.	.	.	.	.	.	.	.	.
Urea	1.8	7.8	.	.	7.4	2.0	4.8	1.6	1.3	3.9	.	2.6	3.7
Ammonium Nitrate	10.8	39.3	.5	.	33.4	9.8	24.4	17.5	15.5	17.1	33.9	17.3	20.9
Other Straight N	.2	2.0	.	.	7.8	.8	1.9	1.9	.	.7	.	1.3	1.6
Triple Super Phosphate	.	.0	.	.	.	.1	.0	.7	.7	.0	.	.4	.2
Single Super Phosphate	.	.	.	.	.	1.4	.2	2.5	.	.	.	1.3	.7
Other Straight P	.1	.	.	.	1.4	.1	.2	.8	.	.3	.	.5	.4
Muriate of Potash	.	.0	2.1	.	.	.5	.2	.2	.	.4	.	.3	.3
Other Straight K	.	.	.	.	.	.4	.1	.	.	.	.	.	.0
NP	.	.	3.5	.	.	5.4	.9	2.6	.4	1.6	.	2.0	1.5
NK	2.9	2.6	.	.	3.1	2.7	2.6	.3	.4	3.6	.	1.7	2.2
PK	2.4	15.4	.	.	8.4	6.3	8.8	2.2	2.4	2.9	49.0	2.7	5.9
Very High N	.1	.7	.	.	.4	10.7	1.8	31.2	24.8	30.8	.	30.5	15.7
High N	32.9	.3	.	.	3.4	7.8	10.5	25.7	29.7	25.4	17.1	25.8	17.9
High P	.1	.	7.7	.	.	8.5	1.7	.	.	.1	.	.1	.9
High K	10.2	1.7	62.2	.	3.1	17.7	10.4	.9	5.3	2.7	.	2.0	6.3
Low N	3.7	20.9	10.5	.	1.	21.8	14.4	.7	.9	.	.	.4	7.6
Low P	3.1	.8	1.1	.	.	1.6	1.4	2.3	13.0	9.9	.	6.3	3.8
Equal NPK	29.2	2.8	12.4	.	14.9	2.3	12.0	1.1	5.4	.4	.	1.1	6.7
Unknown	.	.	.	.	.	.1	.0	7.5	.	.	.	3.7	1.8
Total prod (000tonnes)	174	266	44	0	72	84	640	299	39	259	2	600	1240

Source: 1992 British Survey of Fertiliser Practice

Table SC3.2 Use of product type by crop group in Scotland 1992

	Spring cereal	Winter cereal	potatoes	sugar beet	oil seed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass (not spec)	all grass	row % all crops & grass
Calcium Ammonium Nitrate	18.3	57.8	.	.	20.0	.	96.2	1.6	.6	1.6	.	3.8	100.0
Urea	7.1	45.5	.	.	12.1	3.5	68.2	10.1	1.0	20.7	.	31.8	100.0
Ammonium Nitrate	7.3	41.2	.1	.	9.0	3.3	60.8	19.9	2.3	16.7	.3	39.1	100.0
Other Straight N	1.6	27.4	.	.	27.1	3.4	59.5	32.0	.	8.4	.	40.5	100.0
Triple Super Phosphate	.	3.9	.	.	.	3.2	7.1	80.6	10.9	1.3	.	92.9	100.0
Single Super Phosphate	.	.	.	.	.	13.2	13.2	86.8	.	.	.	86.8	100.0
Other Straight P	2.7	.	.	.	22.9	1.4	27.0	52.9	.	20.1	.	73.0	100.0
Muriate of Potash	.	3.7	28.2	.	.	12.8	44.7	21.8	.	33.6	.	55.3	100.0
Other Straight K	.	.	.	.	.	100.0	100.0	.	.	.	.	.	100.0
NP	.	.	8.4	.	.	25.1	33.5	42.5	.9	23.1	.	66.5	100.0
NK	18.7	26.0	.	.	8.2	8.4	61.3	3.4	.6	34.7	.	38.7	100.0
PK	5.7	56.6	.	.	8.3	7.3	77.8	9.3	1.3	10.2	1.4	22.2	100.0
Very High N	.1	.9	.	.	.2	4.6	5.8	48.1	5.0	41.2	.	94.2	100.0
High N	25.8	.4	.	.	1.1	2.9	30.2	34.7	5.2	29.7	.2	69.8	100.0
High P	2.0	.	30.5	.	.	64.2	96.8	.	.	3.2	.	3.2	100.0
High K	22.7	5.8	34.8	.	2.9	18.9	85.0	3.5	2.6	8.8	.	15.0	100.0
Low N	6.9	58.9	4.9	.	7.6	19.3	97.5	2.1	.4	.	.	2.5	100.0
Low P	11.5	4.3	1.0	.	.	2.8	19.7	14.8	10.8	54.8	.	80.3	100.0
Equal NPK	61.5	9.0	6.6	.	12.9	2.4	92.3	3.9	2.6	1.2	.	7.7	100.0
Unknown	.	.	.	.	.	.5	.5	99.5	.	.	.	99.5	100.0
Total product (100%=1,258,000 tonnes)	14.07	22.02	3.50	.	5.88	6.68	52.15	23.93	3.10	20.67	0.16	47.85	100.0

