THE BRITISH SURVEY OF

Fertiliser Practice

FERTILISER USE ON FARM CROPS FOR CROP YEAR 1998

MAFF Ministry of Agriculture Fisheries and Food

FMA Fertiliser Manufacturers Association

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FOREWORD

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

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

The Survey is carried out annually and is based upon returns from a sample of farms, a new sample being used each year. In 1998, the Survey was co-ordinated by the Data Library at the University of Edinburgh which was also responsible for the survey design, statistical analysis and quality control monitoring. ADAS Consulting Ltd carried out the farm interviewing.

[August] 1999

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The sponsors gratefully acknowledge the co-operation of all farmers taking part in the 1998 British Survey of Fertiliser Practice.

The authors of the report wish to thank all those involved for their assistance and support in the design, conduct and analysis of the Survey .

The agronomic interpretation of the Survey results benefited from advice from Chris Dawson (Chris Dawson & Associates), Agronomic Consultant to the Fertiliser Manufacturers' Association.

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EXECUTIVE SUMMARY

The British Survey of Fertiliser Practice is an annual, nationally representative survey, based on the selection, each year, of a random stratified sample of farms from mainland Britain. In 1998, approximately 1,200 farms were surveyed. The main purpose of the survey is to estimate average application rates of nitrogen, phosphate and potash used for agricultural crops and grassland. Information is also collected on applications of sulphur fertilisers, organic manures and lime.

The main annual changes and other key findings from the 1998 Survey for Great Britain were:

Nitrogen

- Total nitrogen use on tillage crops decreased by 5 kg/ha, to 144 kg/ha. This drop in the overall application rate for total nitrogen, reflecting slight reductions in both straight and compound nitrogen use, was mainly caused by the combined effects of lower nitrogen use on the major cereal crops and oilseed rape.

- Autumn nitrogen was, as in recent years, applied to only 7-12% of the winter cereal crop areas in England and Wales, whereas applications were made to 46-67% of the Scottish crop areas. About 40% of the winter oilseed rape area in England and Wales received autumn nitrogen, compared with 48% in Scotland.

- Overall use of total nitrogen on grassland showed a major decrease of 14 kg/ha, to 109 kg/ha, due to a reduction in compound nitrogen use. This drop in the total application rate was in contrast to the recent partial recovery in nitrogen use, following the very large drop, from 129 kg/ha to 105 kg/ha, recorded in 1992. The wet season in 1998 encouraged plenty of grass growth in most areas, which may have lessened the need for fertiliser inputs in order to meet grazing and forage requirements.

Phosphate

- Overall phosphate use decreased by 3-4 kg/ha on tillage crops and grassland, to 51 kg/ha and 21 kg/ha respectively. These rates were both 2 kg/ha less than the 5-year rolling means.

Potash

- Overall potash rates decreased, by 3 kg/ha on tillage crops and 6 kg/ha on grassland, to 64 kg/ha and 29 kg/ha respectively. The rate for tillage crops was 1 kg/ha more, but for grassland was 2 kg/ha less, than the 5-year rolling means.

Sulphur

- Sulphur use on arable crops susceptible to sulphur deficiency had increased between 1993, when the Survey first started to collect data on sulphur applications, and 1997. The percentages of crop areas treated with sulphur fertiliser were similar to those recorded in 1997, at around 14% for the major cereal crops and, for the second successive year, at 30% for oilseed rape. These findings suggest that sulphur use on these crops may have stabilised, at least temporarily.

- Sulphur was only applied to 3% of the total grassland area, compared with 5% in the previous year and a 5-year rolling mean of 4%. Sulphur treatment on grassland cut for silage dropped from 8% to 6%, despite the greater risk of deficiency under intensive cutting regimes.

The longer term trends since 1985 show that:

- Overall nitrogen use has declined on both tillage crops and grassland.
- Phosphate use has declined gradually on tillage crops, but remains relatively stable on grassland.
- Potash use may have recovered on tillage crops, after a drop between 1992 and 1996. Potash applications to grassland have fluctuated more, and show some signs of marginal decline.

SECTION A

THE BRITISH SURVEY OF FERTILISER PRACTICE

A1 INTRODUCTION

The British Survey of Fertiliser Practice is the principal source of estimates for fertiliser applications in Great Britain. The results from the Survey are used by the British fertiliser industry, by Government and by the wider agricultural community. Estimates from the Survey may be used in conjunction with estimates of crop area from the Annual Agricultural Census[3], to assess the amount of fertiliser used.

Rates of fertiliser applications for 1998 are reported in detail in Section D. Tables are grouped and referenced by geographic coverage: Great Britain (GB), England and Wales (EW) and Scotland (SC). There are tables covering the major crop groups, grassland, product types and farm types. Figures for 'total', 'straight', and 'compound' products are presented in separate tables. For example, Table EW 1.2 contains information on the application of straight nitrogen (N), phosphate (P_2O_5) and potash (K_2O) in England and Wales for major crops and grassland.

HISTORY

The British Survey of Fertiliser Practice (BSFP) has its origins in surveys begun during wartime in 1942 under Dr Frank Yates, conducted thereafter as the Survey of Fertiliser Practice for England and Wales. The survey was re-designed in 1969 as an annual survey to monitor changes in the pattern of fertiliser use, and the methodology was extended to Scotland in 1983. In 1992, responsibility for the management and design of the survey passed from Rothamsted Experimental Station to a research services team based at the Edinburgh University Data Library who re-designed the survey to present reporting for Great Britain – see Burnhill, Chalmers and Fairgrieve (1995)[4]. Publications with information on previous survey results and trends include those by Chalmers, Kershaw and Leech (1990)[5], Church and Lewis (1977)[6] and Yates and Boyd (1965)[7].

TRENDS

Commentary on use and longer term trends is presented in Section B of this report. Recent and past changes in agricultural policies and practice can affect fertiliser usage and, where there is evidence of this, interpretative commentary is also provided. Summary tables on both the average field rates and the overall rates of application have been included to illustrate possible changes in farmers' fertiliser practice.

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[3] MAFF, SOAEFD and the Welsh Office *The Digest of Agricultural Census Statistics UK 1997, TSO*, London, 1997 ISBN 0 11 243039 2 (£25).

[4] Burnhill, P. M., Chalmers, A. G. and Fairgrieve, J. (1995) *The British Survey of Fertiliser Practice: fertiliser use on farm crops 1994*, HMSO, Edinburgh 1995 ISBN 0 11 495304X (£25).

[5] Chalmers, A. G., Kershaw, C. D. and 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.

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

[7] Yates, F. and Boyd, D. A. (1965) 'Two decades of Surveys of Fertiliser Practice' *Outlook on Agriculture* 4 pp 203-221.

SAMPLING

The 1998 British Survey of Fertiliser Practice was carried out using the random selection and interview of a nationally representative sample of approximately 1200 farm holdings in Great Britain (980 from England and Wales and 214 from Scotland). As part of the selection process, 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 five farm type groups (three for England and Wales and two for Scotland). This produced twenty stratification cells in all, the number of farm holdings sampled within each varying in proportion to the total area of crops and grass.

Further details of sampling, including estimates of sampling error, are given in Section C (Sample methodology and sampling variation).

FIELDWORK

The farms in the sample were visited by ADAS Consulting Ltd., who carried out interviews with farmers and farm managers between mid-June and September 1998, recording information on fertiliser use during the 1997/98 growing season. Information on about 10,000 fields was recorded on special field sheets, designed to be read automatically for data transfer at the University of Edinburgh.

CONFIDENTIALITY

Throughout the administration of the survey, strict safeguards were applied to ensure the accuracy and the confidentiality of information relating to individual farms. The Data Library at the University of Edinburgh ensures that no one outside the survey team may identify individual farm data.

A2 DEFINITIONS

1 For the purpose of the Survey, the term **Britain** is defined to cover mainland Britain, Anglesey and the Isle of Wight.

2 The **survey year** ran from autumn 1997 to autumn 1998, corresponding to the 1998 season or harvest year. The recording period for fertiliser applications varied for different crop and grass groups.

3 For the purposes of this survey, a **field** is defined as any single area of land measuring more than 0.2 ha (half an acre) which had a uniform cropping and fertiliser history from autumn 1997. Areas within the same natural boundary receiving different treatments (crops or fertilisers) were recorded separately. Agricultural land which had been set aside under the Arable Area Payment Scheme was recorded, but was not included in analyses unless it was used to grow an industrial crop. Fallow land other than set-aside has always been recorded in the survey.

4 In the report, **tillage** is defined as all crops except grass, forestry, glasshouse crops and land designated as 'set-aside' under the Arable Area Payments scheme. **Grass** refers to all forms of grassland which may be grazed, conserved or grown for seed production; rough grazing is excluded.

5 The abbreviation **N** is used for nitrogen; P_2O_5 for phosphate; K_2O for potash, SO_3 for sulphur and **FYM** for all types of organic manure e.g. slurries and solid manures. The phrase **total use** includes both straight (single nutrient) and compound (multi nutrient) products.

6 For each fertiliser nutrient, the **average field rate** (of application) is defined as the average rate at which a nutrient was used by farmers on those fields which received any dressing of the nutrient. Crop area 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 and variation in farming practice.

7 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.

8 The **overall application rate** is defined as the proportion of the total quantity of nutrient used, in kilograms (kg), to the total extent of crop area, in hectares (ha). When combined with information from the national total crop area estimates in the Agricultural Census, these overall application rates provide a means of estimating tonnages of fertiliser used during the survey year.

Any change in an overall application rate is due 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. Arithmetically, the overall application rate 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, by definition, cannot be greater than the average field rate of application.

A3 CROP AREAS AND WEATHER CONDITIONS

Annual changes in relative cropping areas, as well as any changes in fertiliser practice for individual crops, may affect nutrient application rates when aggregated across the main crop groupings. Table A1.1 provides a summary of census estimates for areas of individual major crops, crop groupings and total tillage and grassland categories in 1996/97 and 1997/98, and illustrates percentage changes in relative cropping areas over the past five years. Tillage crops covered 46% of the total area farmed for crops and grass in 1998, with the remainder in managed grassland, of which four-fifths was at least five years old.

Table A1.1 Cropping and grassland areas ('000 ha), Great Britain, 1996/97-1997/98

Crops	1996/97 000's ha	1997/98 000's ha	% change since 1997	% change since 1993	1997/98 crop areas as % of total tillage area
Wheat	2029	2038	0.4	16.3	41
Barley – winter	832	764	-8.1	19.0	15
– spring	490	456	-6.9	-5.8	9
Total Cereals[a]	3467	3375	-2.7	13.1	68
Oilseed rape – winter	374	443	18.4	59.3	9
– spring	68	62	-8.8	-35.2	1
Sugar beet	196	189	-3.5	-4.4	4
Potatoes[b]	158	157	-0.8	-2.9	3
Peas/beans[c]	197	213	8.0	-12.7	4
Maize/other fodder	180	168	-6.5	19.6	3
Vegetables	125	122	-2.4	-2.0	2
Total tillage[d]	4959	4942	-0.3	9.8	100
Set-aside[e]	306	313	2.3	-53.7	6
Grassland					**1997/98 grass areas as % of total grass area**
Less than 5 years old	1203	1136	-5.6	-17.0	20
5 years and older	4604	4641	0.8	3.5	80
Total grass[f]	5807	5776	-0.5	-3.6	100
Total crops and grass[g]	10765	10718	-0.4	2.2	–

[a] including minor cereals (oats, rye, triticale, mixed corn)
[b] early + 2nd early + maincrop potatoes
[c] harvested dry for animal consumption
[d] including other crops and bare fallow, but not set-aside
[5] including industrial crops; the percentage area is expressed as the ratio of set-aside area to the total area designated for cultivation.
[f] managed grassland, excluding rough grazing
[g] total tillage + total managed grassland

Source: Annual MAFF/SOAEFD/Welsh Office June Census data

There are approximately 11 million hectares of managed agricultural land in Britain of which 5 million hectares are cultivated and 6 million hectares are grassland.

Sixty eight percent (3.4 Mha) of all the land used for tillage was cropped with cereals in 1998, with 41% (2 Mha) used for wheat production. The total tillage area was virtually unchanged, compared to 1997. The 7-8% drop in the barley area, down 102,000 ha, was mainly associated with increased sowings of 'break' crops; the total oilseed rape and pulse (peas/beans) areas increased by 63,000 ha (+14%) and 16,000 ha (+8%) respectively, while the wheat area rose only marginally by 9,000 ha. The proportion of the total oilseed rape crop area which was spring, rather than autumn, sown dropped from 15% to 12% because of a 69,000 ha increase in winter oilseed rape, together with a 6,000 ha decrease for the spring sown crop. Other tillage crops showed relatively little change, apart from the area cultivated with fodder crops which was down by 7%. The total grassland area hardly changed either, because a reduction of 67,000 ha in the area of grassland less than five years old was largely offset by a 37,000 ha expansion in the area of grass at least five years old.

The total tillage area has increased by 10% over the five years since 1993. This may be attributed to the large drop in the set-aside area, down from 678,000 to 313,000 ha, which, in turn, may be attributed to changes to the Arable Area Payment Scheme (AAPS). The five-year changes in winter cereal and spring oilseed rape areas were also related to the AAPS, while the fodder crop area increased because of an expansion in forage maize cropping. The total grassland area has shown a slight, but consistent, decline since 1993.

Unusual seasonal weather conditions can influence fertiliser usage in some years. For example :

- A very wet autumn can delay the establishment of winter sown crops, or alter the ratio of winter to spring sown crops, with their different fertiliser requirements.
- Prolonged wet weather can increase leaching losses of some nutrients, particularly nitrogen and sulphur. Weather conditions also affect other aspects of soil chemistry and nutrient availability.
- Adverse weather conditions can disrupt planned farming activities, such as fertiliser spreading.
- Growing conditions determine plant growth and hence affect nutrient requirements.

The 1997/98 season had a fairly dry autumn, followed by a relatively mild and dry winter across most of southern Britain, with very low rainfall during February. April was, however, exceptionally wet and subsequent rainfall was well above average over most of the summer period, combined with cool temperatures. In Scotland late autumn was wet but was followed by a fairly dry and mild winter and a very wet spring and summer.

Advisory guidelines issued in early spring advocated small cutbacks in spring nitrogen rates for arable crops in England and Wales, because of above average soil nitrogen reserves. However, the high rainfall in April may have encouraged farmers to apply standard amounts of nitrogen fertiliser after all, to counter possible leaching losses from earlier nitrogen dressings. The possible impact of the spring and summer weather pattern on grass growth and fertiliser requirements is discussed in Section B1.3.

SECTION B

COMMENTARY ON FERTILISER USE IN GREAT BRITAIN

This commentary refers to rates of application in mainland Britain of fertilisers containing nitrogen (N), phosphate (P_2O_5), potash (K_2O) and sulphur (SO_3) on tillage crops and grassland (excluding rough grazing). Section B1 of the report covers the five-year period 1994 to 1998. Comments on longer term trends are made in Section B2, using data available from what were, prior to 1992, two separate Surveys of Fertiliser Practice, for England and Wales and for Scotland.

The estimates of overall application rates from the survey relate to usage on farms during the 1997/98 growing season: they form a basis for estimating quantities of fertiliser used in Great Britain. The estimates of the average field rates provide a better indication than overall application rates of actual usage levels and also of any annual variation in fertiliser practice on farms.

The statistics on the pattern of fertiliser practice reported for Great Britain largely reflect practice in England and Wales due to its greater area of total crops and grassland: about 9 million hectares in England and Wales and about 1.7 million hectares in Scotland. In what is otherwise a commentary on Britain as a whole, remarks on the separate countries are only made to highlight particular trends of interest. Readers interested in more detailed recent trends for England and Wales, or for Scotland, can refer to tables presented in Section D of the 1996 to 1998 annual Reports, in conjunction with the summary tables of annual fertiliser use in the main text of the 1995 report[8].

The nutrient rates presented and discussed in the main text of this Report are based on crop areas estimated from the survey data. Data from the 1998 Agricultural Census on crop areas have been summarised in Table A1.1. Crop area estimates from the Agricultural Census have greater reliability as they are derived from a far larger sample of farms. Census crop areas are used in Section C of the report to re-estimate application rates, for total tillage and grassland crop groupings, taking into account the limitations of survey crop area estimates extrapolated from a comparatively small survey sample. These adjusted rates, together with an explanation of their derivation, are given in Section C, along with other comments on methodology. This is the second year that these adjusted rates have been calculated and consideration is being given to their regular inclusion in the report and to the re-estimation of statistics for earlier years in order to assist comparison over time. In general, the adjusted estimates are very close to those reported in Section B, although they do moderate some estimates reported for grassland.

[8] Burnhill, P. M., Chalmers, A. G. and Fairgrieve, J. (1996) *The British Survey of Fertiliser Practice: fertiliser use on farm crops 1995.* HMSO: Edinburgh.

B1.1 Overview of fertiliser use on tillage crops and grassland

Overall rates of total nitrogen, phosphate and potash are illustrated in Figure B1.1, which is based on data presented in Tables B1.1 and B1.2. Application rates for straight and compound nitrogen applied on crops and grassland are also presented in Table B1.1. Definitions of the terms used are set out in the previous section, Section A.

Figure B1.1 Overall fertiliser use (kg/ha) on all crops and grass, Great Britain 1994-1998

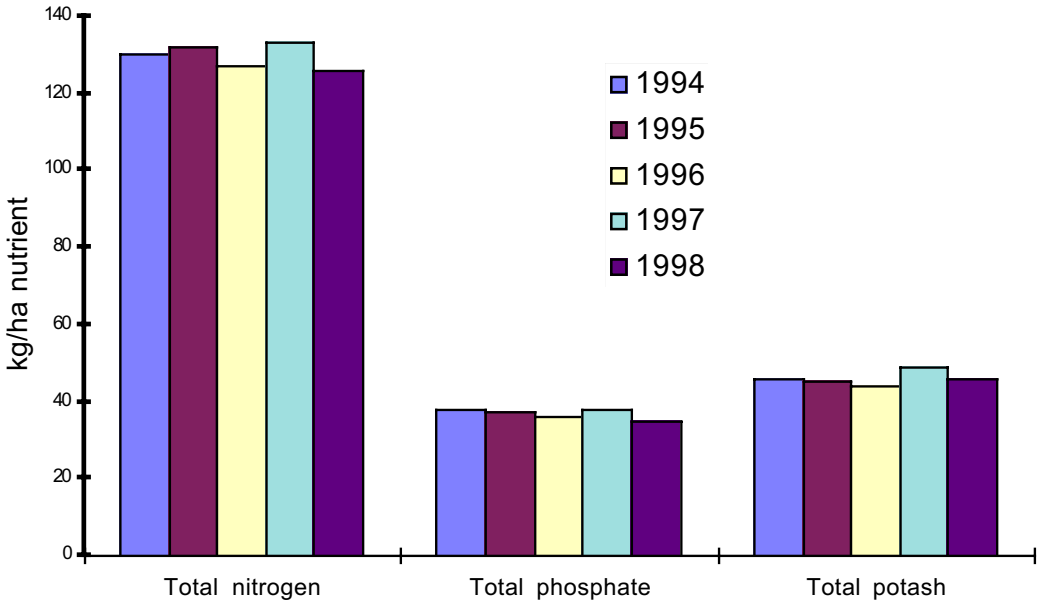


Table B1.1 Overall nitrogen use (kg/ha), Great Britain, 1994 –1998

Total nitrogen

	tillage	grass	all crops and grass
1994	147	116	130
1995	149	118	132
1996	145	115	128
1997	149	123	136
1998	144	109	126

Straight nitrogen

	tillage	grass	all crops and grass
1994	120	51	84
1995	125	52	85
1996	121	53	84
1997	126	54	88
1998	123	53	87

Compound nitrogen

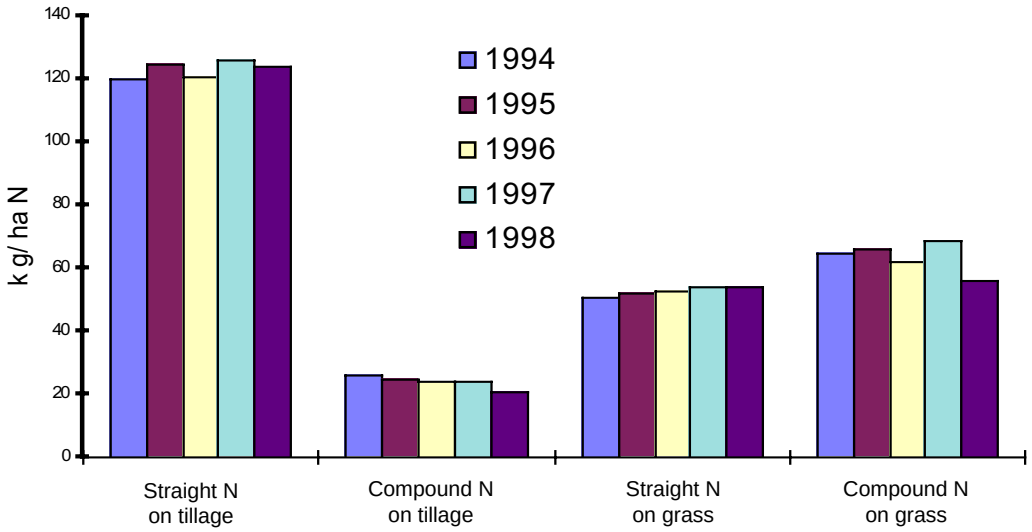
	tillage	grass	all crops and grass
1994	26	65	47
1995	25	66	47
1996	24	62	45
1997	24	69	47
1998	21	56	39

B1.1.1 NITROGEN

All Crops and Grassland

The overall rate for total nitrogen use on all crops and grassland in mainland Britain, which had shown a large increase in the previous year, dropped back by 10 kg/ha in 1998, to 126 kg/ha (Figure B1.1, Table B1.1). This fall is the combined effect of a reduction in the proportion of the crop and grassland area receiving fertiliser, and of a general reduction in field application rates. This decrease in total nitrogen usage, to a level similar to that in 1996, was mainly related to a drop in overall use of compound nitrogen, with a 5 kg/ha decrease in the overall total nitrogen rate for tillage crops and a much larger decrease of 14 kg/ha in the total rate applied to grassland (Table B1.1).