Table SC3.3 Product use in Scotland by month of application

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	row % Total Product 10 tonnes
Calcium Ammonium Nitrate	.	13	38	31	17	1	.	.	.	.	.	.	31
Urea	6	8	36	25	9	8	2	4	.	1	.	1	48
Ammonium Nitrate	.	3	3.	37	15	7	5	2	.	.	.	.	267
Other Straight N	.	2	22	51	8	4	7	2	4	.	.	.	2.
Triple Super Phosphate	.	43	5	3	.	5	.	.	4	39	.	.	2
Single Super Phosphate	.	.	.	43	.	13	.	43	.	.	.	.	8
Other Straight P	.	.	.	17	24	12	23	24	.	.	.	.	4
Muriate of Potash	.	.	36	4	2	18	24	13	4	.	.	.	3
Other Straight K	.	.	23	77	.	.	.	.	.	.	.	.	.
NP	.	2	13	53	4	25	2	2	.	.	.	.	18
NK	.	5	28	32	4	23	4	5	.	.	.	.	26
PK	7	6	5	11	1	1	3	8	31	2.	5	2	73
Very High N	.	.	13	38	18	15	1.	6	.	.	.	.	194
High N	.	.	26	43	16	12	4	.	.	.	.	.	222
High P	.	.	.	39	57	3	.	.	.	.	.	.	11
High K	2	2	25	54	7	3	1	1	2	3	.	.	78
Low N	.	1	1	11	17	1	1	3	34	29	1	.	94
Low P	.	.	11	35	12	34	8	.	.	.	.	.	47
Equal NPK	.	.	22	63	2	2	1	5	5	1	.	.	82
Unknown	1.0	.	.	.	.	.	.	.	22
All fertilisers	1	2	2.	36	15	9	4	3	5	4	.	.	126.

Source: 1992 British Survey of Fertiliser Practice

Table SC4.1 Average fertiliser practice in North East Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	0	.	.	.	.	.	.	.	.	.	.	0
Winter wheat	45	100	99	99	41	194	86	89	194	85	88	37
Spring barley	124	100	96	96	38	83	56	59	83	53	57	180
Winter barley	28	100	99	99	15	159	89	90	159	88	89	24
Oats	16	93	93	93	27	78	58	59	72	54	55	17
Rye	0	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	0	.	.	.	.	.	.	.	.	.	.	0
Main crop potatoes	6	.	.	.	.	.	.	.	.	.	.	9
Sugar beet	0	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	29	99	99	99	38	137	66	66	136	65	65	27
Linseed	1	.	.	.	.	.	.	.	.	.	.	2
Forage maize	0	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	14	100	100	100	64	63	115	91	63	115	91	45
Kale and cow cabbage	1	.	.	.	.	.	.	.	.	.	.	3
Other roots/green crops	2	.	.	.	.	.	.	.	.	.	.	10
Peas	0	.	.	.	.	.	.	.	.	.	.	1
Beans	0	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	0	.	.	.	.	.	.	.	.	.	.	5
Vegetables (other)	2	.	.	.	.	.	.	.	.	.	.	5
Small fruit	1	.	.	.	.	.	.	.	.	.	.	1
Top fruit	2	.	.	.	.	.	.	.	.	.	.	4
Other tillage	5	.	.	.	.	.	.	.	.	.	.	8
All tillage	276	99	96	96	36	115	74	74	114	72	71	378
Temporary grass	110	96	88	89	28	151	48	54	144	42	48	166
Permanent grass	140	71	62	61	28	107	30	35	76	18	21	156
All grass	250	82	73	73	28	129	40	45	106	29	33	322
All crops & grass	525	91	85	85	32	121	60	62	110	51	53	700

*Estimated area under crop

Table SC4.2 Average fertiliser practice in South East Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3	.	.	.	.	.	.	.	.	.	.	7
Winter wheat	154	98	97	98	8	200	74	81	195	72	79	185
Spring barley	152	100	99	100	25	98	52	61	98	51	61	204
Winter barley	55	100	100	100	9	169	72	83	169	72	83	63
Oats	11	100	100	100	37	102	45	49	102	45	49	12
Rye	0	.	.	.	.	.	.	.	.	.	.	1
Early potatoes	3	.	.	.	.	.	.	.	.	.	.	6
Main crop potatoes	22	97	97	97	53	166	177	241	160	171	233	41
Sugar beet	0	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	56	100	100	100	17	213	62	69	213	62	69	58
Linseed	3	.	.	.	.	.	.	.	.	.	.	7
Forage maize	0	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	10	100	96	96	24	78	122	112	78	117	107	20
Kale and cow cabbage	5	.	.	.	.	.	.	.	.	.	.	8
Other roots/green crops	11	71	88	71	10	105	110	108	75	97	77	20
Peas	12	9	59	68	13	26	51	60	2	31	41	16
Beans	5	.	.	.	.	.	.	.	.	.	.	4
Vegetables (brassicae)	22	100	89	83	11	208	83	140	208	74	116	35
Vegetables (other)	5	100	100	100	30	98	140	152	98	140	152	12
Small fruit	1	.	.	.	.	.	.	.	.	.	.	2
Top fruit	4	.	.	.	.	.	.	.	.	.	.	5
Other tillage	2	.	.	.	.	.	.	.	.	.	.	4
All tillage	535	96	97	97	17	157	71	83	150	69	81	710
Temporary grass	88	100	72	75	22	161	51	82	160	37	62	80
Permanent grass	272	79	68	60	23	124	40	41	98	27	24	200
All grass	360	84	69	64	23	135	43	53	113	29	34	280
All crops & grass	895	91	85	83	20	149	62	74	135	53	62	990

*Estimated area under crop

Table SC4.3 Average fertiliser practice in South West Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	0	.	.	.	.	.	.	.	.	.	.	0
Winter wheat	7	.	.	.	.	.	.	.	.	.	.	7
Spring barley	32	98	98	98	83	84	57	55	83	56	55	31
Winter barley	14	100	100	100	51	169	98	102	169	98	102	19
Oats	4	.	.	.	.	.	.	.	.	.	.	7
Rye	0	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	0	.	.	.	.	.	.	.	.	.	.	0
Main crop potatoes	0	.	.	.	.	.	.	.	.	.	.	2
Sugar beet	0	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	1	.	.	.	.	.	.	.	.	.	.	2
Linseed	0	.	.	.	.	.	.	.	.	.	.	0
Forage maize	0	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	2	.	.	.	.	.	.	.	.	.	.	6
Kale and cow cabbage	1	.	.	.	.	.	.	.	.	.	.	3
Other roots/green crops	2	.	.	.	.	.	.	.	.	.	.	5
Peas	0	.	.	.	.	.	.	.	.	.	.	0
Beans	0	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	0	.	.	.	.	.	.	.	.	.	.	1
Vegetables (other)	0	.	.	.	.	.	.	.	.	.	.	2
Small fruit	0	.	.	.	.	.	.	.	.	.	.	0
Top fruit	1	.	.	.	.	.	.	.	.	.	.	1
Other tillage	8	46	46	46	41	188	47	65	86	21	30	11
All tillage	74	92	92	92	62	136	79	78	125	72	71	97
Temporary grass	98	95	71	68	68	196	47	57	187	33	39	96
Permanent grass	469	81	80	77	46	130	40	46	106	32	36	243
All grass	567	84	79	75	50	143	41	48	120	32	36	339
All crops & grass	641	85	80	77	51	142	46	52	120	37	40	436