Figure B1.2 Overall straight and compound nitrogen use (kg/ha), Great Britain 1994 – 1998



Tillage Crops

The overall rate of total nitrogen for tillage crops in Great Britain decreased by 5 kg/ha in 1998 to 144 kg/ha (Table B1.1). A reduction in the field rate for straight nitrogen brought the overall rate down by 3 kg/ha to 123 kg/ha. In 1998, the overall rate for compound nitrogen on tillage crops in Great Britain was 21 kg/ha. This decrease of 3 kg/ha is large in relation to the otherwise slow decline over recent years. This decrease in compound use was reported for England and Wales; there was no corresponding drop in Scotland.

Grassland

The overall rate of total nitrogen on grassland in Great Britain showed a large drop of 14 kg/ha in 1998 down to 109 kg/ha, back to a level closer to that reported after a similar drop in 1992. This substantial reduction is reflected in the lower overall rates reported for England and Wales and Scotland at 16 kg/ha and 5 kg/ha below equivalent rates reported in 1997, resulting from decreases in both dressing covers and average field application rates.

Overall use of straight nitrogen on grassland in Great Britain was virtually unchanged in 1998. The overall rate of compound nitrogen, however, decreased significantly by 13 kg/ha to 56 kg/ha, the lowest rate recorded for five years. The sharp drop in compound nitrogen use was due to the net effect of substantial reductions in both the field rate applied and the proportion of grass area receiving any compound dressing. In England and Wales this resulted in a 15 kg/ha decrease in the overall compound nitrogen rate. By contrast,

compound nitrogen use in Scotland was seen to increase slightly by 2 kg/ha. In recent years, the percentage of grassland receiving dressings of straight and compound nitrogen has remained comparatively stable around the 5-year averages of 42% and 65% respectively. However, in 1998, the proportion of the grassland area receiving compound nitrogen dropped from 68% to 60% (Table B1.10).

B1.1.2 PHOSPHATE AND POTASH

Phosphate

The overall rate of phosphate application on tillage crops in Great Britain dropped significantly by 4 kg/ha in 1998 to 51 kg/ha, the lowest level for 5 years (Table B1.2). This drop was related to decreases of 4 kg/ha and 3 kg/ha in the overall application rates for England and Wales and for Scotland respectively. Overall phosphate use had remained steady for a number of years until 1997, when the application rate rose.

Phosphate usage on grassland in Great Britain also decreased significantly by 4 kg/ha in 1998 to 21 kg/ha which again was the lowest recorded rate over the 5-year period. This drop was experienced in both England and Wales and Scotland, where decreases of 4 kg/ha and 5 kg/ha respectively were reported.

Table B1.2 Overall phosphate and potash use (kg/ha), Great Britain 1994 - 1998

Total phosphate

	tillage	grass	all crops and grass
1994	53	24	38
1995	53	24	37
1996	52	23	36
1997	55	25	39
1998	51	21	35

Total potash

	tillage	grass	all crops and grass
1994	63	31	46
1995	61	31	45
1996	61	30	44
1997	67	35	50
1998	64	29	46

Potash

Overall potash rates fell back in 1998 by 3 kg/ha and 6 kg/ha respectively on tillage crops and grassland in Great Britain, after large apparent increases in the previous year. Decreases for both tillage crops and grassland were recorded in England and Wales, whereas the overall rates in Scotland were almost unchanged from the previous year. The overall rates in 1998 were slightly more on tillage crops and less on grassland than the 5-year means of 63 kg/ha and 31 kg/ha respectively

B1.2 Fertiliser use on major tillage crops

Overall and average field rates of fertiliser application for major tillage crops in Great Britain over the past five years are summarised in Tables B1.3 and B1.4. More detailed statistics for 1998 are presented in Section D.

Small apparent changes in fertiliser use on individual crops should be treated with a degree of caution as these estimates are based on a smaller number of farms and fields than the aggregate estimates for all tillage crops. Information on 'sampling errors', which help in judging whether apparent changes may be real or attributable to sampling variation alone, is given in Section C.

Table B1.3 Overall fertiliser use (kg/ha) on major tillage crops, Great Britain 1994 - 1998

Total nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	186	95	143	194	179	122
1995	193	99	144	176	188	118
1996	185	94	140	171	188	107
1997	192	95	143	169	203	110
1998	182	92	135	188	188	109

Straight nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	170	45	125	42	156	92
1995	177	45	130	33	165	96
1996	174	41	125	25	168	84
1997	179	40	127	30	182	85
1998	171	40	120	49	170	88

Compound nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	15	50	18	152	23	30
1995	16	54	14	143	22	22
1996	11	52	16	146	20	23
1997	13	54	15	139	21	25
1998	11	52	15	139	18	22

Total phosphate

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	52	42	52	194	50	57
1995	51	47	53	185	49	51
1996	51	47	52	178	52	40
1997	53	51	58	173	51	50
1998	48	42	51	184	50	49

Total potash

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	53	52	62	254	52	127
1995	52	55	63	255	50	111
1996	53	56	60	248	52	96
1997	56	59	70	249	55	133
1998	53	58	66	276	48	121

[a] Note: All 1997 and 1998 figures for maincrop potatoes include second early crops

[b] Note: Single crop grouping for the combined winter and spring oilseed rape areas

Table B1.4 Average field rates (kg/ha) on major tillage crops, Great Britain 1994 - 1998

Total nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	187	96	144	197	182	127
1995	194	99	145	182	190	122
1996	188	96	143	180	197	112
1997	193	96	144	184	204	112
1998	183	95	136	193	188	111

Straight nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	175	78	134	123	169	108
1995	184	76	136	108	175	113
1996	179	77	137	111	183	100
1997	185	71	138	101	194	100
1998	176	74	127	123	177	102

Compound nitrogen

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	44	66	45	173	46	86
1995	52	65	44	163	50	77
1996	48	67	51	162	50	74
1997	49	69	49	160	50	82
1998	47	67	46	164	45	73

Total phosphate

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	68	49	68	208	65	80
1995	66	51	63	192	63	70
1996	68	53	64	190	65	67
1997	68	57	65	186	64	63
1998	68	51	66	195	66	68

Total potash

	winter wheat	spring barley	winter barley	maincrop potatoes[a]	oilseed rape[b]	sugar beet
1994	73	59	76	270	70	144
1995	72	59	75	265	69	133
1996	74	62	73	259	67	129
1997	75	64	78	267	71	143
1998	77	64	80	291	68	139

[a] Note: All 1997 and 1998 figures for maincrop potatoes include second early crops

[b] Note: Single crop grouping for the combined winter and spring oilseed rape areas

B1.2.1 NITROGEN

Total nitrogen use decreased on cereal crops and oilseed rape, but remained the same for sugar beet and increased on maincrop potatoes in 1998. As a result, overall rates of total nitrogen were below average for cereals and sugar beet and above average for maincrop potatoes, compared to the averages over the 5-year period shown (1994 to 1998).

Winter wheat

The overall rate of total nitrogen applied to winter wheat in Great Britain has fluctuated over the past five years (Table B1.3), following steady application rates of 185-186 kg/ha over the 1992 to 1994 period. The significant decrease in 1998 of 10 kg/ha, to 182 kg/ha, resulted from decreases of 8 kg/ha and 2 kg/ha in the overall rates of straight and compound nitrogen respectively. Changes in average field rates, a measure of typical farmer practice, were the underlying explanation. The higher rates observed in 1995 and 1997 were both caused by an upward shift in the distribution of nitrogen rates on the crop, since 99-100% of the winter wheat crop is dressed with nitrogen fertiliser each year. The overall rates of straight and compound nitrogen in 1998 were 3 kg/ha and 2 kg/ha less, respectively, than the average for the 5-year period.

Table B1.5 Average field application rates (kg/ha) of nitrogen on cereals by market use, Great Britain 1994 - 1998

Total nitrogen

	winter wheat		spring barley		winter barley	
	milling	non-milling	malting	non-malting	malting	non-malting
1994	208	189	97	95	133	157
1995	205	191	102	96	132	152
1996	198	185	97	93	129	152
1997	209	190	98	91	126	151
1998	192	180	100	89	116	146

- Nitrogen fertiliser requirements for winter wheat depend on the intended market end use, as well as upon average yield potential, soil type and the residual soil nitrogen fertility from previous cropping and manure practice[9]. Milling varieties are usually grown as a second wheat and often receive extra nitrogen, either as a solid dressing or as late foliar urea spray, which is applied in order to improve the chances of achieving an adequate grain protein content for a milling premium. High yielding feed crops, rather than lower yielding varieties of milling wheat, are often grown as a first winter wheat after a break crop, to exploit the potential yield and residual soil nitrogen benefits from the crop rotation, and also to avoid any risk of lower grain protein concentrations as a result of yield 'dilution' effects with a first wheat in the rotation.

These agronomic factors are reflected in the statistics derived from this Survey: between 1994 and 1998, the mean field application rate of nitrogen on milling wheat (203 kg/ha) was 16 kg/ha higher than the average rate of 187 kg/ha on non-milling (feed/seed) varieties (Table B1.5). In 1998 average field rates for both milling and non-milling crops were the lowest for five years – lower by 10 kg/ha and 7 kg/ha, respectively, than the average for the last five years.

[9] *Fertiliser Recommendations for Agricultural and Horticultural Crops. MAFF Reference Book 209 (Sixth edition)* London: HMSO, (1994).

Table B1.6 Percentage distribution (% crop area) of cereal crop areas by market use, Great Britain 1994 - 1998

	winter wheat		spring barley		winter barley	
	milling	non-milling	malting	non-malting	malting	non-malting
1994	26	74	53	47	29	71
1995	20	80	63	38	32	68
1996	20	80	65	35	30	70
1997	16	84	65	35	33	67
1998	26	74	52	48	33	67

Crop area estimates from this Survey indicated a large increase, in the proportion of the winter wheat area in Great Britain grown for milling use in the 1997/98 season, rising from 16% to 26%, back to the same level recorded in 1994 (Table B1.6)[10]. The milling wheat area had declined in 1997, mainly because expected premiums for milling quality had been small. Despite this increase in the milling wheat area percentage, the overall rate of total nitrogen on the total winter wheat crop fell by 10 kg/ha in 1998 (Table B1.3) because of the drop in average field rates for both wheat categories (Tables B1.4 and B1.5).

Spring barley

The average field rate of total nitrogen on spring barley dropped only slightly, by 1 kg/ha, in 1998; the apparent decline in the overall rate, of 3 kg/ha, the lowest recorded rate for spring barley since 1992, may be attributed to a combination of changes in market use and dressing cover, as explained below. The overall rate of total nitrogen decreased by 3 kg/ha for the crop grown both in Scotland and in England and Wales. Overall rates of straight nitrogen applied to spring barley in Great Britain have decreased by 5 kg/ha over the past five years; compound nitrogen rates have fluctuated.

Average field rates of total nitrogen applied to spring barley, have tended to decrease slightly on non-malting crops over the last five years (Table B1.5). Average field rates are generally higher on malting crops, despite annual fluctuations.

- This consistent finding in this survey is contrary to expectation as lower rates of nitrogen are recommended for malting barley, under the same conditions of soil type and nitrogen fertility level, than for the feed varieties of barley. This recommendation is made to avoid the risk of high grain nitrogen content which would adversely affect subsequent malt quality. However, malting crops are normally grown on soils with low nitrogen fertility and the average field rates of nitrogen reported for malting varieties in Table B1.5 are generally in the range recommended for mineral soil types with low nitrogen residues (90 - 100 kg/ha)[11]. Feed crops on the other hand are often grown within mixed rotations, which tend to have a higher soil nitrogen fertility, with consequently less need for nitrogen fertiliser.

Estimates from this Survey indicate a drop, from 65% to 52%, in the proportion of spring barley area in Great Britain grown for malting in 1998 (Table B1.6)[12], back to a level recorded in 1994. The average field rate for the whole of the Great Britain crop dropped by

[10] Estimates by the Home Grown Cereals Authority (HGCA) indicate that only 12% of the total winter wheat area grown in the United Kingdom (UK) was planted to Group 1 varieties (i.e. favoured for breadmaking) in 1998 compared with 11% and 9% in 1996 and 1997 respectively. These data confirm the recent swing towards greater production of feed wheat in Britain, because of the relatively small premiums which farmers have obtained for milling wheat over the past few years. Source: HGCA.

[11] *Fertiliser Recommendations for Agricultural and Horticultural Crops. MAFF Reference Book 209 (Sixth edition)* London: HMSO, 1994.

[12] The corresponding HGCA estimate for the UK was 77% in 1998, compared with 78% in 1997. Source: HGCA.

an estimated 1 kg/ha (Table B1.4) and, combined with a slight reduction in dressing cover (from 97% to 94%) for the total crop area in England and Wales, this explains the 3 kg/ha decrease for the overall rate of total nitrogen (Table B1.3).

Winter barley

The overall rate for total nitrogen on winter barley in Great Britain decreased by 8 kg/ha to 135 kg/ha, mirroring the drop in straight nitrogen use (Table B1.3); both rates were the lowest recorded in the last five years. The drop in the overall nitrogen application rate (and the average field rate) for the crop in England and Wales of 9 kg/ha, was slightly offset by an increase for the Scottish crop of 2 kg/ha.

The average field rate of compound nitrogen applied to winter barley was the same in 1998 as it was in 1994, but because of a change in dressing cover, the overall rate has decreased by 3 kg/ha. The overall rate for straight nitrogen has largely followed the fluctuations in average field rates for straight nitrogen over the past five years; about 90-95% of the crop area is dressed with straight nitrogen and most of the total input is applied in this form. (Table B1.4).

Nitrogen requirements for winter barley, as with the spring sown crop, depend on a range of agronomic factors, including the intended market for the grain. Average field rates of total nitrogen decreased sharply by 10 kg/ha and 5 kg/ha respectively on malting and non-malting crops of winter barley in 1998, continuing the recent downward trend for both categories (Table B1.5). The mean for average field rates over the last five years was 25 kg/ha lower on malting crops (mean 127 kg/ha) than on non-malting (feed/seed) crops (at 152 kg/ha).

- This lower application rate of nitrogen on winter barley grown for malting would be expected. This is because the majority of winter barley feed crops are grown in England in arable rotations at a stage when the soil nitrogen fertility status is low, often following a previous cereal crop. Consequently, they receive more nitrogen fertiliser than malting crops, which are also usually grown in the same situation within the crop rotation. The Survey estimates for the proportion of the crop area grown for malting in Great Britain have been fairly steady at 29% to 33% since 1994, with no change in 1998, at 33% (Table B1.6)[13].

Maincrop potatoes

It should be noted that, for the 1997 and 1998 surveys, second early crops were grouped with maincrop, rather than with early potatoes, as was the practice in previous years, because of their similarity in cropping practice and fertiliser requirements. This provides a robust estimate of fertiliser use on the main crop, but reduces comparability across the five-year period.

In 1998, the overall total rate of nitrogen for maincrop potatoes in Great Britain increased significantly by 19 kg/ha to 188 kg/ha. This reflected the increase in straight nitrogen use (Table B1.3). The overall rate, however, has ranged quite widely over the last five years, from 169 kg/ha to 194 kg/ha in line with the considerable variation in the average field rates (Table B1.4).

About three quarters of the fertiliser nitrogen for potatoes is applied in the form of compound, rather than straight, nitrogen products. The overall rate of compound nitrogen

[13] Recent HGCA estimates indicated that 51% of the crop area was grown for malting in 1998, compared with 26-31% between 1995 and 1997.
Source: HGCA.

was unchanged in 1998, at 139 kg/ha, having fallen by 7 kg/ha in the previous year. The increase in 1998 in the overall rate of straight nitrogen, to the highest recorded level in the last five years, resulted from increases in both the dressing cover and average field rate for the crop grown in England and Wales.

- This increase in straight nitrogen use may reflect some extra nitrogen inputs on sandy soils, applied as top dressings after crop establishment, to compensate for possible leaching losses of seedbed fertiliser nitrogen during the very wet spring.

Oilseed rape

The overall rate of total nitrogen on oilseed rape, as a combined category for the autumn and spring sown crops, decreased in 1998 by 15 kg/ha to 188 kg/ha, due to decreases in overall rates of both straight and compound nitrogen of 12 kg/ha and 3 kg/ha, respectively (Table B1.3). This change resulted from a drop in total nitrogen use on both winter and spring oilseed rape in England and Wales; in Scotland only the rate on the autumn sown crop fell. Despite this overall drop, the total nitrogen rate for the combined oilseed rape crop grouping was close to the 5-year average and the same as the levels recorded for 1995 to 1996. The underlying average field rate for total nitrogen showed an almost identical change in 1998 to that for the overall rate (Table B1.4).

The overall rate of total nitrogen applied to oilseed rape had dropped from 227 kg/ha to 196 kg/ha in 1992 and again to 180 kg/ha in 1993. However, the pattern of total nitrogen use on oilseed rape since 1992 and 1993, when 13% and 34% respectively of the crop was spring-sown, can be attributed mainly to annual changes in the relative areas of the autumn and spring-sown crops. Changes in average field rates for each crop category had a smaller effect (Table B1.7); average field rates of total nitrogen in 1992 to 1993 were 209 kg/ha to 212 kg/ha and 123 kg/ha to 121 kg/ha for winter and spring oilseed rape, respectively.

Changes in the overall rate of total nitrogen on oilseed rape since 1994 have mainly been determined by the use of straight, rather than compound, nitrogen products (Table B1.3). Overall rates of straight, and hence total nitrogen, have increased, over the last five years, while there has been a slight decline in the overall rate for compound nitrogen. During that period, the average field rate for straight nitrogen has ranged from 169 to 194 kg/ha but only from 45 to 50 kg/ha for compound nitrogen, resulting in a range for total nitrogen rates of 182 to 204 kg/ha (Table B1.4).

Table B1.7 Average field application rates of nitrogen on winter and spring oilseed rape and percentage distribution of crop areas, Great Britain 1994 - 1998

	Total nitrogen (kg/ha)		% crop area	
	winter	spring	winter	spring
1994	212	121	66	34
1995	210	121	79	21
1996	212	127	81	19
1997	215	120	88	12
1998	204	115	83	17

There was a decrease in 1998 in the average field rates for total nitrogen applied to both winter (-11 kg/ha) and spring (-5 kg/ha) oilseed rape which mostly explains the lower application rate for the combined crop category (Table B1.4).

Sugar beet

Virtually all the sugar beet crop in Britain is grown in England. Overall and average field rates of total nitrogen for this crop were little changed in 1998: recorded rates had only

decreased by 1 kg/ha (Tables B1.3 and 1.4). Overall nitrogen use appears to have stabilised over the past three years. Although overall rates of both straight and compound nitrogen have decreased to some extent since 1994, the small increase in straight nitrogen use in 1998 was counterbalanced by a drop in the compound nitrogen rate.

B1.2.2 PHOSPHATE AND POTASH

Phosphate

The overall phosphate rate for tillage crops in 1998 dropped by 4 kg/ha to 51 kg/ha, the lowest level over the past five years (mean 53 kg/ha) (Table B1.2). This change was caused mostly by decreases in the phosphate application rates for all the major cereal crops. There was, however, an increase in the overall rate for maincrop potatoes.

Overall rates of phosphate applied to winter wheat, and to winter and spring barley, had been relatively stable over the 1993 to 1996 period. In 1997, they rose, only to fall sharply in 1998, with significant decreases for winter wheat, winter barley and spring barley, now reported at 48 kg/ha, 51 kg/ha and 42 kg/ha respectively. These application rates for each crop are the lowest recorded for the last five years. Dressing covers decreased by 4-7% for these cereal crops in 1998, and this was the main reason for the drop in the overall phosphate rate on winter cereals. Average field rates in 1998 were, however, unchanged for winter wheat and 1 kg/ha more for winter barley, but 6 kg/ha lower for spring barley (Table B1.4).

- The Survey results do not identify any specific reasons for this drop in phosphate (also potash) usage; it may simply reflect a short term strategy on the part of some farmers, making financial savings under difficult economic circumstances.

Annual estimates for phosphate use on maincrop potatoes have tended to be variable, not only in the past five years but also over the longer term. This variability partly reflects the increased sampling error associated with the smaller sample size for this crop, compared to the other major arable crops (see Table C5). The overall rate increased by 11 kg/ha in 1998, to 184 kg/ha, relative to a 5-year average of 183 kg/ha. For oilseed rape, the overall phosphate rate has been relatively steady, at 49 kg/ha to 52 kg/ha over the 1994 to 1998 period. Overall use of phosphate on sugar beet had been stable at 57 kg/ha to 59 kg/ha during 1992-94 and since then has consistently been around 50 kg/ha, apart from a temporary apparent drop to 40 kg/ha in 1996.

Potash

Overall potash use on tillage crops decreased by 3 kg/ha in 1998, to 64 kg/ha (Table B1.2), about the same as the 5-year average of 63 kg/ha. This drop resulted from lower application rates, compared with 1997, on all the major crops except for maincrop potatoes, where potash use increased (Table B1.3).

Overall application rates of potash showed an apparent decrease on the winter cereals (Table B1.3). There were underlying reductions in dressing cover, relative to 1997; the average field rate increased by 2 kg/ha for each winter cereal and was unchanged on spring barley (Table B1.4). Over the last five years, potash use has generally been very consistent on winter wheat at 52 kg/ha to 53 kg/ha, apart from an increase in 1997. Usage has, however, tended to increase slightly on both winter and spring barley, with higher average usage (64 kg/ha and 56 kg/ha, respectively) compared to winter wheat (53 kg/ha).

Overall potash use on maincrop potatoes had been fairly steady during the period 1994 to 1997, ranging from 249 kg/ha to 255 kg/ha, with much less variation (6 kg/ha range) than for phosphate (19 kg/ha range). In 1998, however, the overall rate apparently rose by

27 kg/ha, to 276 kg/ha, due to an increase in the average field rate, but these estimated rates had very high standard errors (Table C5).

Overall potash use on oilseed rape dropped by 7 kg/ha in 1998 to 48 kg/ha, the lowest rate for the last five years, because of decreases in both average field rate and dressing cover. Annual potash use has not, however, been very variable on oilseed rape since 1994, with a 5-year mean of 51 kg/ha.

- The drop in potash use on combinable crops in 1998 may, as suggested for phosphate, be indicative of short-term strategies on some farms to reduce the variable costs of crop production.

The overall potash rate on sugar beet has fluctuated widely since 1994, ranging from 96 kg/ha to 133 kg/ha; in 1998, the overall rate decreased by 14 kg/ha, to 121 kg/ha, due to decreases in both average field rate and dressing cover.

- Part of the reason for recent apparent fluctuations in estimates of nutrient application rates for sugar beet may lie in the reporting process; it is recognised that information on the nutrient content of bulk fertilisers, often applied by contractors, is less reliably reported by farmers than for self-applied, bagged products, where constituent details are given on the bag. This comment is especially pertinent to crops such as sugar beet and potatoes where bulk fertiliser applications are more prevalent. Estimated potash and phosphate rates on sugar beet have relatively high standard errors (Table C5) which, as for potatoes, may be a consequence of less reliable information on the nutrient content of some bulk fertiliser applications which are spread by contractors.

B1.2.3 SULPHUR

Sulphur deficiency is now a recognised problem for certain susceptible crops, particularly oilseed rape, cereals and intensively cut grass, grown on sandy or shallow soils in areas with low levels of atmospheric sulphur deposition[14]. This situation has arisen as a result of the sharp, and continuing, decline in sulphur dioxide emissions from industry and the previous lack of other sulphur inputs from manufactured fertiliser or organic manure dressings, resulting in depleted soil reserves of sulphur. Fertilisers containing sulphur, mainly in water soluble sulphate form, are now an important agronomic input on some soil types for crops which have a large sulphur requirement.

The Survey has collected detailed information on sulphur fertiliser use in Great Britain since 1993. Dressing covers of fertiliser-sulphur increased for both cereals and oilseed rape over the 1993 to 1997 period, such that 13% to 14% of the crop area for each major cereal and approaching one third of the total oilseed rape area, received an application of sulphur in 1997 (Table B1.8). Dressing covers in 1998 showed little change on either cereal crops or, for the second successive year, on oilseed rape, which suggests that sulphur usage may have stabilised.

Average field rates of sulphur for winter cereals and spring barley had tended to increase since 1993 and, in 1997, were all very similar at around 39 kg/ha SO_3 (Table B1.8). The average field rates in 1998 were similar on winter wheat and winter barley but were 12 kg/ha lower, at 27 kg/ha, on spring barley. The recommended rate is 40 kg/ha SO_3 (as a water-soluble form) for potentially deficient cereal crops. For oilseed rape, the recommended application rate is higher, at 75 kg/ha. The actual rate applied to oilseed rape has fluctuated over the past five years, from 45 kg/ha to 63 kg/ha, falling in 1998 to 51 kg/ha (Table B1.8)

[14] McGrath, S. P., Zhao, F. J. and Withers, P. .J A., (1996). Development of sulphur deficiency in crops and its treatment. *Proceedings No. 379*. The Fertiliser Society, York. ISSN 1466-1314.

Table B1.8 Dressing cover (% area) and average application rate (kg/ha SO_3) of sulphur on cereals and oilseed rape, Great Britain 1994 - 1998

Dressing cover

	winter wheat	winter barley	spring barley	oilseed rape
1994	6	7	7	11
1995	11	11	11	22
1996	8	10	7	30
1997	13	13	14	30
1998	15	13	13	30

Average field rate

	winter wheat	winter barley	spring barley	oilseed rape
1994	28	34	32	63
1995	29	29	30	45
1996	46	47	26	48
1997	38	40	39	63
1998	38	36	27	51

Dressing covers of sulphur in Scotland in 1998 were, except for spring barley, much greater than those for England and Wales, at 47% for winter wheat, 39% for winter barley, 19% for spring barley and 60% for oilseed rape. These figures reflect the more widespread need for sulphur applications in Scotland, because of the very low sulphur deposition and greater deficiency risk, compared to most other areas of Britain.

Use of sulphur fertilisers is expected to rise in the future, because of increasing farmer awareness of the potential deficiency risk and the likelihood that a wider range of soil types will gradually become sulphur depleted and thus prone to deficiency, through the continuing decline in sulphur dioxide emissions.

B1.3 Fertiliser use on grassland

Overall fertiliser usage on grassland is summarised below in Table B1.9. The corresponding estimates of dressing cover and average field rates for each nutrient are shown in Table B1.10.

Table B1.9 Overall fertiliser use (kg/ha) on grassland, Great Britain 1994 - 1998

	straight nitrogen	compound nitrogen	total nitrogen	total phosphate	total potash
1994	51	65	116	24	31
1995	52	66	118	24	31
1996	53	62	115	23	30
1997	54	69	123	25	35
1998	53	56	109	21	29

The overall rate of total nitrogen applied to grassland fell significantly in 1998, down to 109 kg/ha, following the high rate of 123 kg/ha in 1997. This was due to a very large drop in the overall rate of compound nitrogen applied, to a level below that recorded over recent years. Phosphate and potash use also decreased in 1998, following a rise in the application rate for each nutrient in the previous year.

Table B1.10 Dressing cover (%) and average application rate (kg/ha) of fertiliser on grassland, Great Britain 1994 - 1998

Dressing cover

	straight nitrogen	compound nitrogen	total nitrogen	total phosphate	total potash
1994	39	64	81	64	42
1995	43	66	84	68	44
1996	42	66	86	68	47
1997	42	68	86	70	69
1998	43	60	79	62	63

Average field rate

	straight nitrogen	compound nitrogen	total nitrogen	total phosphate	total potash
1994	127	100	141	37	48
1995	121	101	140	35	48
1996	124	94	133	34	45
1997	129	101	142	36	51
1998	125	93	138	33	46

The decrease in overall rates of compound nitrogen, total phosphate and total potash in 1998 were related to reductions in both dressing covers and average field rates (Table B1.10). The dressing covers for compound nitrogen and phosphate were the lowest over the five-year period; the figure for potash remained well above the 5-year mean.

B1.3.1 NITROGEN

Over the past five years (1994 to 1998), the changes in the overall rate of total nitrogen applied to grassland in Great Britain largely followed the changing pattern of compound nitrogen use (Table B1.9). This pattern in the overall rate of compound nitrogen over this period was related to changes in the dressing cover (Table B1.10), combined, in 1997 only, with an increase in the average field rate.

In England and Wales, the overall rate of total nitrogen applied to grassland decreased by 16 kg/ha in 1998 to 107 kg/ha, due, as stated, to a reduction in overall use of compound nitrogen; the overall rate of straight nitrogen use remained virtually unchanged at 57 kg/ha. In Scotland, the much smaller decrease in total nitrogen use (from 124 kg/ha to 119 kg/ha) was due to a drop in the overall rate of straight nitrogen; this was the result of a substantial drop in the field application rate (from 97 kg/ha to 88 kg/ha) along with a small reduction in dressing cover. About half of the total nitrogen used on grassland in England and Wales is applied in straight form, compared with only a quarter in Scotland.

Cutting and Grazing Management

Fertiliser requirements for grassland vary according to the type of livestock enterprise, intensity of production and associated cutting and grazing regimes used for sward management. Fertiliser use on dairy, other livestock and mixed farms in England and Wales and in Scotland in 1998 are presented in the Section D tables. The Survey estimates for annual distributions of the total grassland area between grazing and cutting management regimes since 1994 are summarised in Table B1.11. These should not be taken as authoritative national estimates of grassland utilisation, as the Survey is designed to estimate fertiliser application rates, not to derive accurate crop areas. Fertiliser usage for the different cutting and

grazing categories is presented in Table B1.12. The differences in average field rates for each nutrient illustrate the influence of grassland management practice on fertiliser inputs.

Table B1.11 Grassland utilisation (% of grass area), Great Britain 1994 -1998

	grazed [a]	silage [b]	hay [b]
1994	87	29	12
1995	91	29	14
1996	88	30	12
1997	91	35	13
1998	94	36	12

Most grassland is grazed at some stage during the season (Table B1.11). About 90% of grassland was grazed (with or without cutting) during the period 1994 to 1997; the proportion increased to 94% in 1998. The proportion of the total grassland area cut for silage had been around 28% to 30% for a number of years, but increased in 1997 to 35%; this level of utilisation was maintained in 1998, at 36%. A much smaller percentage of grassland, on average about 12%, is cut for hay.

Table B1.12 Nitrogen application rates (kg/ha) by grassland utilisation, Great Britain 1994 - 1998

Total nitrogen

	Overall application rate				Average field rate		
	grazed [a]	silage [b]	hay [b]		grazed [a]	silage [b]	hay [b]
1994	108	177	83	1994	133	185	107
1995	114	185	88	1995	136	187	110
1996	110	172	94	1996	128	178	107
1997	119	179	85	1997	138	185	99
1998	107	168	82	1998	136	176	101

Straight nitrogen

	Overall application rate				Average field rate		
	grazed [a]	silage [b]	hay [b]		grazed [a]	silage [b]	hay [b]
1994	49	70	37	1994	125	128	111
1995	50	74	39	1995	120	124	101
1996	52	71	46	1996	125	127	106
1997	53	72	33	1997	129	134	94
1998	52	79	44	1998	125	130	100

Compound nitrogen

	Overall application rate				Average field rate		
	grazed [a]	silage [b]	hay [b]		grazed [a]	silage [b]	hay [b]
1994	59	107	45	1994	93	132	77
1995	63	111	49	1995	97	135	80
1996	58	101	48	1996	90	129	79
1997	66	107	52	1997	98	130	77
1998	55	89	39	1998	92	118	71

Grass grown for silage receives much higher rates of nitrogen application for both straight and, especially, compound products (Table B1.12); the rates applied for hay are the lowest.

[a] may also be cut [b] may also be grazed

There was, however, no change in the proportion of grass grown for silage or hay in 1998. The major change in 1998 was the decrease in the rate of compound nitrogen applied for silage, as well as to grass grown for grazing or for hay; all decreases were due to decreases in the average field rate (Table B 1.12).

The fall in the field rate applied for silage was particularly marked, down to 118 kg/ha, a low for recent years; the fall in the rate applied to grass grown for hay was also significant. However, in both instances there is some evidence of a switch to straight nitrogen products, partly offsetting the reduction in the overall rate of total nitrogen.

When grazing pasture is considered, an alternating pattern of high and low rates of compound product is apparent (Table B1.12). The application rate for straight nitrogen shows a more general annual fluctuation.

- Seasonal weather conditions affect herbage production and will therefore also influence grassland utilisation. The wet spring and summer produced a large amount of grass growth in some areas, which had to be managed by additional cutting and/or grazing. Good grass growing conditions, due to the wet spring and summer, may also have lessened the need for mid to late season nitrogen applications on more intensive livestock farms, compared with normal practice. In addition, high silage yields at first cut on many farms may have reduced the areas initially reserved for later cuts to meet remaining forage requirements, with less related use of compound fertiliser.

Livestock numbers dictate forage production requirements, but there were no major changes in 1998; the total number of cattle and calves (dairy plus beef) in Great Britain decreased by 1%, whilst the number of sheep and lambs increased by 4%.

B1.3.2 PHOSPHATE AND POTASH

The overall rate of phosphate application on grassland in Great Britain had marginally increased over the period 1994 to 1997, but dropped by 4 kg/ha in 1998 (Table B1.9). This was partly due to a decrease in dressing cover (Table B1.10).

Table B1.13 Phosphate and potash use (kg/ha) by grassland utilisation, Great Britain 1994 -1998

Total phosphate

	Overall application rate				Average field rate		
	grazed [a]	silage [b]	hay [b]		grazed [a]	silage [b]	hay [b]
1994	21	36	19	1994	34	46	32
1995	23	35	21	1995	34	43	33
1996	22	34	21	1996	33	43	31
1997	24	36	24	1997	35	44	34
1998	20	30	19	1998	33	40	32

Total potash

	Overall application rate				Average field rate		
	grazed [a]	silage [b]	hay [b]		grazed [a]	silage [b]	hay [b]
1994	27	61	23	1994	44	73	38
1995	28	61	26	1995	44	72	42
1996	27	58	26	1996	42	69	40
1997	32	64	28	1997	47	75	41
1998	28	54	23	1998	44	67	39

[a] may also be cut [b] may also be grazed

Overall potash use had increased in 1997 (due to increased dressing cover), but then fell back in 1998, due to a reduction in both the dressing cover and the average field rate. The decreases observed for both nutrients in 1998 reflected lower overall rates of application on grassland in both England and Wales and, for phosphate only, in Scotland (see Figures B2.7; B2.8).

Overall phosphate use had tended to increase slightly on grazed grass over recent years, but not on grass cut for silage. In 1998, however, overall phosphate rates dropped by 4 kg/ha to 6 kg/ha across the three utilisation categories, to the lowest levels in recent years (Table B1.13), similar to those recorded in 1992 when a sharp fall in application rates last occurred.

Overall potash use on grazed grassland had been relatively stable over the period 1994 to 1996, although less so for cut grassland, but then had increased appreciably in 1997 on grazed and silage-cut grassland (Table B1.13). In 1998, the overall rate dropped by 4 kg/ha on grazed grass, back down to levels recorded between 1994 and 1996. On grass cut for silage or for hay, the rates dropped by 10 kg/ha and 5 kg/ha respectively, to the lowest recorded rates since 1992, when Survey results were first presented for Great Britain.

Average field rates for phosphate and potash have not shown any major changes on either grazed or cut grassland categories since 1994 except possibly for the decrease on silage-cut grassland in 1998 (Table B1.13). The marked changes in overall application rates for these (compound) nutrient products over this period have been associated mainly with changes in dressing cover.

- It may be that the increased amount of grazing recorded in 1998 is partly responsible for the reduction in phosphate and potash use, as these nutrients are less likely to be applied where grass is grazed rather than cut. Also, although not intended after high yields were obtained at first cut, some mid to late season silage cuts may have been necessary in order to manage and control excess sward growth during the wet summer. On those fields, straight nitrogen only may have been applied after first cut, in anticipation of grazing, rather than cutting, swards.

B1.3.3 SULPHUR

Only a small proportion of all grassland, 4% on average over the past five years, receives any application of sulphur fertiliser (Table B1.14). Sulphur deficiency, causing loss of herbage yield and/or quality, is a potential risk on some soil types where grassland is cut intensively for silage, but deficiency is very unlikely where swards are used mainly for grazing or single hay cuts[15]. About 7% of grass cut for silage was treated with sulphur fertiliser; but only 3-4% of grass used for grazing or hay production was treated. There is little evidence of any increase in the percentage areas dressed with sulphur over the past 5 years, even on grassland used for silage production. In 1998, there was a small recorded drop in dressing cover, particularly on grass cut for silage. The generally static level of usage on grassland contrasts with the recent increases in sulphur use on the main arable crops which are susceptible to sulphur deficiency.

- The significant proportion of heavier textured soil types which occur in the main grassland farming areas, and the level of 'available' sulphur inputs from slurry applications to silage fields, are among possible reasons for the current low level of sulphur fertiliser use on grassland. Lack of farmer awareness about the risks of sulphur deficiency in cut grass, particularly on second silage cuts, may also be an explanation.

[15] Potential yield losses of silage due to sulphur deficiency on coarse textured or shallow soils in low sulphur deposition areas are most likely to occur in second and subsequent cuts, rather than first cut, unless the deficiency is very severe.

Table B1.14 Sulphur use on grassland, Great Britain 1994 -1998

Dressing cover (%)

	grazed	silage	hay	all grass
1994	4	8	2	4
1995	4	8	4	5
1996	3	6	1	3
1997	4	8	5	5
1998	3	6	4	3

Average application rate (kg/ha SO_3)

	grazed	silage	hay	all grass
1994	39	42	35	38
1995	33	35	40	34
1996	40	45	24	42
1997	34	43	27	38
1998	32	39	32	34

Average field rates of sulphur (as SO_3) have fluctuated over the period from 1994 to 1998, for all of the grassland management categories, but have not shown any clear trend (Table B 1.14). In 1998, the rates for grazing and silage cut grassland were reduced for the second year in succession. However, at 39 kg/ha the average field rate for silage equals the mean for the 1994 to 1998 five-year period, and approximates to the rate of 40 kg/ha SO_3 recommended for each silage cut where there is a risk of sulphur deficiency.

B2 LONGER TERM TRENDS

The British Survey of Fertiliser Practice was first conducted as an integrated British survey in 1992. Before that date the annual Survey of Fertiliser Practice had been carried out separately for England and Wales and for Scotland. Survey statistics from those earlier surveys have been collated in order to report an aggregated series for total nitrogen, phosphate and potash use for the fourteen-year period, 1985 to 1998. Other series are presented for England and Wales dating from 1970, and for Scotland from 1983.

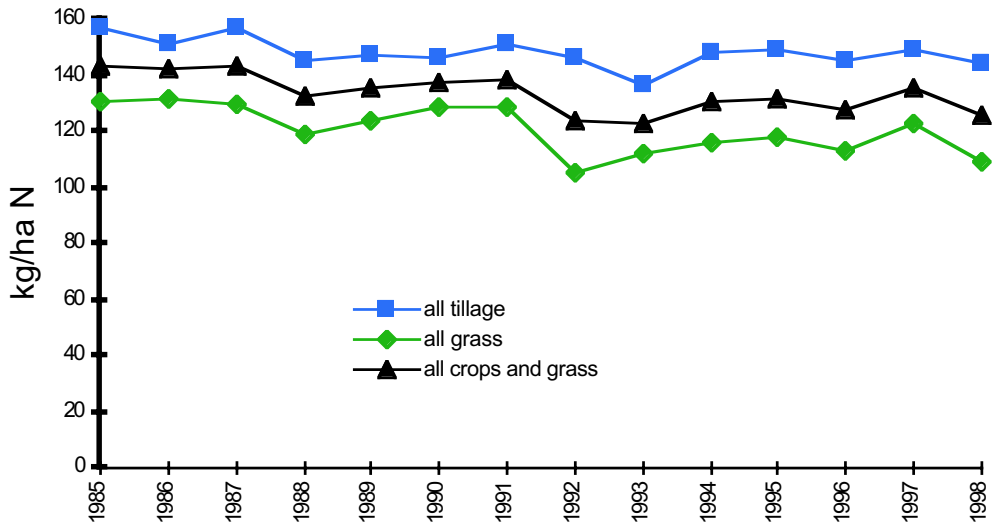
B2.1 Longer term trends for Nitrogen

B2.1.1 NITROGEN USE IN GREAT BRITAIN

Table B2.1 Total overall nitrogen rates (kg/ha,) Great Britain 1985 - 1998

1985	157	131	144
1986	152	132	142
1987	157	130	143
1988	146	119	132
1989	147	124	136
1990	147	129	138
1991	151	129	139
1992	147	105	124
1993	137	112	123
1994	149	116	131
1995	149	118	132
1996	145	113	128
1997	149	123	136
1998	144	109	126

Figure B2.1 Overall nitrogen use (kg/ha), Great Britain 1985 - 1998



The overall application rates for total nitrogen in Great Britain shown in Figure B2.1 are taken from Table B2.1. This confirms that consistently higher overall rates of nitrogen are

applied to the 'all tillage' category, when compared to the 'all grass' category; the latter also includes grass grown for grazing. These longer term trends in the overall rates of nitrogen on all crops and grass are the net effects of changes to 'all tillage' and 'all grass', which appear to exhibit slightly different trends from one another.

The nitrogen rate for the 'all tillage' category shows an overall decline over the period, 1985 to 1998, from 157 kg/ha to 144 kg/ha. The annual rates for tillage can be characterised as two main time frames:

1985 to 1987 – rates from 152 kg/ha to 157 kg/ha

1988 to 1998 – after the sharp fall to about 147 kg/ha, rates fluctuated with subsequent annual rates ranging from 144 kg/ha to 149 kg/ha. Within this relatively stable time frame, however, there was a notable decline to 137 kg/ha in 1993, following the temporary increase to 151 kg/ha in 1991.

The downward shift in total nitrogen use on tillage crops since the mid to late 1980s is mainly related to lower application rates on individual major tillage crops, rather than the effects of any changes in relative cropping areas.

The long-term trends for overall rates of total nitrogen on grassland can be viewed within three time frames:

1985 to 1987 – a stable, high rate at about 131 kg/ha

1988 to 1991 – a sudden sharp fall to 119 kg/ha, with a subsequent recovery to 129 kg/ha

1992 to 1998 – a sharp fall to 105 kg/ha, with a subsequent gradual recovery but repeated falls in 1996 (to 113 kg/ha) and 1998 (109 kg/ha).

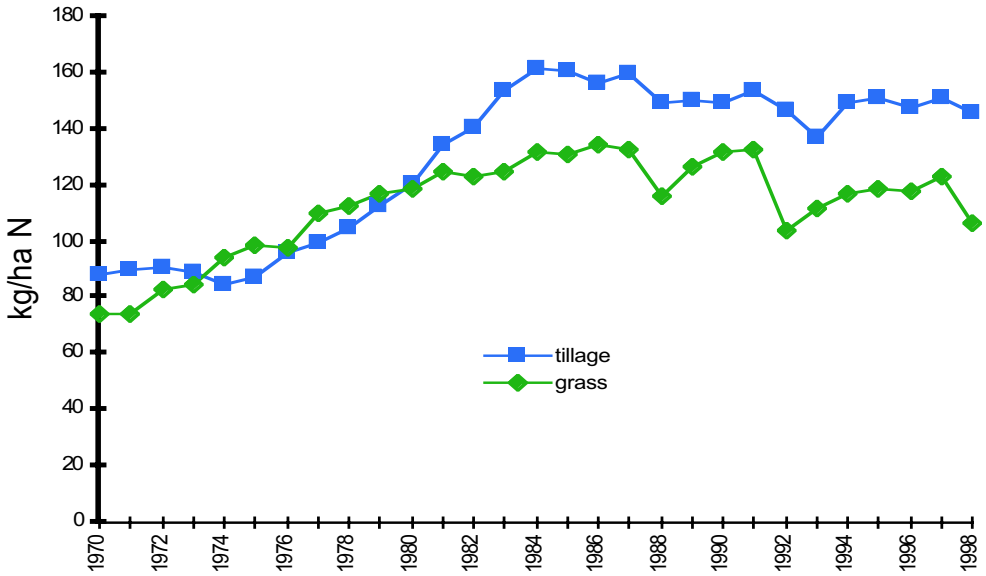
The more recent results for grassland, since 1995, give little indication as to whether or not the partial recovery in nitrogen use initially observed after the sharp fall in 1992 will continue.