*Estimated area under crop

Table SC5.1 Average fertiliser practice on general cropping farms in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	3											6
Winter wheat	172	100	97	98	14	200	79	86	200	76	84	196
Spring barley	191	100	97	97	14	101	55	66	101	53	64	264
Winter barley	67	100	100	100	3	166	81	90	166	81	89	74
Oats	26	100	100	100	24	107	62	71	107	62	71	22
Rye	4											6
Early potatoes	3											6
Maincrop potatoes	24	97	97	97	43	155	186	233	150	180	226	43
Sugar beet	0	.	.	.	.	.	.	.	.	.	.	0
Oilseed rape	66	100	100	100	20	195	64	74	194	64	74	72
Linseed	3											6
Forage maize	0	.	.	.	.	.	.	.	.	.	.	0
Turnips (stock)	9	100	96	96	47	75	135	124	75	129	119	26
Kale and cow cabbage	2											2
Other roots/green crops	4	85	85	85	23	111	125	151	94	106	128	12
Peas	15	3	59	70	14	50	46	69	1	27	48	21
Beans	5											4
Vegetables (brassicae)	21	100	88	83	8	207	83	138	207	73	114	37
Vegetables (other)	5	100	100	100	15	76	146	138	76	146	138	12
Small fruit	1											1
Top fruit	2											3
Other tillage	5											5
All tillage	627	96	96	96	15	154	74	87	148	71	83	818
Temporary grass	67	100	76	76	4	143	43	51	143	33	39	97
Permanent grass	91	97	72	63	5	134	34	46	130	25	29	117
All grass	158	98	74	69	4	138	38	48	135	28	33	214
All crops & grass	785	97	91	91	13	151	69	81	146	63	73	1032

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table SC5.2 Average fertiliser practice on dairy farms in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	.	.	.	.	.	.	.	.	.	.	.	.
Winter wheat	18	100	100	100	5	199	80	80	199	80	80	19
Spring barley	49	99	99	99	75	87	58	60	86	57	60	44
Winter barley	13	100	100	100	42	140	76	80	140	76	80	14
Oats	2											2
Rye	.	.	.	.	.	.	.	.	.	.	.	.
Early potatoes	.	.	.	.	.	.	.	.	.	.	.	.
Maincrop potatoes	2											3
Sugar beet	.	.	.	.	.	.	.	.	.	.	.	.
Oilseed rape	11											7
Linseed	.	.	.	.	.	.	.	.	.	.	.	.
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	3											4
Kale and cow cabbage	.											2
Other roots/green crops	2											5
Peas	1											1
Beans	.	.	.	.	.	.	.	.	.	.	.	.
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	.	.
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	.	.
Small fruit	.	.	.	.	.	.	.	.	.	.	.	.
Top fruit	2											2
Other tillage	6											8
All tillage	111	98	97	97	53	133	68	69	130	66	67	111
Temporary grass	71	98	81	82	65	268	66	88	262	53	72	70
Permanent grass	166	94	94	92	70	178	39	50	167	36	46	162
All grass	237	95	90	89	68	205	46	61	195	42	54	232
All crops & grass	348	96	92	91	63	182	53	63	174	49	58	343

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table SC5.3 Average fertiliser practice on mixed farms in Scotland 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	.	.	.	.	.	.	.	.	.	.	.	.
Winter wheat	12	100	100	100	30	212	75	88	212	75	88	16
Spring barley	18	100	100	100	70	80	50	55	80	50	55	26
Winter barley	4											4
Oats	2											4
Rye	.											.
Early potatoes	.											.
Maincrop potatoes	1											2
Sugar beet	.											.
Oilseed rape	4											4
Linseed	.											.
Forage maize	.											.
Turnips (stock)	2											7
Kale and cow cabbage	2											2
Other roots/green crops	2											2
Peas	.											.
Beans	.											.
Vegetables (brassicae)	1											1
Vegetables (other)	1											4
Small fruit	.	.	.	.	.	.	.	.	.	.	.	.
Top fruit	1	.	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	.	.	.
All tillage	48	97	97	97	44	131	69	78	127	67	75	73
Temporary grass	38	92	65	72	33	123	36	46	113	23	34	38
Permanent grass	176	69	64	64	24	109	44	50	76	28	32	105
All grass	215	73	64	65	26	112	42	49	82	27	32	143
All crops & grass	263	78	70	71	29	117	49	56	90	34	40	216