The more recent estimates for overall rates of total nitrogen on the aggregate of 'all crops and grass', although higher than in the 1991 to 1992 period, are still well below the rates recorded in the mid to late 1980s. The mean rate during the 1994 to 1998 period was 131 kg/ha, up on the low rates of 124 kg/ha in 1992 and 1993, but still below the average of 143 kg/ha recorded over 1985 to 1987.

B2.1.2 NITROGEN USE IN ENGLAND AND WALES

The earlier surveys for England and Wales, which together account for around 84% (9.0 Mha) of the agricultural land in Britain, provide a longer time series. With this perspective it is clear that overall application rates of total nitrogen had risen steadily since 1970, before reaching a plateau of higher application rates between 1984 and 1987 (Figure B2.2). The more rapid increase in nitrogen use on tillage crops than on grassland from the mid-1970s to mid-1980s can be attributed, in part, to improvements in the breeding and yield potential of cereal cultivars and to the introduction and subsequent expansion of oilseed rape cropping. The period since the 1988 growing season has been one of net decline characterised, particularly for grassland, by a repeated pattern of sharp decline and partial recovery, which has been more significant in recent years.

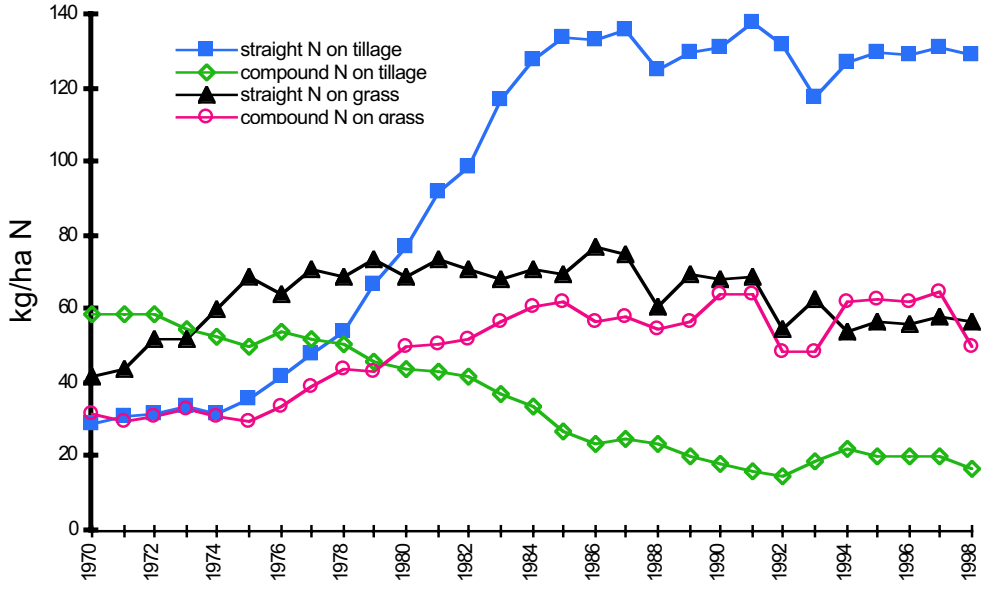
Figure B2.2 Overall nitrogen use (kg/ha), England and Wales 1970 - 1998



The changes in total nitrogen rate on tillage crops in England and Wales since 1970 largely reflect the pattern of straight nitrogen use. About 85% of the total nitrogen input for tillage crops is now applied in this form (Figures B2.2 and B2.3). The overall rate of straight nitrogen on tillage crops increased appreciably, from 36 kg/ha to 134 kg/ha, between the mid-1970s and mid-1980s. The application rate then fell in 1988 and again in 1993, followed each time by a sustained recovery, although there has been a slight downward trend over the last decade. In contrast, compound nitrogen use on tillage crops, having been in long term decline from 1970 until 1992, appears to have stabilised, or possibly to have recovered slightly, since then.

The large temporary decrease in overall straight nitrogen use in England and Wales in 1993 resulted from a fall in the proportion of the total tillage area cropped with cereals and oilseed rape, following the introduction, in 1992, of the Transitional Oilseeds Scheme and subsequent Arable Area Payment Scheme (AAPS) along with widespread adoption of rotational set-aside on arable farms. These schemes halved the commodity price for oilseed rape, which reduced the

Figure B2.3 Overall straight and compound nitrogen use (kg/ha), England and Wales 1970 - 1998



fertiliser nitrogen requirements for this crop. A big increase in spring, rather than winter, oilseed rape cropping, in response to rapeseed price reductions under the AAPS, was a further contributory factor to the drop in straight nitrogen use in 1993.

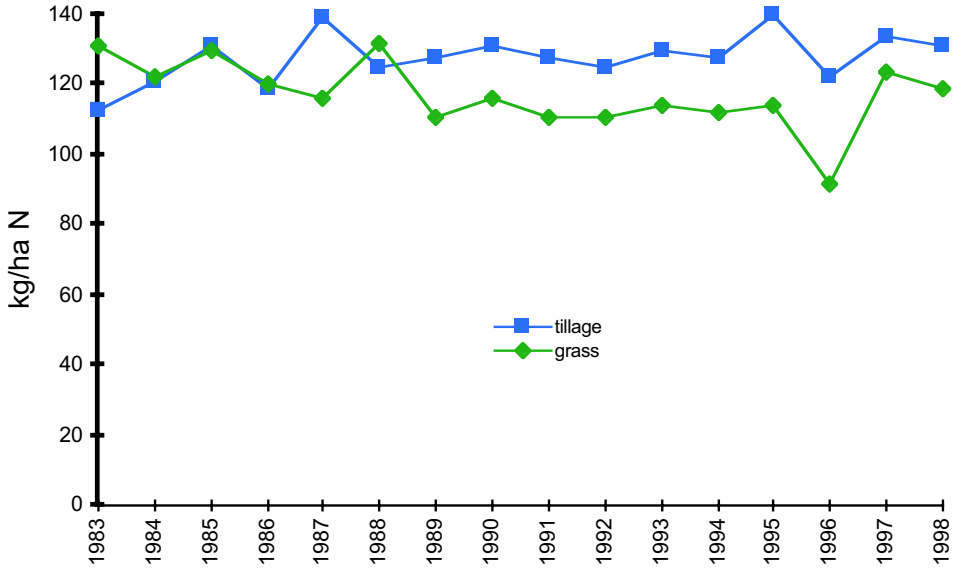
On grassland, in contrast to tillage crops, the long-term trend in the application rate of straight nitrogen in England and Wales has been one of gradual increase in the 1970s and early 1980s, followed by a net decline up to the present time, despite full or partial recoveries following the notable falls in the 1988 and 1992 seasons (Figure B2.3). The overall rate of compound nitrogen applied to grass also rose from the mid-1970s until the mid-1980s, then slowly declined before rising again to a high in 1990 of 64 kg/ha. The application rate subsequently fell dramatically in 1992 and then again in 1998, after a sustained recovery (Figure B2.3). Since the mid-1970s, an increasing proportion of total nitrogen on grassland in England and Wales has been applied as compound nitrogen, resulting in slightly over 50% being applied in this form between 1994 and 1997.

- The dramatic drop, in 1992, of nitrogen applied to grassland reflected decreases in both the average field rate and dressing cover percentage for straight nitrogen in England and Wales that year. The underlying causes of this sudden change in nitrogen use were not fully resolved, although the effects of the unusual seasonal weather pattern on grassland productivity and related fertiliser requirements may have been a contributing factor. This fall was larger than the comparable fall in 1998 which was also caused by a decrease in both average field rate and dressing cover of compound nitrogen and which, again, may have been weather related.

B2.1.3 NITROGEN USE IN SCOTLAND

Data for total nitrogen use on tillage crops and grassland since 1983, the first year that the Survey was carried out in Scotland, are presented in Figure B2.4. The trends differ from those for England and Wales. The total nitrogen rates show larger annual fluctuations than those for England and Wales on both tillage and grassland during the first period from 1983 to 1987, ranging from 113 kg/ha to 139 kg/ha and 116 kg/ha to 131 kg/ha respectively. Both sets of nitrogen rates then remained fairly stable until 1994, but since then have again tended to show wide annual fluctuations. Within the longer time perspective, the significance of the volatility observed in recent years is unclear. Total nitrogen rates on tillage crops are typically about 10% lower in Scotland than in England and Wales, largely because of differences in cropping practice, associated nitrogen requirements and a lower usage of straight nitrogen applications (see Section D Tables). Malting spring barley and mixed rotations are more common in

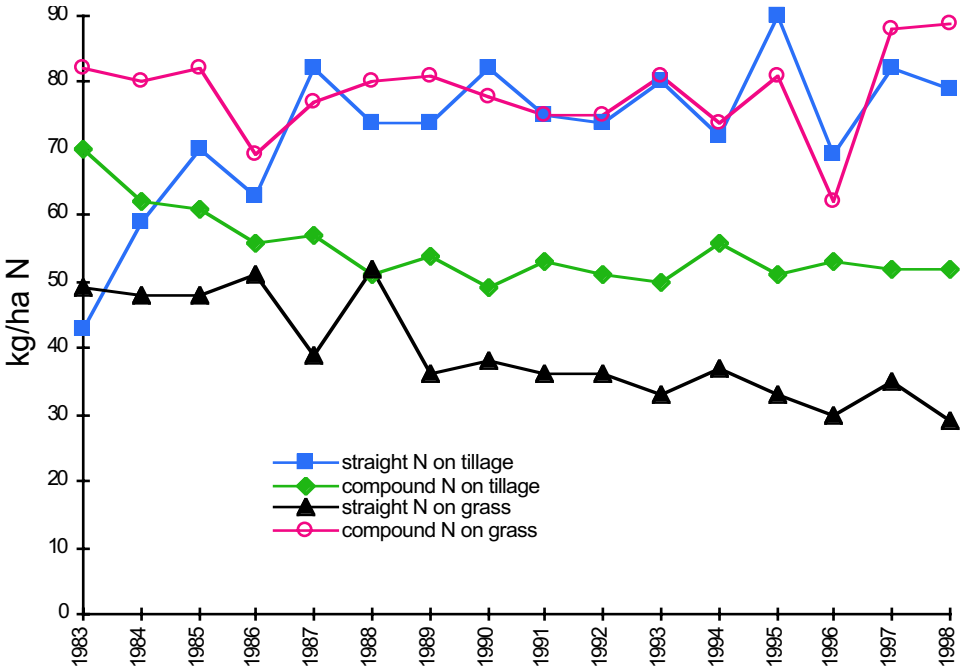
Figure B2.4 Overall nitrogen use (kg/ha), Scotland 1983 - 1998



Scotland, whereas in England and Wales winter wheat and oilseed rape are grown on a much higher proportion of the total tillage area. Before 1985, more nitrogen was applied to tillage crops in Scotland in compound rather than in straight form (Figure B2.5). Although the overall rate of compound nitrogen on tillage crops declined during the 1980s it now represents about 40% of total nitrogen use on tillage crops, despite annual fluctuations since 1988.

Overall use of straight nitrogen fell sharply on grassland in both 1987 and 1989, and has shown a further gradual decline since then (Figure B2.5). Compound nitrogen, however, is the main form of nitrogen fertiliser used on grassland in Scotland and currently represents about three-quarters of the total input. The overall rate of compound nitrogen shows little long-term change relative to annual fluctuations, despite the sharp fall in 1996 and subsequent large increase in 1997, which was sustained in 1998.

Figure B2.5 Overall straight and compound nitrogen use (kg/ha), Scotland 1983 - 1998



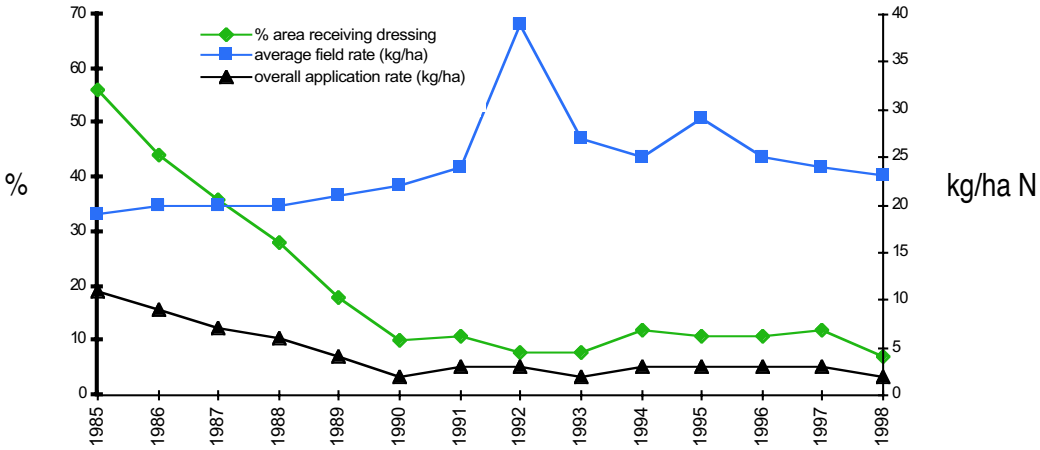
B2.1.4 AUTUMN AND WINTER APPLICATIONS OF NITROGEN FERTILISER

Overall nitrogen use during the autumn and early winter period has decreased considerably on winter cereals and on winter oilseed rape in England and Wales since 1985 (Figure B2.6). On winter cereals, this large change in nitrogen timing practice has resulted in a dramatic drop in dressing covers, from 56%-64% in 1984/85 to around 11%-12% in 1990/91. Since then, dressing covers have been relatively stable, on average 10% and 12% for winter wheat and winter barley respectively. The corresponding average field rates applied have, however, remained fairly constant over the whole of the 1985 to 1998 period, apart from a temporary increase in 1992, with mean rates of 24 kg/ha for both winter wheat (range 19-39 kg/ha) and winter barley (range 18-32 kg/ha).

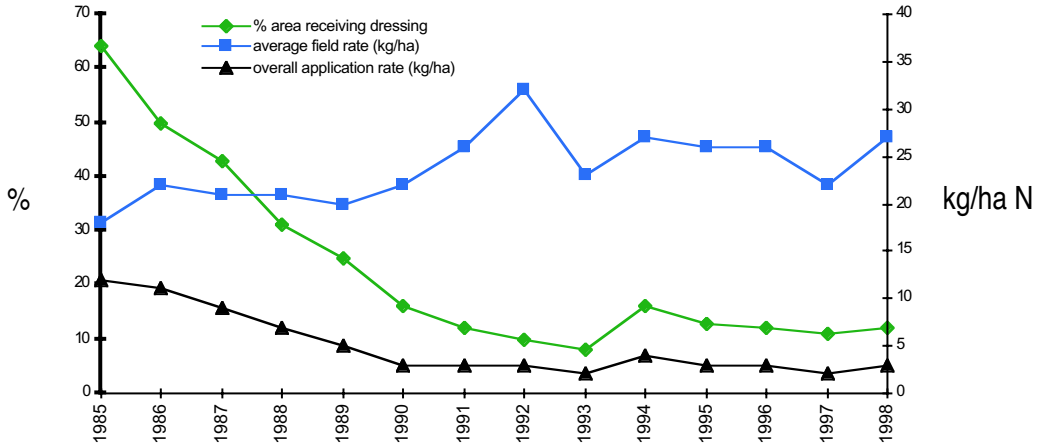
On winter oilseed rape, the dressing cover decreased steadily between 1985 and 1990, from 88% down to 45%, but has shown very little net change since then, despite some annual fluctuations. In contrast to winter cereals, the average field rate for autumn-winter applied nitrogen during this period decreased on winter oilseed rape, from 52 kg/ha in 1985 to 38 kg/ha in 1998. Overall use of autumn-winter applied nitrogen on the crop has shown a slight further drop since 1990, due to the combined effects of the annual changes in both dressing cover and average field rate (Figure B2.6).

Figure B2.6 Nitrogen use during the period August to January, England and Wales 1985-1998

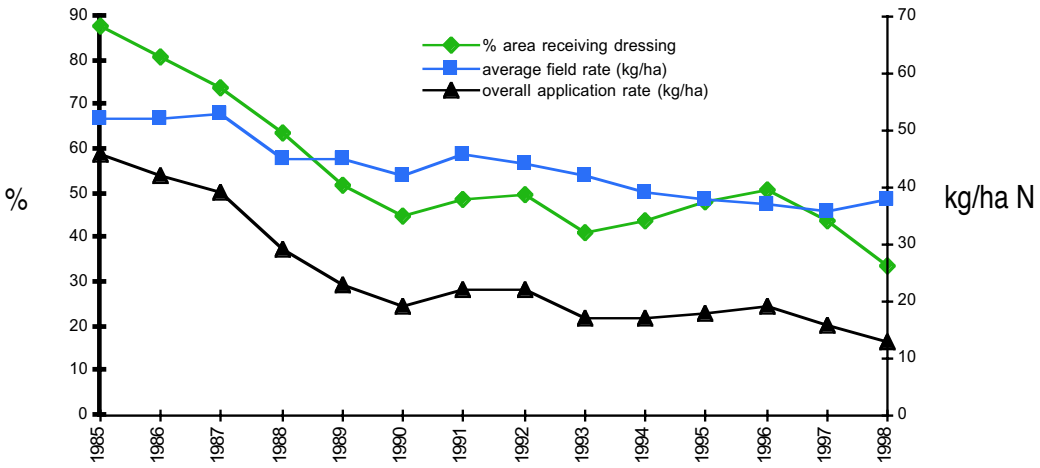
Winter wheat



Winter barley



Winter oilseed rape



In England and Wales, autumn nitrogen applications are not normally recommended for winter cereals, as they rarely give an economic yield response and may cause environmental pollution because of overwinter leaching losses. Autumn nitrogen, at 30 kg/ha, is still recommended for winter oilseed rape, unless the soil has a high nitrogen fertility, as the crop normally requires more nitrogen than winter cereals during the autumn growth period. However, the economic yield benefit is small, and in practice only half of the total winter oilseed rape area now receives an autumn dressing of nitrogen fertiliser. The survey results may be taken to indicate the implementation of good agronomic and environmental practice by arable farmers in response to their awareness of research findings and advisory recommendations.

In Scotland, autumn nitrogen is also now only recommended for winter oilseed rape, although some farmers may still perceive that autumn nitrogen use encourages better establishment of winter cereal crops under the colder and wetter conditions in that part of Britain. In practice, autumn nitrogen is used more widely on these crops in Scotland than in England and Wales. In the 1997/98 season, 46% - 67% and 67% respectively of the winter cereal and winter oilseed rape areas in Scotland received a nitrogen dressing during August to January, with corresponding average field rates of 20 kg/ha - 21 kg/ha and 43 kg/ha.

B2.2 Longer term trends for Phosphate and Potash

B2.2.1 PHOSPHATE AND POTASH USE IN GREAT BRITAIN

Annual overall rates of phosphate and potash use on tillage crops and on grassland since 1985 are illustrated in Figure B2.7, using the data presented in Table B2.2.

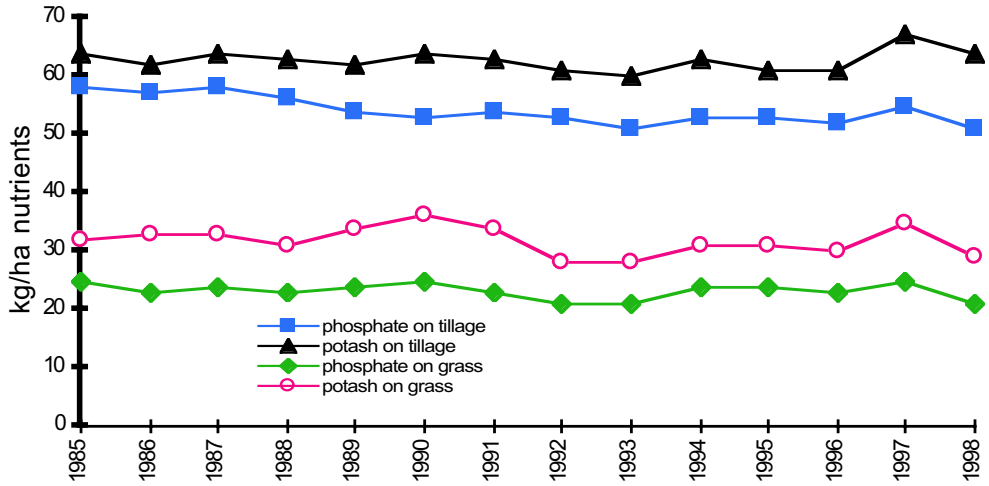
Overall rates of phosphate and potash applied to tillage crops are approximately double those used on grassland. Phosphate use on tillage crops has declined slightly during the fourteen year period since 1985, from a mean of 57 kg/ha over 1985 to 1989 to 53 kg/ha over 1994 to 1998 (Figure B2.7). Phosphate application rates on grassland have remained relatively stable, at 23-25 kg/ha, apart from the lower rate of 21 kg/ha in 1992 to 1993 and again in 1998.

Table B2.2 Phosphate and potash application rates (kg/ha), Great Britain 1985 - 1998

	All tillage		All grass		All crops and grass	
	phosphate	potash	phosphate	potash	phosphate	potash
1985	58	64	25	32	41	48
1986	57	62	23	33	40	47
1987	58	64	24	33	40	48
1988	56	63	23	31	39	47
1989	54	62	24	34	39	48
1990	53	64	25	36	39	49
1991	54	63	23	34	38	49
1992	53	61	21	28	36	44
1993	51	60	21	28	34	43
1994	53	63	24	31	38	46
1995	53	61	24	31	37	45
1996	52	61	23	30	36	44
1997	55	67	25	35	39	50
1998	51	64	21	29	35	46

Within the perspective of the longer term series, the phosphate and potash rates recorded for the 1997 season are high, but only that for potash on 'all tillage' is historically high. Although, in contrast, the estimate for the 1998 season represents a sharp fall, levels for both inputs are no lower than recorded at other times during this period.

Figure B2.7 Overall phosphate and potash use (kg/ha), Great Britain 1985 - 1998



Overall potash use on tillage crops was generally slightly lower during 1992 to 1996 compared to earlier years, but the most recent results may suggest a recovery in application rates. Although annual fluctuations in potash use have been more evident on grassland, overall rates have consistently (except in 1997) been slightly lower over 1992 to 1998 compared to the 1985 to 1991 period.

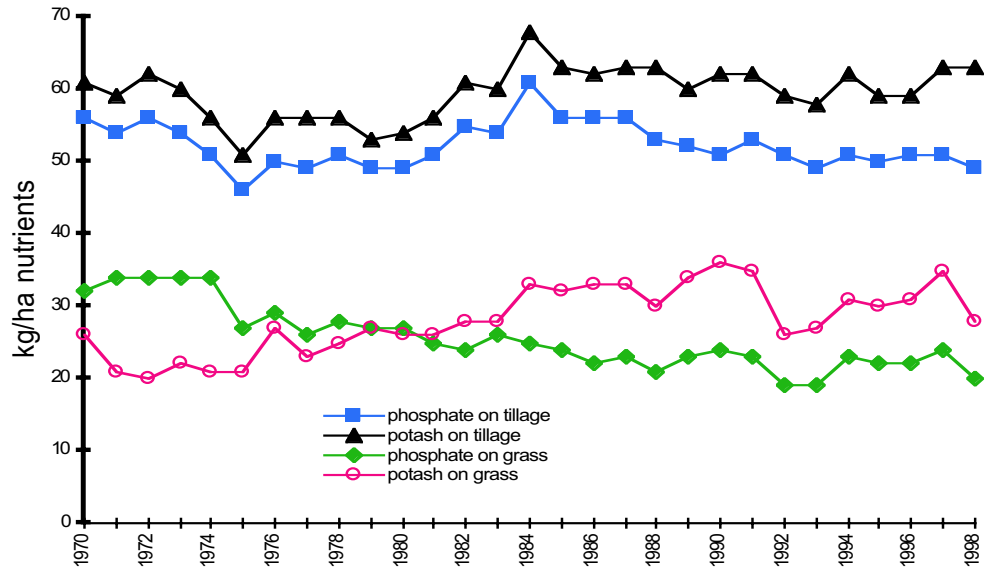
The annual changes in overall potash rates since 1985 follow a similar pattern to those observed for the overall rates of total nitrogen (see Figure B2.1).

B2.2.2 PHOSPHATE AND POTASH USE IN ENGLAND AND WALES

Overall rates of phosphate and potash on tillage crops show a similar pattern of annual fluctuations over the last twenty nine years (Figure B2.8). However, despite the variations observed in application rates during the 1970s and 1980s, the long-term trends since 1970 suggest a marginal decline in phosphate, but not potash, use.

Phosphate use on grassland showed a general decline between 1970 (32 kg/ha) and 1992 (19 kg/ha, the lowest level recorded), but has increased slightly since then (Figure B2.8).

Figure B2.8 Overall phosphate and potash use, England and Wales 1970 - 1998



- Insoluble phosphate fertilisers, such as basic slag or ground rock phosphate, were still commonly used on grassland in the early 1970s, at application rates which may have supplied relatively large amounts of total phosphate. Since then, phosphate inputs have been largely based on fertiliser products containing water soluble phosphate, which may partly explain the decline in the overall application rate.

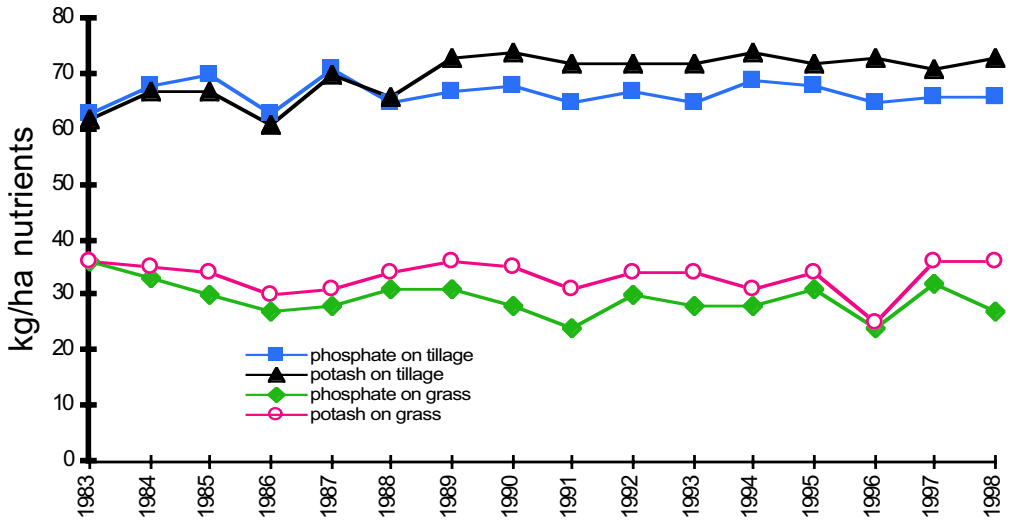
In contrast, potash use on grassland showed a general increase between 1972 (20 kg/ha) and 1991 (35 kg/ha), followed by a sharp fall in 1992 and subsequent recovery until a further drop in 1998.

B2.2.3 PHOSPHATE AND POTASH USE IN SCOTLAND

Overall rates of phosphate and potash on tillage crops tended to fluctuate between 1983 and 1989, but have subsequently been stable (Figure B2.9); phosphate use has shown very little net change over the sixteen year period, but potash use has risen, due to increases over the period 1983 to 1989.

Overall rates of phosphate and potash on grassland show almost identical patterns of annual changes (Figure B2.9). The longer term trends suggest that phosphate use has dropped slightly, while there has been little or no net change in potash use, despite the fall in 1996. Application rates for both of these nutrients in Scotland tend to be slightly higher than those for England and Wales (see Figure B2.8), both on tillage crops and on grassland.

Figure B2.9 Overall phosphate and potash use (kg/ha), Scotland 1983 - 1998



SECTION C

SURVEY METHODOLOGY AND SAMPLING VARIATION

The British Survey of Fertiliser Practice has a nationally representative sampling design aimed at producing reliable estimates. Although 'random' sampling is involved, the design used leads to estimates that are more precise than those which would have been obtained by a 'simple random sampling' of farms. This design by Edinburgh University Data Library builds upon that used by Rothamsted Experimental Station for the pre-1992 Surveys.

Table C1.EW Sampling characteristics for the 1998 survey, England and Wales

	farm holdings in population in 1996	total crops & grass in 1996	notional sampling fraction	target sample size	achieved sample size	achieved sample fraction
England & Wales		(column%)	(%)			(%)
Livestock						
(MAFF 'robust' types 4 -7)						
crops & grass area						
20-50 ha	24536	9.3	0.46	112	107	0.44
51-100 ha	17987	14.3	0.96	172	140	0.78
101-200 ha	9431	12.4	1.57	148	121	1.28
200+ ha	2652	11.8	5.35	142	132	4.98
Crops & mixed						
(MAFF robust types 1,2,8)						
crops & grass area						
20-50 ha	10445	4.0	0.46	48	38	0.36
51-100 ha	10743	8.8	0.98	105	85	0.79
101-200 ha	9431	15.0	1.91	180	134	1.42
200+ ha	5903	23.9	4.84	286	205	3.47
Horticulture						
(MAFF robust type 3)						
crops & grass area						
20-50 ha	484	0.2	0.4	12	4	0.83
51-100 ha	165	0.1	0.9	8	6	3.63
101-200 ha	76	0.1	1.8	8	7	9.21
200+ ha	23	0.1	4.3	4	1	4.34
Total for England and Wales	91876	100		1225	981	

NB Farm holdings predominantly engaged in horticulture were deliberately over-sampled in order to provide sufficient precision in estimating fertiliser dressings on such crops.

Table C1.SC Sampling characteristics for the 1998 survey, Scotland

	farm holdings in population in 1996	total crops & grass in 1996	notional sampling fraction	target sample size	achieved sample size	achieved sample fraction
Scotland		(column%)	(%)			(%)
Cereal/gen. cropping/horticulture						
(SOAEFD 'robust' groups 1-3)						
crops & grass area						
20-50 ha	1041	2.9	0.77	8	7	0.67
51-100 ha	1303	7.8	1.53	20	15	1.15
101-200 ha	1138	13.1	2.80	32	20	1.75
200+ ha	434	11.3	6.45	28	22	5.07
Livestock & mixed						
(SOAEFD 'robust' groups 4-8)						
crops & grass area						
20-50 ha	2905	8.2	0.69	20	20	0.69
51-100 ha	3418	20.0	1.46	50	52	1.52
101-200 ha	2133	23.8	2.81	60	50	2.34
200+ ha	553	12.8	5.80	32	28	5.06
Total for Scotland	12925	100		250	214	

As in past years, farms with less than 20 hectares of crops and grass were excluded from the survey, since they are excluded from the Agricultural Census which acts as a sampling frame. The farms included in the Census are stratified according to four size groups and five farm types (three for England and Wales and two for Scotland), in order, thereby, to reflect the variability in fertiliser practice across Britain. This produced twenty stratification cells, twelve for England and Wales and eight for Scotland.

The fraction of farm holdings sampled from within each cell was proportional to the total area of crops and grass. The survey aims to provide reliable fertiliser usage estimates for the actively farmed area in Britain and samples from a range of suitable farm types to achieve this. A 'variable fraction stratification' scheme is set out in Tables C1.EW and C1.SC. The farm holdings within each cell were ordered according to the '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 SOAEFD. This resulted in a target sample of 1475, of which 1195 farms were successfully surveyed, an achieved 'sampling fraction' of 1.1% of farms in mainland Great Britain (Table C2).

Table C2 Summary sampling characteristics 1998

	farm holdings in population in 1996	total crops and grass in 1966 (million ha)	target sample size	achieved size of sample	achieved sampling fraction (%)
England & Wales	91876	8.8	1225	981	1.1
Scotland	12925	1.7	250	214	1.6
Great Britain	104801	10.5	1475	1195	1.1

It should be noted that the farms were stratified according to information collected in the 1996 Agricultural Census. Results from the Survey were 'weighted' using the inverse of the achieved sampling fraction for the appropriate stratification cell.

Characteristics of the achieved sample

Sources of error

Surveys always represent a compromise between cost, quality and timeliness. 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; results are reliable if those obtained from the sample of farms are very similar to the results that would have been obtained had the sampling scheme provided a different set of farms to survey - a notion that justifies all random sampling.

There are several sources of error in surveys which need to be controlled and estimated for their effect on the uncertainty that inevitably surrounds any statistics derived from observation. The uncertainty associated with surveying a sample of farms, compared to the very high cost which would be incurred in attempting to approach every farmer, is commented on below as sampling variation.

There are also a variety of 'non sampling errors'. These include those associated with measurement: obtaining accurate answers to the questions put to the farmer about, for example, the detail of each fertiliser dressing applied to each field throughout the season. A major source of potential error is that brought about by the failure to collect information from each selected farm.

Non-response

Some non-response is inevitable in all voluntary sample surveys. Consequently, not all the 1475 farms in the target sample for the 1998 survey were successfully surveyed; some were found, on inspection, to be farms that should have been excluded from the survey as '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 1195 farms: 1016 of these responses were from the 'main' sample and 179 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 the fertiliser surveys previously carried out by Rothamsted, is a strategy designed to counter the threat of bias from the non-response to the main sample; any over-sampling created thereby is subsequently discounted through the use of sampling weights. The use of a reserve sample also means that there can be no one simple 'response rate'.

The net response rate to the main sample (excluding the farms discovered to be invalid), is the most appropriate for comparison with previous years and with other surveys. In 1998, this was 69%, which was similar to that achieved in 1997, but lower than in previous years (Tables C3 and C4). The net response rate to the reserve sample was 47.1%, also lower than in previous years. The overall rate of 66% in 1997 was therefore down compared to previous years. The main reasons for refusal, up in 1997 to 26%, are set out in Table C4, together with 'non contact' rates. A lower response rate introduces an unwelcome greater threat of bias in the estimates derived from the survey; it is not sensible to assume that non responding farms have the same average fertiliser practice as those that took part in the survey. This risk of bias increases the uncertainty that surrounds the estimates made from survey data.

Table C3 Response to main and reserve samples

	1998	invalid returns*		1997 (%)	**1998 (%)**
issued from Main Sample	**1474**				
response to Main Sample	**1016**		crude response rate	68.6	**68.9**
non-response	**458**	of which 4 were invalid	net response rate	68.9	**69.1**
issued from Reserve Sample	**384**				
response to Reserve Sample	**179**		crude response rate	54.9	**46.6**
non-response	**205**	of which 4 were invalid	net response rate	55.2	**47.1**
achieved sample size	**1195**		achieved rate	82.1	**81.1**

* Farms found not to conform to Survey Specifications are classified as 'invalid'.

Table C4 Analysis of non-response, 1994 - 1998

		1994	1995	1996	1997	**1998**
a)	**net response rate**	(%)	(%)	(%)	(%)	**(%)**
	main sample	81	84	82	69	**69**
	reserve sample	71	67	76	55	**47**
	'overall' achieved rate	80	81	80	66	**64**
b)	**refusal rate**	16	14	16	26	**26**
	main reasons for refusal (% of refusal rate)					
	too busy	38	28	42	28	**38**
	not interested	21	29	21	32	**32**
	don't do surveys	9	15	6	4	**10**
	want payment	5	5	3	2	**4**
	too much paperwork (IACS)	7	6	14	2	**3**
	other	20	17	14	32	**13**
c)	**non-contact rate**	4	4	8	5	**10**
d)	**achieved sample size**					
	from main sample	1169	1190	1140	992	**981**
	from reserve sample	207	173	209	195	**179**
	in total	1376	1363	1349	1187	**1195**

Sampling variation

Statistics calculated from survey data are only estimates subject to a degree of sampling variation. An indication of the reliability of a survey estimate is given by its 'standard error'. A selection of standard errors is set out in Table C5.

Table C5 Standard errors of application rates for the major crops in 1998

Great Britain

	standard error for overall application rate (kg/ha)					standard error for average field rates (kg/ha)					fields in sample
	total N	str't N	comp N	total P_2O_5	total K_2O	total N	str't N	comp N	total P_2O_5	total K_2O	
winter wheat	2.9	2.5	0.5	0.9	1.4	2.8	2.3	4.1	0.5	0.9	2398
oilseed rape	3.0	2.7	0.3	1.2	1.1	3.3	4.0	3.0	1.4	1.8	654
winter barley	3.2	3.3	1.5	1.5	2.4	2.6	4.2	7.2	1.2	1.8	1014
spring barley	2.6	3.4	3.0	1.9	2.2	1.8	2.8	1.9	1.1	1.9	638
m/c potatoes [a]	4.9	12.9	16.9	9.2	21.3	3.7	18.0	7.0	7.5	15.2	205
sugar beet	1.4	2.9	2.1	7.1	5.1	2.2	3.6	5.9	6.0	5.7	303
all tillage crops	1.6	1.6	0.9	1.4	1.3	1.5	0.8	2.9	0.7	1.4	6612
all grass	2.1	2.6	0.6	0.1	0.7	2.4	3.3	1.9	0.5	1.6	4287

England & Wales

	standard error for overall application rate (kg/ha)					standard error for average field rates (kg/ha)					fields in sample
	total N	str't N	comp N	total P_2O_5	total K_2O	total N	str't N	comp N	total P_2O_5	total K_2O	
winter wheat	3.3	3.0	0.4	1.0	1.5	3.3	2.8	5.6	0.6	0.8	2290
oilseed rape	4.9	3.7	1.3	0.9	1.0	5.2	4.6	3.4	1.0	1.1	579
winter barley	1.9	2.5	1.7	1.8	2.6	2.2	2.9	8.1	1.5	2.2	919
spring barley	3.4	3.2	2.4	3.2	5.5	2.5	6.0	2.3	2.3	4.8	349
m/c potatoes[a]	6.4	13.7	18.6	10.2	23.8	4.9	19.6	8.1	8.2	17.3	191
sugar beet	1.4	2.9	2.1	7.1	5.1	2.2	3.6	5.9	6.0	5.7	303
all tillage crops	2.2	2.3	0.9	1.5	1.4	2.1	1.5	4.5	0.6	1.5	5884
all grass	1.4	3.0	1.6	0.1	0.9	5.2	2.9	1.9	0.3	0.5	3634

Scotland

	standard error for overall application rate (kg/ha)					standard error for average field rates (kg/ha)					fields in sample
	total N	str't N	comp N	total P_2O_5	total K_2O	total N	str't N	comp N	total P_2O_5	total K_2O	
winter wheat	10.2	7.6	4.6	3.7	6.3	10.2	10.6	7.1	1.8	5.1	108
oilseed rape	18.6	11.0	7.8	10.4	13.0	18.1	10.6	2.5	6.2	9.3	75
winter barley	20.8	21.6	3.4	3.3	4.5	17.4	22.2	3.3	1.1	2.5	95
spring barley	2.7	3.1	3.1	0.5	3.6	2.7	1.4	3.5	0.8	3.7	289
m/c potatoes [a]	19.8	18.9	11.4	15.6	3.7	20.1	24.1	11.3	15.6	13.6	14
all tillage crops	7.7	9.8	2.9	2.4	4.0	7.2	6.7	3.5	1.3	3.7	728
all grass	6.8	4.6	4.3	0.9	1.9	7.9	7.1	7.0	0.6	1.1	653

[a] maincrop potatoes include second early crops.

The size of the 'standard error' is influenced by several factors, some of which vary across years. Changes in sample design have been kept to a minimum, but changes in the variability of application rates across farms in Britain, and therefore in the sample, may have had an effect on the precision of sample survey results. This is especially critical for the precision of the overall application rates wherever there is change in the percentage of fields being dressed with fertiliser, or when there are marked changes in the very high or very low rates of application on fields in a farm.

A reliable estimate is one which is large relative to its standard error; standard errors which are relatively large indicate poorly determined survey estimates. This is particularly 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 size of standard errors for the application rates in the survey actually depends 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 1998, in Great Britain, the estimated overall application rate of total nitrogen use on winter wheat was 182 kg/ha. This is large relative to the value of the corresponding standard error of 2.9 kg/ha, indicating reliability (good precision), a 'relative error' near to 1.59% (the ratio of 2.9 to 182, as a percentage). The application of phosphate on spring barley, in Scotland, provides another example of precision: the estimated overall application rate was 56 kg/ha, with a corresponding standard error of 0.5 kg/ha, a 'relative error' of 0.89%. The application of compound nitrogen on 2nd early/maincrop potatoes, in Britain, is estimated with much less precision: 139 kg/ha with a corresponding standard error of 16.9 kg/ha, resulting in a much larger 'relative error' of 12% due, in part, to the relatively small number (205) of fields of that category of potatoes represented in the Survey.

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 nitrogen would have a narrower Confidence Interval: with a lower bound of 177.2 (183 - 2 x 2.9) and an upper bound of 188.9 (183 + 2 x 2.9). On 95% of occasions such an interval will enclose the 'true value'; this gives confidence to believe that the true value lies in that narrow range. The comparable 95% Confidence Interval for the overall application rate of nitrogen on maincrop potatoes would be much wider.

Assessing estimates of change

This same approach can be adopted to assess the statistical significance of an observed change in a crop application rate between two years. 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 three or more times the size of the standard error of one year's estimate.

For example, the overall application rate of potash on winter barley in Britain, in 1998, was estimated at 66 kg/ha, an apparent decrease from 70 kg/ha in 1997. The difference is 4 kg/ha. The standard error in 1998 was 2.4 kg/ha. The observed difference of 4 kg/ha is not greater than 3 times 2.4 (= 7.2) kg/ha and may, therefore, be attributable as due to sampling variation alone.

Estimating the standard error

The procedure required to obtain accurate standard errors for a complex survey design is not straightforward. 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 Station[16], and used for earlier (pre-1992) 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. Moreover, it is computationally complex and difficult to extend to a wide variety of estimators.

The approach taken for the British Survey of Fertiliser Practice after 1992 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 1994 Survey for operational purposes, 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 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. In 1997 there were four replicates for England and Wales; in Scotland there were two, these being systematically subdivided post survey. This provides four working replicates which are used to derive the standard errors reported here.

An alternative approach to estimation

As was stated in Section B, the timely availability of data from the 1998 Agricultural Census has allowed the re-estimation of application rates by adjusting the components of the sample according to the distribution of the areas of major crops found nationally. This is believed to provide more robust figures for the aggregate estimates for 'all tillage', 'all grass' and 'all crops and grass'. These adjusted rates are given below, together with the estimates obtained using the methods usually employed.

Table C6 Re-estimation of overall total fertiliser use (kg/ha), Great Britain 1998

		Overall application rates (kg/ha)				
		straight nitrogen	compound nitrogen	total nitrogen	total phosphate	total potash
all tillage		123	21	144	51	64
	revised estimate	123	22	145	52	65
all grass		53	56	109	21	29
	revised estimate	54	56	110	21	29
all crops and grass		87	39	126	35	46
	revised estimate	85	40	125	35	46

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

It is in the nature of random sampling that the characteristics of each achieved sample will differ in several respects from one another, and from the underlying population. In particular, the proportion of different crops grown will differ in the achieved sample from that in the population. The method of adjustment used here in these alternative estimates attempts to counter this by 'post-stratifying' or 'weighting' by the distribution of area of the major crops reported to the Agricultural Census (June 1998).