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

Table SC5.4 Average fertiliser practice on farms in less favoured areas (Scotland) 1992

	Ha* '000	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P	K	FYM	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	
Spring wheat	.											1
Winter wheat	14	74	100	100	26	192	71	83	142	71	83	13
Spring barley	77	100	100	100	52	78	53	56	78	53	56	132
Winter barley	13	100	100	100	63	203	87	87	203	87	87	15
Oats	7	90	90	90	40	62	50	54	56	45	48	20
Rye	.	.	.	.	.	.	.	.	.	.	.	.
Early potatoes	.	.	.	.	.	.	.	.	.	.	.	.
Maincrop potatoes	2	.	.	.	.	.	.	.	.	.	.	4
Sugar beet	.	.	.	.	.	.	.	.	.	.	.	.
Oilseed rape	10	100	100	100	42	173	68	55	173	68	55	10
Linseed	1	.	.	.	.	.	.	.	.	.	.	3
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.
Turnips (stock)	17	100	100	100	54	68	114	90	68	114	90	49
Kale and cow cabbage	3	.	.	.	.	.	.	.	.	.	.	8
Other roots/green crops	9	70	87	66	8	80	97	77	56	85	51	23
Peas	.	.	.	.	.	.	.	.	.	.	.	.
Beans	.	.	.	.	.	.	.	.	.	.	.	.
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	.	3
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	.	3
Small fruit	2	.	.	.	.	.	.	.	.	.	.	2
Top fruit	2	.	.	.	.	.	.	.	.	.	.	5
Other tillage	5	89	79	79	23	74	83	63	66	66	50	12
All tillage	161	95	97	96	46	102	69	67	97	67	65	303
Temporary grass	129	95	81	79	43	132	43	58	125	35	46	151
Permanent grass	516	75	71	65	31	99	37	37	74	26	24	353
All grass	646	79	73	68	33	107	38	42	85	28	28	504
All crops & grass	806	82	78	74	36	106	46	48	87	36	35	307

*Estimated area under crop

NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

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**The British Survey of
Fertiliser Practice
1992**

**Sources of Advice on Nitrogen
Fertiliser**

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1992 British Survey of Fertiliser Practice

Supplementary Report on Sources of Advice on Nitrogen Fertiliser

When asked 'what main source of advice do you use when deciding how much nitrogen fertiliser to apply?' the vast majority of farmers in 1992 responded that they had used their own judgement and preferred not to seek external advice, see Table 1(a). Rather than seek advice from Independent Consultants or from advisers from ADAS or Scottish Agricultural College (SAC), those who did turn to others were more likely to turn to the suppliers of fertiliser products, although this might refer to the printed information supplied with the fertiliser. (Figures shown in italics.)

Table 1 Main sources of advice on Nitrogen application, Great Britain

Col %	(a) by farm		(b) weighted by size of farm		
	Great Britain 1992	number of farms in sample	England and Wales		Scotland
			1991	1992	1992
own judgement	71	915	44	53	67
all consultants	28	487	51	43	29
<i>ADAS/SAC</i>	8	162		15	13
<i>independent</i>	8	178		20	8
<i>manuf./merch.</i>	12	147		8	8
press/trade lit.	1	11	4	1	.
no Nitrogen used	.		0.6	1.3	0.5
	100%	1413	100%	100%	100%

The overall figures in Table 1(a) are unduly influenced by the responses from farmers of small holdings who are less likely to turn to others for advice and who account for a relatively low proportion of harvest or fertiliser. The figures in Table 1(b) correct for this by weighting by the size of the farm, in terms of total crops and grass (ha). This shows the impact of advice in terms of potential harvest. The figures have also been disaggregated by country to allow comparison with the 1991 Survey for England and Wales.

The comparison makes it plain that advice from some form of consultancy was taken on Nitrogen application for less than half the agricultural land in England and Wales in 1992, down on 1991. These weighted estimates show the role played by ADAS and independent consultants as sources of advice in a more positive light. The figure in Scotland in 1992 was less than a third, with the SAC adviser the major source of advice.

Table 2 indicates that external advice from consultants was sought most often for arable farms, as expected, but here too this is much less in 1992 than in 1991. The change was greatest for horticulture, although sample numbers are small for these farms. As indicated above, small holdings do not seek the benefits of external advice.