In general, the adjusted estimates are very close to those reported in Section B, B2.1
Longer term trends for Nitrogen
although they do moderate the estimate of the overall rates of total nitrogen on *'all tillage'* and *'all grass'*.

SECTION D – TABLES

CONTENTS

The numbering of these tables corresponds to the numbering used in the 1993 - 1998 BSFP Reports

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ENGLAND AND WALES TABLES 1998

SCOTLAND TABLES 1998

Note: Row percentages may not sum exactly to 100 due to rounding.

Table GB1.1 Total fertiliser use, Great Britain 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	72	44	41	8	127	42	42	91	18	17	20
Winter wheat	99	71	69	12	183	68	77	182	48	53	2398
Spring barley	97	82	89	30	95	51	64	92	42	58	638
Winter barley	99	762	83	15	136	66	80	135	51	66	1014
Oats	96	88	88	17	100	64	76	96	56	66	169
Rye/Triticale	94	70	86	8	125	55	73	117	39	63	51
Seed potatoes	91	91	96	23	144	209	210	131	190	191	15
Early potatoes	100	100	98	48	154	143	222	154	143	217	17
2nd Early/Maincrop potatoes	98	94	95	33	193	195	291	188	184	276	205
Sugar beet	98	71	87	25	111	68	139	109	49	121	303
Spring oilseed rape	99	71	72	27	115	49	58	114	35	42	105
Winter oilseed rape	100	77	70	8	204	69	71	203	53	49	565
Linseed	79	45	47	15	71	52	64	56	23	30	148
Forage maize	86	72	51	82	70	63	86	60	45	44	188
Rootcrops for stockfeed	85	72	72	65	74	94	92	63	67	66	101
Leafy forage crops	98	64	63	37	89	46	51	86	29	32	53
Arable silage/other fodder crops	95	88	91	72	123	71	80	117	62	73	28
Peas – human consumption	2	30	42	1	0	74	113	0	22	48	88
Peas – animal consumption	11	56	58	20	43	59	74	4	33	43	102
Beans – animal consumption	0	57	58	6	10	65	69	9	37	40	160
Vegetables (brassicae)	86	90	92	20	222	75	140	191	67	129	34
Vegetables (other)	86	75	83	7	132	89	148	113	67	123	106
Soft fruit	100	94	97	3	76	70	92	76	66	89	14
Top Fruit	62	32	53	2	52	32	61	33	10	33	40
Other Tillage	48	29	34	24	86	56	82	42	16	28	67
All tillage	93	73	74	18	155	70	87	144	51	65	6629
Grass under 5 years	92	67	71	49	170	40	64	157	27	45	1235
Grass 5 years and over	76	61	61	43	129	32	41	98	19	25	3052
All grass	79	62	63	44	138	33	46	109	21	29	4287
All crops & grass	86	67	68	31	147	53	68	126	35	46	10916

Source: British Survey of Fertiliser Practice 1998.

Table GB1.2 Use of straight fertiliser, Great Britain 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	68	7	6	110	72	109	75	5	7	20
Winter wheat	98	8	8	176	84	92	171	6	8	2398
Spring barley	54	1	6	74	73	116	40	1	7	638
Winter barley	94	5	10	127	86	100	120	4	10	1014
Oats	80	13	15	98	83	85	79	11	13	169
Rye/Triticale	93	5	11	103	0	70	96	0	8	51
Seed potatoes	42	14	8	99	31	300	42	4	25	15
Early potatoes	57	4	18	86	122	181	49	5	32	17
2nd Early/Maincrop potatoes	39	2	18	123	144	238	49	3	42	205
Sugar beet	86	2	19	102	133	118	88	2	23	303
Spring oilseed rape	80	5	6	106	60	76	85	3	5	105
Winter oilseed rape	99	9	5	189	92	88	188	8	45	565
Linseed	76	2	4	66	55	101	50	1	5	148
Forage maize	38	4	18	88	74	120	34	3	22	188
Rootcrops for stockfeed	26	3	1	72	157	107	19	49	1	101
Leafy forage crops	51	5	5	77	0	0	39	0	0	53
Arable silage/other fodder crops	34	11	7	65	60	126	22	7	9	28
Peas – human consumption	2	6	18	0	93	159	0	6	29	88
Peas – animal consumption	4	5	8	46	92	126	2	5	10	102
Beans – animal consumption	5	3	5	185	91	88	9	3	4	160
Vegetables (brassicae)	84	7	3	125	0	136	104	0	48	34
Vegetables (other)	77	1	13	124	192	112	95	1	14	106
Soft fruit	23	3	25	77	0	17	17	0	4	14
Top Fruit	43	7	28	48	88	97	20	7	27	40
Other Tillage	31	2	10	103	108	95	32	3	10	67
All tillage	82	6	9	150	86	108	123	5	10	6629
Grass under 5 years	63	2	4	138	97	77	87	2	3	1235
Grass 5 years and over	38	1	1	120	61	78	45	1	1	3052
All grass	43	1	1	125	68	78	53	1	1	4287
All crops & grass	62	3	5	141	82	104	87	3	5	10916

Source: British Survey of Fertiliser Practice 1998.

Table GB1.3 Use of compound fertiliser, Great Britain 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	36	37	35	45	36	29	16	13	10	20
Winter wheat	23	64	62	47	65	73	11	42	46	2398
Spring barley	78	82	85	67	50	59	52	42	50	638
Winter barley	32	72	74	46	65	77	15	47	56	1014
Oats	39	75	75	44	60	72	17	45	54	169
Rye/Triticale	38	70	75	57	55	73	22	39	55	51
Seed potatoes	65	91	83	138	204	201	89	186	167	15
Early potatoes	98	98	93	108	141	198	105	138	185	17
2nd Early/Maincrop potatoes	85	94	88	164	192	266	139	181	233	205
Sugar beet	30	70	71	73	66	138	22	46	98	303
Spring oilseed rape	45	67	67	66	48	55	30	32	37	105
Winter oilseed rape	38	69	65	40	65	68	15	45	45	565
Linseed	17	43	43	35	52	60	6	22	26	148
Forage maize	67	69	36	39	62	61	26	42	22	188
Rootcrops for stockfeed	64	72	71	69	88	92	44	63	65	101
Leafy forage crops	62	64	63	76	46	51	47	29	32	53
Arable silage/other fodder crops	88	88	88	108	63	72	95	56	63	28
Peas – human consumption	2	25	25	0	67	76	0	17	19	88
Peas – animal consumption	7	51	51	37	55	65	3	28	33	102
Beans – animal consumption	10	54	54	0	63	67	0	34	36	160
Vegetables (brassicae)	70	90	89	122	75	139	86	67	124	34
Vegetables (other)	28	74	75	65	88	146	18	65	109	106
Soft fruit	81	94	94	72	70	90	59	66	85	14
Top Fruit	23	25	25	52	17	21	12	4	5	40
Other Tillage	18	27	28	54	51	65	10	14	18	67
All tillage	35	68	66	61	68	82	21	46	54	6629
Grass under 5 years	64	66	69	109	38	61	70	25	42	1235
Grass 5 years and over	59	60	60	89	31	41	53	18	24	3052
All grass	60	61	61	93	32	45	56	20	28	4287
All crops & grass	48	64	64	82	50	63	39	33	40	10916

Source: British Survey of Fertiliser Practice 1998.

Table GB1.4 Use of lime, Great Britain 1998

	Crop area receiving dressing (%)						Average field rate of CaO equivalent (tonnes/ha)						Fields in sample	Fields limed
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields	Fields
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	20	4
Winter wheat	4	1	•	2	•	8	2.1	2.7	2.2	2.4	1.1	2.2	2398	196
Spring barley	7	•	•	6	•	14	2.3	3.5	2.7	2.7	1.5	2.5	638	90
Winter barley	7	1	•	3	•	12	2.0	2.4	0.5	2.5	2.4	2.2	1014	121
Oats	2	8	1	2	1	12	1.7	2.8	•	3.4	•	2.6	169	20
Rye/Triticale	4	•	9	•	2	16	2.0	•	•	2.0	2.6	2.1	51	8
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	15	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	17	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	•	•	205	4
Sugar beet	4	4	45	3	•	16	1.5	2.8	2.7	2.3	3.7	2.3	303	49
Spring oilseed rape	6	1	1	4	1	12	2.8	2.2	•	2.6	•	2.7	105	13
Winter oilseed rape	9	2	•	4	2	15	2.0	2.9	5.7	3.0	•	2.4	565	83
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	148	4
Forage maize	17	3	10	3	10	24	2.2	1.7	•	1.8	•	2.1	188	44
Rootcrops for stockfeed	9	5	4	7	1	22	2.2	2.5	•	2.8	2.1	2.5	101	23
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	•	•	53	3
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	•	•	28	1
Peas – human consumption	2	2	1	•	2	6	1.0	1.0	5.7	2.6	•	2.2	88	5
Peas – animal consumption	1	34	5	2	2	12	2.2	3.3	2.8	1.3	•	2.6	102	13
Beans – animal consumption	9	4	10	10	•	13	2.4	2.6	•	•	2.5	2.4	160	21
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	34	3
Vegetables (other)	9	7	3	4	1	20	1.0	1.4	•	2.6	1.7	1.5	106	21
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	14	1
Top Fruit	•	•	•	•	•	•	•	•	•	•	•	•	40	1
Other tillage	11	•	1	•	1	13	2.5	•	•	2.6	1.3	2.4	67	9
All tillage	6	2	1	3	•	11	2.1	2.5	2.6	2.5	2.1	2.3	6629	724
Grass under 5 years	6	1	•	3	1	10	2.4	2.4	1.1	2.6	2.5	2.5	1235	125
Grass 5 years and over	4	•	•	2	1	8	2.3	2.0	1.1	2.7	1.7	2.4	3052	240
All grass	5	•	•	2	1	8	2.4	2.1	1.1	2.7	1.8	2.4	4287	354
All crops & grass	5	1	•	3	1	10	2.2	2.5	2.5	2.6	1.9	2.3	10916	1042

Source: British Survey of Fertiliser Practice 1998.

Table GB2.1 Average fertiliser practice by grassland utilisation, Great Britain 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed – not mown	70	56	54	30	116	29	30	82	16	16	2272
Grazed – mown	92	71	75	65	160	38	61	147	27	46	1738
All grazings	79	61	62	44	136	33	44	107	20	28	4010
Cut for seed grazed	.	.	.	.	.	.	.	.	.	.	5
Cut for seed not grazed	100	96	69	1	137	93	99	137	89	68	19
All cut for seed	100	96	74	9	136	82	94	136	79	70	25
Cut for silage grazed	95	74	79	69	174	39	66	165	29	52	1340
Cut for silage not grazed	99	83	90	55	196	43	82	193	36	74	200
All cut for silage	95	75	80	68	176	40	67	168	30	54	1549
Cut for hay grazed	81	58	59	50	100	32	38	82	19	23	488
Cut for hay not grazed	74	65	65	36	117	28	42	86	18	27	40
All cut for hay	81	59	60	50	101	32	39	82	19	23	529
All mowings	92	72	76	64	162	39	63	150	28	48	1995
All grass	79	62	63	44	138	33	46	109	21	29	4287

Source: British Survey of Fertiliser Practice 1998.

Table GB3.0 Product and nutrient use by month of application, Great Britain 1998

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Product ('000 tonnes)
Straight N	•	•	•	•	•	10	32	31	15	5	4	3	2373
Straight P	17	22	7	2	3	14	9	9	10	•	2	7	61
Straight K	18	16	8	3	5	21	12	5	5	2	2	3	106
Compounds	9	9	3	1	1	10	20	19	14	6	4	4	2511
Unknown	14	20	9	5	10	21	9	4	3	3	3	•	12
All fertilisers	5	5	2	•	1	10	25	25	14	5	4	3	5063

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Nutrient ('000 tonnes)
N	1	1	•	•	•	9	29	30	16	6	4	3	1185
P_2O_5	15	16	3	1	2	12	18	15	10	3	2	5	332
K_2O	13	14	4	1	2	13	17	14	11	4	3	3	432
Total	**6**	**6**	**2**	•	**1**	**10**	**25**	**24**	**14**	**5**	**4**	**4**	**1949**

Note: 'product use' refers to the total tonnage of the products used by farmers in the survey year 1998

'nutrient use' refers to the tonnage of each nutrient contained in the products usd (eg 100 kg of a 20 : 10 : 10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O
100 kg of ammonium nitrate, one of the 'straight N' products, contains typically 34.5 kg of N)

Source: British Survey of Fertiliser Practice 1998.

Table EW1.1 Total fertiliser use, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	70	41	38	5	130	43	43	92	17	16	18
Winter wheat	99	70	68	12	183	67	77	181	47	52	2290
Spring barley	94	66	80	28	94	44	63	88	29	50	349
Winter barley	99	75	82	13	133	65	80	132	48	65.	919
Oats	96	88	88	13	106	66	81	102	59	71	128
Rye/Triticale	93	64	83	10	115	55	73	108	35	61	46
Seed potatoes	.	.	.	.	.	.	.	.	.	.	9
Early potatoes	100	100	98	48	154	143	222	154	143	217	17
2nd Early/Maincrop potatoes	97	94	94	33	193	197	294	188	185	278	191
Sugar beet	98	71	87	25	111	68	139	109	49	121	303
Spring oilseed rape	99	68	69	31	116	48	57	115	33	40	77
Winter oilseed rape	100	76	68	9	203	68	69	203	52	47	518
Linseed	79	45	47	15	71	52	64	56	23	30	148
Forage maize	86	72	52	82	70	63	86	60	46	44	186
Rootcrops for stockfeed	78	56	56	63	79	78	100	62	43	56	57
Leafy forage crops	97	53	51	31	80	41	48	77	22	25	34
Arable silage/other fodder crops	93	84	88	75	107	56	75	99	47	66	18
Peas – human consumption	0	31	44	1	0	74	113	0	23	50	84
Peas – animal consumption	10	55	57	18	45	59	74	4	32	42	99
Beans – animal consumption	0	57	58	6	0	65	69	9	37	40	158
Vegetables (brassicae)	85	89	92	20	224	74	138	191	65	127	32
Vegetables (other)	85	74	83	7	134	87	149	114	65	124	103
Soft fruit	100	89	94	5	77	66	82	77	58	77	12
Top Fruit	62	32	53	2	52	32	6	33	10	33	40
Other Tillage	54	32	38	26	87	57	82	47	18	31	65
All tillage	92	70	71	16	158	70	89	146	49	63	5901
Grass under 5 years	92	62	68	49	176	40	65	162	25	44	961
Grass 5 years and over	74	58	58	43	130	32	42	96	19	24	2673
All grass	77	59	59	44	139	33	47	107	20	28	3634
All crops & grass	85	64	65	30	149	53	69	127	34	45	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW1.2 Use of straight fertiliser, England and Wales 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	70	7	7	109	72	109	77	5	7	18
Winter wheat	98	8	8	176	84	94	171	7	8	2290
Spring barley	59	5	8	86	0	138	51	0	12	349
Winter barley	94	5	11	126	86	101	118	4	11	919
Oats	90	17	19	101	83	85	91	14	16	128
Rye/Triticale	91	6	14	99	0	70	90	0	10	46
Seed potatoes	.	.	.	.	.	.	.	.	.	9
Early potatoes	57	4	18	86	122	181	49	5	32	17
2nd Early/Maincrop potatoes	40	2	19	126	144	238	50	3	46	191
Sugar beet	86	2	19	102	133	118	88	2	23	303
Spring oilseed rape	76	5	8	116	60	76	88	3	6	77
Winter oilseed rape	99	10	5	191	92	89	190	9	5	518
Linseed	76	2	4	66	55	101	50	1	5	148
Forage maize	39	4	19	88	74	120	34	3	22	186
Rootcrops for stockfeed	42	1	1	71	200	107	30	2	1	57
Leafy forage crops	54	6	6	77	0	0	41	0	0	34
Arable silage/other fodder crops	41	15	10	68	60	126	28	9	13	18
Peas – human consumption	2	6	19	0	93	159	0	6	30	84
Peas – animal consumption	4	6	8	46	92	126	2	5	10	99
Beans – animal consumption	5	3	5	185	91	88	9	3	4	158
Vegetables (brassicae)	83	7	3	127	0	136	106	0	4	32
Vegetables (other)	78	1	13	124	192	112	97	1	14	103
Soft fruit	40	6	5	77	0	75	31	0	4	12
Top Fruit	43	7	28	48	88	97	20	6	27	40
Other Tillage	35	3	11	103	108	95	36	3	11	65
All tillage	84	6	10	153	86	110	129	5	11	5901
Grass under 5 years	69	2	4	147	96	78	102	12	3	961
Grass 5 years and over	39	2	1	123	61	78	48	1	1	2673
All grass	44	12	2	130	68	78	57	1	1	3634
All crops & grass	64	4	6	145	82	106	93	3	6	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW1.3 Use of compound fertiliser, England and Wales 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	34	34	31	44	36	28	15	12	9	18
Winter wheat	21	63	61	48	65	73	10	41	44	2290
Spring barley	58	66	72	65	44	53	37	29	38	349
Winter barley	28	70	72	49	62	75	14	44	54	919
Oats	27	72	71	38	63	78	10	45	545	128
Rye/Triticale	28	64	69	61	55	74	17	35	51	46
Seed potatoes	•	•	•	•	•	•	•	•	•	9
Early potatoes	98	98	93	108	141	198	105	138	185	17
2nd Early/Maincrop potatoes	84	94	87	163	194	267	137	182	232	191
Sugar beet	30	70	71	73	66	138	22	46	98	303
Spring oilseed rape	39	63	63	69	47	54	27	29	34	77
Winter oilseed rape	34	67	63	39	6	67	13	43	42	518
Linseed	17	43	43	35	52	60	6	22	26	148
Forage maize	67	69	36	39	62	61	26	43	22	186
Rootcrops for stockfeed	43	56	55	73	73	99	32	41	55	57
Leafy forage crops	51	53	51	71	41	48	36	22	25	34
Arable silage/other fodder crops	4	84	84	86	45	63	72	37	52	18
Peas – human consumption	2	26	26	0	67	76	0	17	20	84
Peas – animal consumption	7	50	50	41	55	65	3	27	32	99
Beans – animal consumption	10	54	54	0	63	67	0	34	36	158
Vegetables (brassicae)	70	89	89	123	74	138	85	65	123	32
Vegetables (other)	27	74	74	64	86	147	17	64	109	103
Soft fruit	66	89	89	69	66	82	46	58	73	12
Top Fruit	23	25	25	52	17	21	12	4	5	40
Other Tillage	20	30	31	55	52	65	11	15	20	65
All tillage	29	65	63	61	68	83	17	44	52	5901
Grass under 5 years	58	61	65	104	37	62	61	23	41	961
Grass 5 years and over	56	57	57	86	31	41	48	18	24	2673
All grass	56	57	58	89	32	45	50	19	27	3634
All crops & grass	43	61	61	80	51	65	34	31	39	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW1.4 Use of lime, England and Wales 1998

	Crop area receiving dressing (%)						Average field rate of CaO equivalent (tonnes/ha)						Fields in sample	Fields limed
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields	Fields
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	18	3
Winter wheat	4	1	1	0	0	8	2.5	0	0	0	0	2.5	2290	176
Spring barley	8	1	3	0	1	13	2.2	2.7	2.4	2.2	1.5	2.2	349	46
Winter barley	7	1	2	0	0	11	2.3	2.5	2.7	2.6	2.5	2.4	919	98
Oats	3	10	1	0	10	14	2.0	2.8	0.5	2.6	2.4	2.1	128	18
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	46	4
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	9	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	17	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	•	•	191	4
Sugar beet	4	4	3	5	0	16	1.5	2.8	2.7	2.3	3.7	2.3	303	49
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	•	•	77	5
Winter oilseed rape	9	2	3	0	0	15	2.1	2.8	5.7	3.3	0	2.5	518	76
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	148	4
Forage maize	17	3	3	0	0	24	2.2	1.7	0	1.8	0	2.1	186	44
Rootcrops for stockfeed	3	8	7	0	1	20	1.4	2.5	0	2.3	2.1	2.2	57	11
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	•	•	34	2
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	•	•	18	0
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	•	•	84	5
Peas – animal consumption	1	4	2	5	0	13	2.2	3.3	2.8	1.3	0	2.6	99	12
Beans – animal consumption	8	4	0	0	0	13	2.2	2.6	0	•	2.5	2.4	158	21
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	32	3
Vegetables (other)	8	7	4	0	1	20	1.0	1.4	0	2.6	1.7	1.5	103	21
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	12	1
Top Fruit	•	•	•	•	•	•	•	•	•	•	•	•	40	1
Other Tillage	•	•	•	•	•	•	2.5	0	0	2.6	1.3	2.4	65	9
All tillage	5	2	2	1	0	10	2.1	2.6	2.6	2.5	1.9	2.3	5901	603
Grass under 5 years	6	1	2	0	1	10	2.5	2.4	0	2.8	2.1	2.5	961	101
Grass 5 years and over	5	0	1	0	1	8	2.3	2.0	1.1	2.6	2.4	2.3	2673	203
All grass	5	0	1	0	1	8	2.4	2.1	1.5	2.7	2.3	2.3	3634	294
All crops & grass	5	1	2	0	1	9	2.2	2.5	2.6	2.6	2.2	2.3	9535	872

Source: British Survey of Fertiliser Practice 1998.

Table EW1.5 Percentage of crop area by field application rate – N, England and Wales 1998

row %	kg/ha																	Fields in sample
	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	
Spring wheat	30	•	•	7	1	11	40	3	2	6	•	•	•	•	•	•	•	•	18
Winter wheat	1	•	1	3	3	4	10	21	25	19	9	3	1	1	1	•	•	•	2290
Spring barley	6	2	5	18	32	22	10	3	1	1	•	•	•	•	•	•	•	•	349
Winter barley	1	•	3	3	14	19	26	22	7	2	1	•	•	•	•	•	1	•	919
Oats	4	•	4	19	21	21	17	9	•	4	•	•	•	•	•	•	•	•	128
Rye/Triticale	7	•	11	8	5	15	38	16	•	•	•	•	•	•	•	•	•	•	46
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	•	22	•	•	2	7	2	11	30	9	5	•	7	6	•	•	•	•	17
2nd Early/Maincrop potatoes	3	1	1	•	8	3	6	17	19	18	7	3	6	4	•	1	•	2	191
Sugar beet	2	•	9	7	19	22	31	7	3	•	•	•	•	•	•	•	•	•	303
Spring oilseed rape	1	•	8	7	24	32	7	10	2	4	4	1	•	•	•	•	•	•	77
Winter oilseed rape	0	•	•	1	6	3	2	8	23	28	15	8	5	•	•	1	•	•	518
Linseed	21	1	24	25	19	6	3	0	•	•	1	•	•	•	•	•	•	•	148
Forage maize	14	22	16	7	21	10	7	1	•	•	•	1	•	•	1	•	•	•	186
Rootcrops for stockfeed	22	•	23	23	8	12	9	1	•	•	1	2	•	•	•	•	•	•	57
Leafy forage crops	3	1	4	41	36	6	3	6	•	•	•	•	•	•	•	•	•	•	34
Arable silage/other fodder crops	7	•	28	4	19	24	•	2	•	•	•	15	•	•	•	•	•	•	18
Peas – human consumption	100	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	84
Peas – animal consumption	90	2	8	•	•	•	1	•	•	•	•	•	•	•	•	•	•	•	99
Beans – animal consumption	95	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	158
Vegetables (brassicae)	15	•	•	3	2	•	5	6	8	6	27	17	10	•	2	•	•	•	32
Vegetables (other)	15	•	7	9	13	9	14	15	8	4	3	•	•	4	•	•	•	•	103
Soft fruit	•	•	7	43	44	•	7	•	•	•	•	•	•	•	•	•	•	•	12
Top Fruit	38	2	31	16	7	4	1	•	•	1	•	•	•	•	•	•	•	•	40
Other Tillage	46	2	18	4	11	3	•	16	•	•	•	•	•	•	•	•	•	•	65
All tillage	8	1	3	5	9	9	12	15	15	12	6	2	1	•	•	•	•	•	5901
Grass under 5 years	8	1	8	11	8	5	10	6	5	10	5	9	3	2	4	3	2	1	961
Grass 5 years and over	26	1	10	15	11	7	7	4	3	4	3	4	1	2	1	1	1	•	2673
All grass	23	1	10	15	10	6	7	4	4	5	3	4	1	2	2	1	1	•	3634
All crops & grass	15	1	6	9	9	7	10	9	9	8	4	3	1	1	1	1	1	•	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW1.6 Percentage of crop area by field application rate – P_2O_5, England and Wales 1998

row %	kg/ha 0	<25	25–	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Spring wheat	59	5	26	7	3	•	•	•	•	•	•	•	•	•	•	•	•	•	18
Winter wheat	30	3	9	34	19	3	1	•	•	•	•	•	•	•	•	•	•	•	2290
Spring barley	34	10	33	18	4	1	•	•	1	•	•	•	•	•	•	•	•	•	349
Winter barley	25	3	16	31	22	2	•	1	1	•	•	•	•	•	•	•	•	•	919
Oats	12	3	12	43	29	2	•	•	•	•	•	•	•	•	•	•	•	•	128
Rye/Triticale	36	11	15	19	18	1	•	•	•	•	•	•	•	•	•	•	•	•	46
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	•	26	2	•	3	2	13	10	13	5	5	21	•	•	•	•	•	•	17
2nd Early/Maincrop potatoes	6	1	1	1	8	9	2	13	13	8	15	12	4	3	1	•	1	2	191
Sugar beet	29	6	21	26	8	4	3	1	3	•	1	•	•	•	•	•	•	•	303
Spring oilseed rape	32	7	19	40	1	•	•	•	•	•	•	•	•	•	•	•	•	•	77
Winter oilseed rape	24	1	13	38	18	4	1	•	•	•	•	•	•	•	•	•	•	•	518
Linseed	55	4	16	18	5	1	•	•	•	•	•	•	•	•	•	•	•	•	148
Forage maize	28	3	18	32	12	6	1	1	•	•	•	•	•	•	•	•	•	•	186
Rootcrops for stockfeed	44	4	18	9	12	6	4	•	•	•	1	•	1	•	•	•	•	•	57
Leafy forage crops	47	•	43	9	•	•	•	•	•	•	•	•	•	•	•	•	•	•	34
Arable silage/other fodder crops	16	7	31	16	30	•	•	•	•	•	•	•	•	•	•	•	•	•	18
Peas – human consumption	69	•	5	16	4	5	•	•	1	•	•	•	•	•	•	•	•	•	84
Peas – animal consumption	45	5	9	33	6	2	•	•	•	•	•	•	•	•	•	•	•	•	99
Beans – animal consumption	43	•	9	33	12	3	•	•	•	•	•	•	•	•	•	•	•	•	158
Vegetables (brassicae)	11	8	6	44	17	•	15	•	•	•	•	•	•	•	•	•	•	•	32
Vegetables (other)	26	•	18	13	15	14	6	7	1	1	•	•	•	•	•	•	•	•	103
Soft fruit	11	•	5	62	21	•	•	•	•	•	•	•	•	•	•	•	•	•	12
Top Fruit	68	18	7	•	7	•	•	•	•	•	•	•	•	•	•	•	•	•	40
Other Tillage	68	4	13	4	9	2	•	1	•	•	•	•	•	•	•	•	•	•	65
All tillage	30	3	13	31	16	3	1	1	1	•	1	•	•	•	•	•	•	•	5901
Grass under 5 years	38	20	24	11	4	1	1	•	•	•	•	•	•	•	•	•	•	•	961
Grass 5 years and over	42	25	24	7	1	1	•	•	•	•	•	•	•	•	•	•	•	•	2673
All grass	41	24	24	7	2	1	•	•	•	•	•	•	•	•	•	•	•	•	3634
All crops & grass	35	13	18	19	9	2	1	•	•	•	•	•	•	•	•	•	•	•	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW1.7 Percentage of crop area by field application rate – K_2O, in England and Wales 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Spring wheat	62	14	17	•	3	•	4	•	•	•	•	•	•	•	•	•	•	•	18
Winter wheat	32	1	8	25	22	6	2	2	1	•	•	•	•	•	•	•	•	•	2290
Spring barley	20	5	32	18	16	2	1	1	5	•	•	•	•	•	•	•	•	•	349
Winter barley	18	2	11	24	28	10	3	2	2	•	•	•	•	•	•	•	•	•	919
Oats	12	1	7	25	43	5	7	•	•	•	•	•	•	•	•	•	•	•	128
Rye/Triticale	17	•	8	31	38	4	1	•	1	•	•	•	•	•	•	•	•	•	46
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	2	22	•	•	•	•	•	•	14	•	•	24	•	12	15	11	•	•	17
2nd Early/Maincrop potatoes	6	0	1	•	•	5	2	1	3	8	10	13	9	15	3	10	4	11	191
Sugar beet	13	6	1	5	9	13	18	11	9	6	3	2	1	1	•	1	•	•	303
Spring oilseed rape	31	7	13	32	14	2	1	•	•	•	•	•	•	•	•	•	•	•	77
Winter oilseed rape	32	1	13	31	17	4	1	0	1	•	•	•	•	•	•	•	•	•	518
Linseed	53	2	14	12	16	1	1	0	1	•	•	•	•	•	•	•	•	•	148
Forage maize	48	4	11	10	10	6	1	4	2	3	•	•	•	•	•	•	•	•	186
Rootcrops for stockfeed	44	•	4	12	17	10	1	5	5	•	•	•	1	•	•	•	•	•	57
Leafy forage crops	49	4	36	5	5	•	•	•	2	•	•	•	•	•	•	•	•	•	34
Arable silage/other fodder crops	12	22	11	14	9	•	15	16	•	•	•	•	•	•	•	•	•	•	18
Peas – human consumption	56	•	2	14	9	3	•	1	14	•	1	•	•	•	•	•	•	•	84
Peas – animal consumption	43	6	5	26	10	5	3	1	•	•	2	•	•	•	•	•	•	•	99
Beans – animal consumption	42	•	7	31	14	5	0	1	•	•	•	•	•	•	•	•	•	•	158
Vegetables (brassicae)	8	2	•	5	15	20	6	25	2	9	•	8	•	•	•	•	•	•	32
Vegetables (other)	17	•	11	4	10	7	5	13	8	5	11	3	5	•	•	•	•	•	103
Soft fruit	6	•	5	35	32	22	•	•	•	•	•	•	•	•	•	•	•	•	12
Top Fruit	47	25	4	5	5	•	•	14	•	•	•	•	•	•	•	•	•	•	40
Other Tillage	62	2	8	7	12	2	1	1	5	•	1	•	•	•	•	•	•	•	65
All tillage	29	2	10	22	20	6	3	2	2	1	1	1	•	•	•	•	•	•	5901
Grass under 5 years	32	13	19	11	9	8	4	2	1	•	•	•	•	•	•	•	•	•	961
Grass 5 years and over	42	20	22	7	4	2	1	•	•	•	•	•	•	•	•	•	•	•	2673
All grass	41	19	21	8	4	3	2	1	•	•	•	•	•	•	•	•	•	•	3634
All crops & grass	34	10	15	15	12	5	2	1	1	•	•	•	•	•	•	•	•	•	9535

Source: British Survey of Fertiliser Practice 1998.

Table EW2.1 Average fertiliser practice by grassland utilisation, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed – not mown	67	51	49	30	118	29	30	79	15	15	1928
Grazed – mown	92	69	73	66	158	37	60	145	25	44	1487
All grazings	77	58	59	44	137	33	45	105	19	27	3415
Cut for seed grazed	.	.	.	.	.	.	.	.	.	.	4
Cut for seed not grazed	100	96	69	1	137	93	99	137	89	68	19
All cut for seed	100	96	74	9	136	82	95	136	80	70	24
Cut for silage grazed	95	71	77	70	173	38	65	165	27	50	1132
Cut for silage not grazed	99	83	90	45	204	44	86	202	37	77	148
All cut for silage	95	72	78	68	175	39	67	167	28	52	1289
Cut for hay grazed	80	56	57	51	101	32	37	81	18	21	432
Cut for hay not grazed	70	61	61	33	125	27	44	87	17	27	33
All cut for hay	80	56	57	50	102	31	38	81	18	21	466
All mowings	92	69	74	64	161	38	62	148	26	46	1685
All grass	77	59	59	44	139	33	47	107	20	28	3634

Source: British Survey of Fertiliser Practice 1998

Table EW2.2 Percentage of grass area by field application rate – N, England and Wales 1998

row %	kg/ha																	Fields in sample
	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	
Grazed – not mown	33	1	13	15	10	6	5	3	2	3	2	3	1	1	1	1	1	1	1928
Grazed – mown	8	1	6	15	11	7	11	5	6	7	5	6	2	3	3	2	2	•	1487
All grazings	23	1	10	15	11	6	7	4	4	4	3	4	1	2	1	1	1	•	3415
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Cut for seed not grazed	•	•	•	21	•	10	23	28	12	7	•	•	•	•	•	•	•	•	19
All cut for seed	•	•	1	18	•	8	28	27	11	6	•	•	•	•	•	•	•	•	24
Cut for silage grazed	5	1	5	13	8	8	11	6	7	8	6	7	3	4	3	2	3	•	1132
Cut for silage not grazed	1	•	5	7	4	7	7	7	5	9	10	22	1	2	7	3	3	1	148
All cut for silage	5	1	5	13	8	8	11	6	7	8	6	8	3	3	3	2	3	•	1289
Cut for hay grazed	20	1	10	22	17	8	9	4	3	3	1	1	1	•	•	•	•	•	432
Cut for hay not grazed	30	•	2	23	5	16	2	7	•	2	5	9	•	•	•	•	•	•	33
All cut for hay	20	1	9	22	17	8	9	4	2	3	2	1	1	•	•	•	•	•	466
All mowings	8	1	6	15	10	7	11	6	6	7	5	7	2	3	3	2	2	•	1685
All grass	23	1	10	15	10	6	7	4	4	5	3	4	1	2	2	1	1	•	3634

Source: British Survey of Fertiliser Practice 1998

Table EW2.3 Percentage of grass area by field application rate – P_2O_5, England and Wales 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Grazed – not mown	49	25	20	5	1	1	•	•	•	•	•	•	•	•	•	•	•	•	1928
Grazed – mown	31	23	29	11	3	2	•	•	•	•	•	•	•	•	•	•	•	•	1487
All grazings	42	24	24	7	2	1	•	•	•	•	•	•	•	•	•	•	•	•	3415
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Cut for seed not grazed	4	3	2	15	48	16	•	1	10	•	•	•	•	•	•	•	•	•	19
All cut for seed	4	4	12	18	40	13	•	1	8	•	•	•	•	•	•	•	•	•	24
Cut for silage grazed	29	23	30	13	3	2	•	•	•	•	•	•	•	•	•	•	•	•	1132
Cut for silage not grazed	17	19	38	15	5	4	3	•	1	•	•	•	•	•	•	•	•	•	148
All cut for silage	28	23	31	13	3	2	•	•	•	•	•	•	•	•	•	•	•	•	1289
Cut for hay grazed	44	22	27	4	1	1	•	•	•	•	•	•	•	•	•	•	•	•	432
Cut for hay not grazed	39	40	11	9	•	2	•	•	•	•	•	•	•	•	•	•	•	•	33
All cut for hay	44	22	27	4	1	1	•	•	•	•	•	•	•	•	•	•	•	•	466
All mowings	31	23	30	11	3	2	•	•	•	•	•	•	•	•	•	•	•	•	1685
All grass	41	24	24	7	2	1	•	•	•	•	•	•	•	•	•	•	•	•	3634

Source: British Survey of Fertiliser Practice 1998

Table EW2.4 Percentage of grass area by field application rate – K_2O, England and Wales 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Grazed – not mown	51	22	20	5	1	1	•	•	•	•	•	•	•	•	•	•	•	•	1928
Grazed – mown	27	15	24	11	9	7	4	1	1	•	•	•	•	•	•	•	•	•	1487
All grazings	41	19	21	8	4	3	2	1	•	•	•	•	•	•	•	•	•	•	3415
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Cut for seed not grazed	31	•	•	32	12	7	•	•	17	•	•	•	•	•	•	•	•	•	19
All cut for seed	26	1	1	36	11	6	•	5	14	•	•	•	•	•	•	•	•	•	24
Cut for silage grazed	23	14	23	13	10	9	5	2	1	•	1	•	•	•	•	•	•	•	1132
Cut for silage not grazed	10	12	16	18	10	10	12	7	1	•	•	•	3	•	•	•	•	•	148
All cut for silage	22	14	23	13	10	9	6	2	1	•	•	•	•	•	•	•	•	•	1289
Cut for hay grazed	43	18	26	8	2	2	•	•	•	•	•	•	•	•	•	•	•	•	432
Cut for hay not grazed	39	37	7	2	5	9	2	•	•	•	•	•	•	•	•	•	•	•	33
All cut for hay	43	19	25	8	2	2	•	•	•	•	•	•	•	•	•	•	•	•	466
All mowings	26	15	23	12	9	7	5	2	1	•	•	•	•	•	•	•	•	•	1685
All grass	41	19	21	8	4	3	2	1	•	•	•	•	•	•	•	•	•	•	3634

Source: British Survey of Fertiliser Practice 1998

Table EW3.0 Product and nutrient by month of application, England and Wales 1998

(a) Product use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Product ('000 tonnes)
Straight N	1	•	•	•	•	10	32	31	15	5	3	3	2196
Straight P	17	22	7	2	3	14	9	7	10	•	2	7	59
Straight K	19	17	9	3	5	22	11	4	5	2	2	2	103
Compounds	10	10	3	1	2	11	20	16	15	5	4	4	2048
Unknown	4	23	11	6	12	24	11	3	4	•	3	•	11
All fertilisers	6	6	2	1	1	11	25	23	15	5	4	3	4417

(b) Nutrient use

row %	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Nutrient ('000 tonnes)
N	1	1	•	•	•	10	30	29	17	6	4	3	1037
P_2O_5	16	17	4	1	2	13	18	12	10	2	2	4	281
K_2O	15	15	4	1	3	14	16	11	11	3	3	4	372
Total	7	7	2	1	1	11	25	22	14	5	4	4	1690

Note: 'product use' refers to the total tonnage of the products used by farmers in the survey year 1998

'nutrient use' refers to the tonnage of each nutrient contained in the products usd (eg 100 kg of a 20 : 10 : 10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O

100 kg of ammonium nitrate, one of the 'straight N' products, contains typically 34.5 kg of N)

Source: British Survey of Fertiliser Practice 1998.

Table EW5.1 Average fertiliser practice on dairy farms, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	98	83	86	46	166	63	75	163	52	65	84
Spring barley	81	65	67	71	90	44	53	73	28	35	35
Winter barley	97	80	85	39	114	49	64	111	39	54	76
Oats	•	•	•	•	•	•	•	•	•	•	2
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	0
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	2
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	9
Sugar beet	•	•	•	•	•	•	•	•	•	•	3
Spring oilseed rape	100	96	96	13	125	52	54	125	50	52	13
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	6
Linseed	•	•	•	•	•	•	•	•	•	•	1
Forage maize	86	68	48	90	74	63	91	63	43	44	64
Rootcrops for stockfeed	•	•	•	•	•	•	•	•	•	•	7
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	7
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	6
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	4
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	1
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	5
All tillage	92	77	75	54	125	59	74	115	45	55	329
Grass under 5 years	100	61	70	72	223	41	79	223	25	56	270
Grass 5 years and over	89	62	65	66	185	36	58	166	22	38	579
All grass	92	62	66	68	195	37	63	179	23	42	849
All crops & grass	92	65	68	65	181	42	66	167	27	45	1178

Source: British Survey of Fertiliser Practice 1998.

Table EW5.2 Average fertiliser practice on cattle and sheep farms, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	100	90	90	37	175	63	81	175	56	72	62
Spring barley	96	93	93	68	78	38	45	75	36	42	52
Winter barley	100	90	89	49	145	68	80	145	61	72	67
Oats	91	91	91	25	101	59	75	92	54	69	16
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	3
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	6
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	0
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	7
Linseed	•	•	•	•	•	•	•	•	•	•	5
Forage maize	92	92	56	89	52	71	66	48	65	37	31
Rootcrops for stockfeed	90	90	90	71	74	78	86	67	70	77	19
Leafy forage crops	100	80	80	64	93	39	37	93	32	30	15
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	9
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	2
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	2
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	4
All tillage	96	90	87	53	126	62	74	121	55	64	303
Grass under 5 years	86	72	76	56	138	33	52	119	24	40	246
Grass 5 years and over	66	61	60	40	97	29	33	64	18	20	1331
All grass	68	62	61	41	102	30	35	69	18	21	1577
All crops & grass	70	63	63	42	104	33	38	72	21	24	1880

Source: British Survey of Fertiliser Practice 1998.

Table EW5.3 Average fertiliser practice on other livestock/mixed farms, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	3
Winter wheat	100	72	75	19	183	66	79	182	48	59	538
Spring barley	90	76	78	16	85	37	45	76	28	35	86
Winter barley	100	76	83	18	128	67	85	127	51	70	229
Oats	91	81	83	11	95	69	81	86	56	67	50
Rye/Triticale	92	42	67	13	106	69	84	97	29	56	11
Seed potatoes	•	•	•	•	•	•	•	•	•	•	1
Early potatoes	•	•	•	•	•	•	•	•	•	•	3
2nd Early/Maincrop potatoes	99	99	100	62	191	165	250	189	163	250	39
Sugar beet	96	58	83	73	90	65	140	87	37	117	36
Spring oilseed rape	100	54	54	56	100	34	44	100	18	24	15
Winter oilseed rape	99	75	71	14	201	70	77	199	52	55	108
Linseed	64	38	46	23	86	50	73	55	19	33	40
Forage maize	81	67	47	70	66	63	96	53	42	45	85
Rootcrops for stockfeed	45	49	49	73	78	82	91	35	40	44	13
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	4
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	3
Peas – human consumption	0	23	23	8	0	77	77	0	18	18	10
Peas – animal consumption	7	70	70	24	0	53	64	0	37	44	27
Beans – animal consumption	1	61	52	14	0	71	70	0	43	36	20
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	1
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	5
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	15	11	18	73	56	25	71	9	3	12	10
All tillage	9	71	74	25	152	68	87	140	48	64	1337
Grass under 5 years	89	55	60	21	144	42	59	129	23	35	289
Grass 5 years and over	76	45	44	21	128	33	46	97	15	20	372
All grass	80	48	49	21	134	36	51	108	18	25	661
All crops & grass	88	63	65	23	146	59	77	128	37	50	1998

Source: British Survey of Fertiliser Practice 1998.

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, England and Wales 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	100	56	50	6	134	38	28	134	21	14	13
Winter wheat	100	68	64	7	184	68	76	183	46	49	1606
Spring barley	97	57	80	18	101	49	75	98	28	59	176
Winter barley	100	72	80	4	137	65	80	137	47	64	547
Oats	100	93	90	13	117	67	83	117	62	75	60
Rye/Triticale	93	68	87	7	119	52	69	110	35	60	32
Seed potatoes	•	•	•	•	•	•	•	•	•	•	8
Early potatoes	100	100	97	47	141	132	199	141	132	192	12
2nd Early/Maincrop potatoes	97	92	93	22	195	208	311	188	192	288	137
Sugar beet	99	75	89	17	115	68	139	114	51	123	264
Spring oilseed rape	99	64	66	26	120	51	66	119	33	43	49
Winter oilseed rape	100	76	67	8	204	68	67	204	52	45	397
Linseed	82	45	46	13	68	52	63	56	23	29	102
Forage maize	•	•	•	•	•	•	•	•	•	•	6
Rootcrops for stockfeed	96	38	38	40	72	88	121	69	34	46	18
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	8
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	0
Peas – human consumption	0	32	46	2	0	74	115	0	24	53	74
Peas – animal consumption	13	48	50	12	39	59	76	5	28	38	67
Beans – animal consumption	5	57	60	4	185	64	69	10	37	41	132
Vegetables (brassicae)	85	89	92	21	222	73	139	189	65	128	30
Vegetables (other)	85	74	83	5	140	88	152	119	65	126	96
Soft fruit	100	89	94	6	77	66	82	77	58	77	12
Top Fruit	62	32	53	2	52	32	61	33	10	33	40
Other Tillage	63	36	41	9	90	59	86	57	21	35	46
All tillage	92	68	69	9	164	72	92	152	50	64	3932
Grass under 5 years	91	60	55	15	145	51	64	131	30	35	156
Grass 5 years and over	73	39	38	13	118	41	46	86	16	18	391
All grass	77	44	42	14	125	44	51	96	19	22	547
All crops & grass	91	66	66	9	160	70	89	145	46	59	4479

Source: British Survey of Fertiliser Practice 1998.