Table 2 Advice on N application by farm type, England & Wales

Row %		own judgement	all consultants	ADAS	indep	manuf or merch	press / trade lit.	no nitrogen used	not answered
Cereals	1991	33	62				4	0	1
	1992	41	55	17	31	7	1	0	3
Gen. cropping	1991	42	55				2	1	0
	1992	48	50	16	27	7	.	0	1
Horticulture	1991	23	76				.	1	1
	1992	52	47	25	13	9	0	1	0
Mainly Dairy	1991	43	51				5	1	1
	1992	57	41	9	22	11	0	1	0
Dairy	1991	60	37				3	0	0
	1992	60	36	14	10	12	0	3	0
Pigs/Poult/Mix	1991	38	57				5	0	0
	1992	61	34	16	12	6	3	1	1
Livestock	1991	60	30				5	3	2
	1992	66	28	10	8	10	.	5	1
Small holdings <250 SMD	1991	49	33				4	13	.
	1992	60	22	8	7	8	3	11	4

Advice from ADAS and the independent consultants were equally important as sources of advice for most of the livestock categories of farm type, with ADAS as a greater source for horticulture. Table 3a shows that independent consultants are playing the major role in providing advice for individual fields (consistent with their larger role as advisers for specialist cereal and general cropping farms).

An alternative interpretation is given in Table 3b. This indicates that consultants were as likely to be asked in 1992 to give advice on particular fields as they were 'more generally by crop'. This was also the case in 1991. Advice from ADAS was more likely to be for a crop more generally, whereas advice from independent consultants (and from merchants and manufacturers) is as likely to apply to individual fields as it is more generally by crop. Unsurprisingly, advice from the farming press and trade literature is used more generally by crop.

Table 3 Level of advice and source of advice, England & Wales

		source of advice (col %)		level of advice (row %)	
		for individual fields	for a particular crop	for individual fields	for a particular crop
all consultants	1991	97	91	47	53
	1992	99	98	47	53
<i>independent</i>	1992	56	39	55	45
<i>manuf/merch</i>	1992	25	40	47	53
ADAS	1992	19	19	35	65
press/trade lit.	1991	3	9	20	80
	1992	1	2	22	78

Table 4 indicates the farmers' recall of the factors which were taken into account when the advice was given, again weighted to show significance in terms of the extent of farming activity. This indicates that overall advice for arable fields was most likely to take account of previous cropping and to a greater extent for the 1992 harvest year than the 1991. The level of yield and soil type were also important factors for the 1992 harvest year, again appreciably more than 1991. Account was taken of the use of organic manure in less than half of the arable area receiving N advice, although more so than in 1991. This, however, should be seen in the context of 17% of the total tillage area receiving some form of organic manure dressing.

Advice from ADAS was reported to have taken equally into account such factors as previous cropping, yield and soil type, and was as likely as not also to have taken account the use of organic manure. Reports from independent consultants focused on yield and previous cropping, and were more likely to have taken previous cropping into account than any other source.

Table 4 Factors taken into account in advice on arable fields, by source of advice (%)

		advice given took account of			
		previous cropping	yield	soil type	use of organic manure
all consultants	1991	74	62	58	36
	1992	91	87	85	43
<i>independent manuf/merch ADAS</i>	1992	97	93	88	42
	1992	87	85	85	48
	1992	85	76	76	36
press/trade lit.	1991	87	64	51	65
	1992	95	81	85	63

NB the figures in Table 4 are weighted by size of farm.

Farmers were presented with a list of potential factors (level of yield, previous cropping, use of organic manure, soil type) and were invited to indicate all that applied.

The advice offered was not always followed (Table 5) although it was more likely to have been than not, especially if obtained from an independent consultant. There is some suggestion in 1992 of a slight increase of the small proportion of farmers who were applying nitrogen fertiliser on arable fields at rates greater than recommended by their advisers. Conversely, lower rates were more often applied than recommended in the farming press and trade literature. The proportion of the arable area receiving more N than recommended in 1992 was greatest where ADAS was the source of advice.

Table 5 Actual fertiliser use compared with advice given

row %

		lower	similar	higher
all consultants	1991	13	79	4
	1992	6	82	7
<i>independent manuf/merch ADAS</i>	1992	5	88	6
	1992	5	74	12
	1992	8	83	3
press/trade lit.	1991	10	81	4
	1992	57	38	4