Table SC1.1 Total fertiliser use, Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	2
Winter wheat	100	95	95	18	195	79	85	195	75	81	108
Spring barley	100	99	99	33	96	56	66	95	56	65	289
Winter barley	98	93	93	29	169	85	87	166	79	81	95
Oats	95	88	88	27	80	54	57	76	48	50	41
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	100	100	100	36	196	168	246	196	168	245	14
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	99	84	84	9	112	54	60	111	45	50	28
Winter oilseed rape	100	90	90	5	208	71	80	208	64	72	47
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	97	97	97	68	67	107	85	65	104	82	44
Leafy forage crops	100	100	100	57	118	55	57	118	55	57	19
Arable silage/other fodder crops	100	100	100	63	161	102	91	161	102	91	10
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	•	•	•	•	•	•	2
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	2
All tillage	97	94	94	27	135	70	78	131	66	73	728
Grass under 5 years	91	82	84	48	151	41	59	138	34	50	274
Grass 5 years and over	91	83	82	46	122	30	37	111	25	30	379
All grass	91	83	82	46	130	33	43	119	27	36	653
All crops & grass	94	87	87	39	132	49	58	124	43	51	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC1.2 Use of straight fertiliser, Scotland 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	2
Winter wheat	96	1	9	175	0	60	168	0	5	108
Spring barley	48	2	5	58	73	73	28	1	3	289
Winter barley	95	0	2	147	88	75	139	0	1	95
Oats	47	5	5	72	0	0	34	0	0	41
Rye/Triticale	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	31	1	1	83	0	0	25	0	0	14
Sugar beet	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	98	3	6	71	60	0	70	2	0	28
Winter oilseed rape	100	3	5	173	0	75	173	0	4	47
Linseed	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	1	5	1	87	140	0	1	7	0	44
Leafy forage crops	43	2	2	78	0	0	33	0	0	19
Arable silage/other fodder crops	15	23	3	43	0	0	7	0	0	10
Peas – human consumption	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	•	•	•	•	•	2
Top Fruit	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	2
All tillage	66	1	4	121	69	66	79	1	3	728
Grass under 5 years	43	1	2	86	106	75	37	1	2	274
Grass 5 years and over	29	0	0	90	67	75	26	0	0	379
All grass	33	0	1	88	90	75	29	0	1	653
All crops & grass	46	1	2	107	75	68	49	1	1	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC1.3 Use of compound fertiliser, Scotland 1998

	Crop area receiving dressing (%)			Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	2
Winter wheat	69	99	89	39	79	84	27	75	75	108
Spring barley	98	100	98	69	55	63	67	54	62	289
Winter barley	74	93	93	36	85	86	27	79	80	95
Oats	82	88	88	51	54	57	42	48	50	41
Rye/Triticale	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	100	100	100	171	168	246	171	168	245	14
Sugar beet	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	71	84	84	58	51	60	41	43	50	28
Winter oilseed rape	79	90	90	44	71	76	35	64	68	47
Linseed	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	97	97	97	66	101	85	64	97	82	44
Leafy forage crops	100	100	100	84	55	57	84	55	57	19
Arable silage/other fodder crops	100	100	100	154	102	91	154	102	91	10
Peas – human consumption	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	•	•	•	•	•	2
Top Fruit	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	2
All tillage	85	94	93	61	69	76	52	65	70	728
Grass under 5 years	84	82	83	121	40	59	101	33	48	274
Grass 5 years and over	83	83	82	102	30	37	85	25	30	379
All grass	83	83	82	108	33	43	89	27	35	653
All crops & grass	84	87	86	89	48	57	74	42	49	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC1.4 Use of lime, Scotland 1998

	Crop area receiving dressing (%)						Average field rate of CaO equivalent (tonnes/ha)						Fields in sample	Fields limed
	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Ground limestone	Ground chalk	Magnesian limestone	Sugar beet lime	Other	All	Fields	Fields
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Winter wheat	•	•	18	•	•	18	•	•	3	2.6	•	2.6	108	19
Spring barley	5	•	9	•	•	15	2.3	•	•	2.7	•	2.6	289	44
Winter barley	3	•	22	•	•	26	3	•	3	•	2	24	95	24
Oats	•	•	3	•	•	3	•	•	•	•	•	•	0	1
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	5	2
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	6	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	0	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	•	•	14	0
Sugar beet	•	•	•	•	•	•	•	•	•	•	•	•	0	0
Spring oilseed rape	12	•	11	•	•	34	2.5	•	•	2.6	•	2.5	28	9
Winter oilseed rape	3	•	11	•	•	14	2.5	•	•	1.8	•	2.0	47	6
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	0	0
Forage maize	•	•	•	•	•	•	•	•	•	•	•	•	2	0
Rootcrops for stockfeed	19	•	7	•	•	26	2.5	•	•	3.6	•	2.7	44	11
Leafy forage crops	•	•	3	•	•	5	•	•	•	•	•	•	19	1
Arable silage/other fodder crops	•	•	8	•	•	8	•	•	•	•	•	•	10	1
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	•	•	4	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	3	0
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	2	1
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	2	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	•	•	3	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	2	0
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	0	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	•	•	2	0
All tillage	4	•	12	•	•	17	2.4	•	•	2.5	2.3	2.5	728	122
Grass under 5 years	3	•	5	•	•	9	2.2	•	1.1	2.4	•	2.3	274	24
Grass 5 years and over	•	•	9	•	•	9	2.5	•	•	2.7	•	2.7	379	36
All grass	1	•	8	•	•	9	2.3	•	1.4	2.6	•	2.6	653	60
All crops & grass	2	•	10	•	•	12	2.3	•	1.1	2.6	2.3	2.5	1381	182

Source: British Survey of Fertiliser Practice 1998.

Table SC1.5 Percentage of crop area by field application rate – N, Scotland 1998

row %	kg/ha																	Fields in sample
	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Winter wheat	•	•	•	3	3	2	4	17	21	21	5	2	•	•	•	•	•	•	108
Spring barley	•	•	6	14	26	42	7	3	1	•	•	•	•	•	•	•	•	•	289
Winter barley	2	•	4	•	9	4	15	17	18	17	10	•	3	•	•	•	•	•	95
Oats	5	4	15	26	22	15	12	2	•	•	•	•	•	•	•	•	•	•	41
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	6
Early Potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	1	•	18	10	32	•	20	20	•	•	•	•	•	•	14
Sugar beet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Apring oilseed rape	1	•	10	15	8	32	11	15	5	•	•	3	•	•	•	•	•	•	28
Winter oilseed rape	•	•	•	•	10	•	•	9	21	29	12	10	5	5	•	•	•	•	47
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	3	1	24	42	19	4	2	2	2	•	•	•	•	•	•	•	•	•	44
Leafy forage crops	•	3	4	3	19	10	48	11	1	•	•	•	•	•	•	•	•	•	19
Arable silage/other fodder crops	•	•	28	18	29	29	•	•	•	•	•	•	•	•	•	•	•	•	10
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
All tillage	3	1	5	10	16	22	8	9	9	8	6	2	1	•	•	•	•	•	728
Grass under 5 years	9	1	3	16	11	5	8	13	8	7	5	6	2	3	2	•	•	•	274
Grass 5 years and over	9	3	7	20	12	12	12	4	6	5	2	3	•	1	3	•	•	•	379
All grass	9	2	6	19	12	10	11	7	7	6	3	4	1	2	2	•	•	•	653
All crops & grass	6	1	6	15	13	14	10	7	7	7	4	3	1	1	1	•	•	•	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC1.6 Percentage of crop area by field application rate – P_2O_5, Scotland 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Spring wheat	•	•	70	30	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Winter wheat	5	5	6	18	50	14	1	1	•	•	•	•	•	•	•	•	•	•	108
Spring barley	1	4	32	51	10	3	•	1	•	•	•	•	•	•	•	•	•	•	289
Winter barley	7	1	2	16	65	8	•	2	•	•	•	•	•	•	•	•	•	•	95
Oats	12	14	28	20	25	•	•	•	•	•	•	•	•	•	•	•	•	•	41
Rye/Triticale	•	28	•	50	22	•	•	•	•	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	17	15	23	•	24	21	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	1	•	38	10	33	•	18	•	•	•	•	•	•	•	14
Sugar beet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	16	3	24	50	4	3	•	•	•	•	•	•	•	•	•	•	•	•	28
Winter oilseed rape	10	5	3	46	33	•	•	3	•	•	•	•	•	•	•	•	•	•	47
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Forage maize	78	•	•	22	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	3	•	12	8	28	28	4	3	8	2	2	2	•	•	•	•	•	•	44
Leafy forage crops	•	5	21	66	8	•	•	•	•	•	•	•	•	•	•	•	•	•	19
Arable silage/other fodder crops	•	•	24	28	5	•	•	15	28	•	•	•	•	•	•	•	•	•	10
Peas – human consumption	100	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	62	38	•	•	•	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	100	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	5	95	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	11	•	•	•	•	89	•	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	100	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	97	3	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
All tillage	6	4	18	35	27	6	1	1	1	•	1	•	•	•	•	•	•	•	728
Grass under 5 years	18	24	32	19	3	2	1	•	•	•	•	•	•	•	•	•	•	•	274
Grass 5 years and over	17	34	39	8	2	•	•	•	•	•	•	•	•	•	•	•	•	•	379
All grass	17	31	37	11	2	1	•	•	•	•	•	•	•	•	•	•	•	•	653
All crops & grass	12	20	29	20	12	3	1	1	1	•	•	•	•	•	•	•	•	•	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC1.7 Percentage of crop area by field application rate – K_2O, Scotland 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Winter wheat	5	1	6	22	45	16	1	4	•	•	•	•	•	•	•	•	•	•	108
Spring barley	1	3	18	42	29	7	1	•	•	•	•	•	•	•	•	•	•	•	289
Winter barley	7	•	2	13	65	11	•	2	•	•	•	•	•	•	•	•	•	•	95
Oats	12	8	27	24	28	•	•	•	•	•	•	•	•	•	•	•	•	•	41
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	5
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	1	•	10	•	•	28	7	30	•	14	9	•	•	•	14
Sugar beet	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	16	•	18	42	24	•	•	•	•	•	•	•	•	•	•	•	•	•	28
Winter oilseed rape	10	•	1	45	33	2	•	8	•	•	•	•	•	•	•	•	•	•	47
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	3	•	11	15	49	19	•	1	2	•	•	1	•	•	•	•	•	•	44
Leafy forage crops	•	•	21	71	8	•	•	•	•	•	•	•	•	•	•	•	•	•	19
Arable silage/other fodder crops	•	•	24	28	20	•	•	•	28	•	•	•	•	•	•	•	•	•	10
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	3
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	2
All tillage	6	2	12	32	35	8	1	2	•	•	•	1	•	•	•	•	•	•	728
Grass under 5 years	16	14	22	24	9	7	7	•	•	•	•	•	•	•	•	•	•	•	274
Grass 5 years and over	18	31	30	12	5	2	2	•	•	•	•	•	•	•	•	•	•	•	379
All grass	18	26	28	15	6	3	3	•	•	•	•	•	•	•	•	•	•	•	653
All crops & grass	13	16	21	21	17	5	2	1	•	•	•	•	•	•	•	•	•	•	1381

Source: British Survey of Fertiliser Practice 1998.

Table SC2.1 Average fertiliser practice by grassland utilisation, Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Grazed – not mown	88	79	78	37	108	27	29	95	21	22	344
Grazed – mown	95	89	89	61	168	44	669	160	39	59	251
All grazings	91	83	82	45	128	33	419	116	27	34	595
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	1
All cut for seed	•	•	•	•	•	•	•	•	•	•	1
Cut for silage grazed	95	91	91	65	179	45	70	170	41	63	208
Cut for silage not grazed	97	84	92	78	175	40	72	170	34	66	52
All cut for silage	95	90	91	67	179	45	70	170	40	64	260
Cut for hay grazed	99	82	84	49	93	38	48	92	31	40	56
Cut for hay not grazed	•	•	•	•	•	•	•	•	•	•	7
All cut for hay	99	82	85	49	92	37	47	91	30	39	63
All mowings	96	88	90	64	168	43	67	161	38	59	310
All grass	91	83	82	46	130	33	43	119	27	36	653

Source: British Survey of Fertiliser Practice 1998.

Table SC2.2 Percentage of grass area by field application rate – N, Scotland 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Grazed – not mown	12	3	8	25	14	7	11	6	5	3	1	3	•	1	1	•	•	•	344
Grazed – mown	5	•	4	7	7	17	10	10	7	11	6	7	1	4	5	•	•	•	251
All grazings	9	2	7	19	12	10	11	7	5	6	2	4	•	2	2	•	•	•	595
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
Cut for silage grazed	5	•	3	2	5	18	10	10	7	12	6	8	1	5	6	•	•	•	208
Cut for silage not grazed	3	2	•	3	15	1	16	3	25	9	13	•	4	•	6	•	•	•	52
All cut for silage	5	•	3	2	7	15	11	9	10	11	8	7	2	4	6	•	•	•	260
Cut for hay grazed	1	•	18	27	20	10	7	4	8	2	2	1	•	•	•	•	•	•	56
Cut for hay not grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	7
All cut for hay	1	•	16	29	19	9	8	4	8	1	2	1	•	•	•	•	•	•	63
All mowings	4	•	3	7	8	14	11	9	10	10	7	6	2	4	5	•	•	•	310
All grass	9	2	6	19	12	10	11	7	7	6	3	4	1	2	2	•	•	•	653

Source: British Survey of Fertiliser Practice 1998

Table SC2.3 Percentage of grass area by field application rate – P_2O_5, Scotland 1998

row %	kg/ha																	Fields in sample
	0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	
Grazed – not mown	21	38	34	6	1	•	•	•	•	•	•	•	•	•	•	•	•	•	344
Grazed – mown	11	17	44	21	6	2	1	•	•	•	•	•	•	•	•	•	•	•	251
All grazings	17	32	37	10	2	1	•	•	•	•	•	•	•	•	•	•	•	•	595
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
Cut for silage grazed	9	16	43	23	6	2	•	•	•	•	•	•	•	•	•	•	•	•	208
Cut for silage not grazed	16	23	33	20	5	3	•	•	•	•	•	•	•	•	•	•	•	•	52
All cut for silage	10	17	42	22	6	2	•	•	•	•	•	•	•	•	•	•	•	•	260
Cut for hay grazed	18	25	37	6	12	•	1	•	•	•	•	•	•	•	•	•	•	•	56
Cut for hay not grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	7
All cut for hay	18	26	38	6	12	•	1	•	•	•	•	•	•	•	•	•	•	•	63
All mowings	12	18	42	20	5	2	•	•	•	•	•	•	•	•	•	•	•	•	310
All grass	17	31	37	11	2	1	•	•	•	•	•	•	•	•	•	•	•	•	653

Source: British Survey of Fertiliser Practice 1998

Table SC2.4 Percentage of grass area by field application rate – K_2O, Scotland 1998

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	175-	200-	225-	250-	275-	300-	325-	350-	375-	400+	Fields in sample
Grazed – not mown	22	36	30	11	2	•	•	•	•	•	•	•	•	•	•	•	•	•	344
Grazed – mown	11	10	25	23	13	9	8	1	•	•	•	•	•	•	•	•	•	•	251
All grazings	18	28	29	14	5	3	3	•	•	•	•	•	•	•	•	•	•	•	595
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
Cut for silage grazed	9	8	22	25	15	10	9	1	•	•	•	•	•	•	•	•	•	•	208
Cut for silage not grazed	8	7	19	24	19	12	10	•	•	•	•	•	•	•	•	•	•	•	52
All cut for silage	9	8	21	25	16	10	9	1	•	•	•	•	•	•	•	•	•	•	260
Cut for hay grazed	16	21	38	8	9	6	1	2	•	•	•	•	•	•	•	•	•	•	56
Cut for hay not grazed	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	7
All cut for hay	15	21	39	7	9	6	1	2	•	•	•	•	•	•	•	•	•	•	63
All mowings	11	9	24	23	14	9	8	1	•	•	•	•	•	•	•	•	•	•	310
All grass	18	26	28	15	6	3	3	•	•	•	•	•	•	•	•	•	•	•	653

Source: British Survey of Fertiliser Practice 1998

Table SC3.0 Product and nutrient by month of application, Scotland 1998

(a) Product use

row %	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Product ('000 tonnes)
Straight N	•	1	•	•	•	8	30	38	12	4	5	3	177
Straight P	•	•	•	•	•	•	•	•	•	•	•	•	2
Straight K	•	•	•	•	•	•	•	•	•	•	•	•	3
Compounds	4	5	1	•	•	2	21	34	13	1	5	5	463
Unknown	•	•	•	•	•	•	•	•	•	•	•	•	2
All fertilisers	3	4	1	•	•	4	24	35	13	9	5	4	646

(b) Nutrient use

row %	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total Nutrient ('000 tonnes)
N	1	1	•	•	•	4	25	37	13	10	6	4	148
P_2O_5	8	10	2	1	•	3	22	30	11	6	3	5	51
K_2O	7	9	1	•	•	3	22	31	11	8	3	5	61
Total	4	5	1	•	•	3	24	35	12	8	5	4	260

Note: 'product use' refers to the total tonnage of the products used by farmers in the survey year 1998

'nutrient use' refers to the tonnage of each nutrient contained in the products usd (eg 100 kg of a 20 : 10 : 10 compound contains 20 kg of N, 10 kg of P_2O_5 and 10 kg of K_2O

100 kg of ammonium nitrate, one of the 'straight N' products, contains typically 34.5 kg of N)

Source: British Survey of Fertiliser Practice 1998.

Table SC5.1 Average fertiliser practice on general cropping farms, Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	0
Winter wheat	100	94	94	14	196	78	84	196	73	79	90
Spring barley	100	99	99	15	105	59	73	105	59	73	131
Winter barley	100	91	91	8	169	85	88	169	78	80	57
Oats	100	100	100	15	92	63	66	92	63	66	21
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	3
Seed potatoes	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	100	100	100	37	197	169	247	197	169	247	11
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	100	100	100	1	118	56	61	118	56	61	18
Winter oilseed rape	100	89	89	4	206	72	81	206	64	72	43
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	•	•	•	•	•	•	•	•	•	•	9
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	2
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	2
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	4
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	3
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	2
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	2
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	2
Soft fruit	•	•	•	•	•	•	•	•	•	•	2
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	0
All tillage	99	95	95	13	150	74	85	148	70	81	408
Grass under 5 years	94	75	81	10	132	34	51	124	25	41	54
Grass 5 years and over	85	69	69	22	78	21	23	66	15	16	62
All grass	89	72	74	17	102	27	36	91	19	26	116
All crops & grass	97	90	91	14	141	66	77	136	60	70	524

Source: British Survey of Fertiliser Practice 1998.

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, Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	•	•	•	•	•	•	•	•	•	•	0
Spring barley	100	100	100	90	64	40	44	64	40	44	17
Winter barley	•	•	•	•	•	•	•	•	•	•	7
Oats	•	•	•	•	•	•	•	•	•	•	1
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	0
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	0
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	1
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	0
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	2
Rootcrops for stockfeed	•	•	•	•	•	•	•	•	•	•	2
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	2
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	1
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	0
All tillage	97	95	94	92	97	50	51	94	47	48	34
Grass under 5 years	100	92	100	74	191	49	67	191	46	67	38
Grass 5 years and over	98	92	89	83	186	37	52	182	34	46	97
All grass	98	92	91	81	187	40	56	184	37	50	135
All crops & grass	98	92	91	82	178	41	55	174	38	50	169

Source: British Survey of Fertiliser Practice 1998.

Table SC5.3 Average fertiliser practice on mixed farms, Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	0
Winter wheat	100	100	100	35	190	81	88	190	81	88	17
Spring barley	99	99	99	44	92	52	57	91	52	57	88
Winter barley	89	100	100	39	171	92	94	152	92	94	18
Oats	•	•	•	•	•	•	•	•	•	•	9
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	2
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	1
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	8
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	4
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	92	92	92	69	61	91	84	57	84	77	14
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	4
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	3
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	1
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	1
All tillage	97	95	95	41	117	63	67	114	60	63	170
Grass under 5 years	97	93	95	50	157	41	53	152	38	50	68
Grass 5 years and over	88	76	76	30	124	24	27	109	18	20	61
All grass	91	82	82	37	136	31	37	124	25	31	129
All crops & grass	94	87	87	39	128	45	51	120	40	44	299

Source: British Survey of Fertiliser Practice 1998.

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 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	•	•	•	•	•	•	•	•	•	•	1
Spring barley	100	100	100	62	76	57	60	75	56	60	53
Winter barley	100	96	93	78	172	82	82	172	79	76	13
Oats	•	•	•	•	•	•	•	•	•	•	10
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	0
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	2
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	1
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	0
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	98	98	98	62	69	115	81	68	113	80	19
Leafy forage crops	100	100	100	36	116	51	54	116	51	54	11
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	4
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	1
All tillage	89	88	88	57	91	65	64	81	58	56	116
Grass under 5 years	84	74	74	51	138	41	63	115	30	47	114
Grass 5 years and over	90	84	82	37	94	29	34	84	24	28	159
All grass	88	81	80	41	105	32	41	92	26	33	273
All crops & grass	88	82	81	43	103	37	44	91	30	36	389

Source: British Survey of Fertiliser Practice 1998.

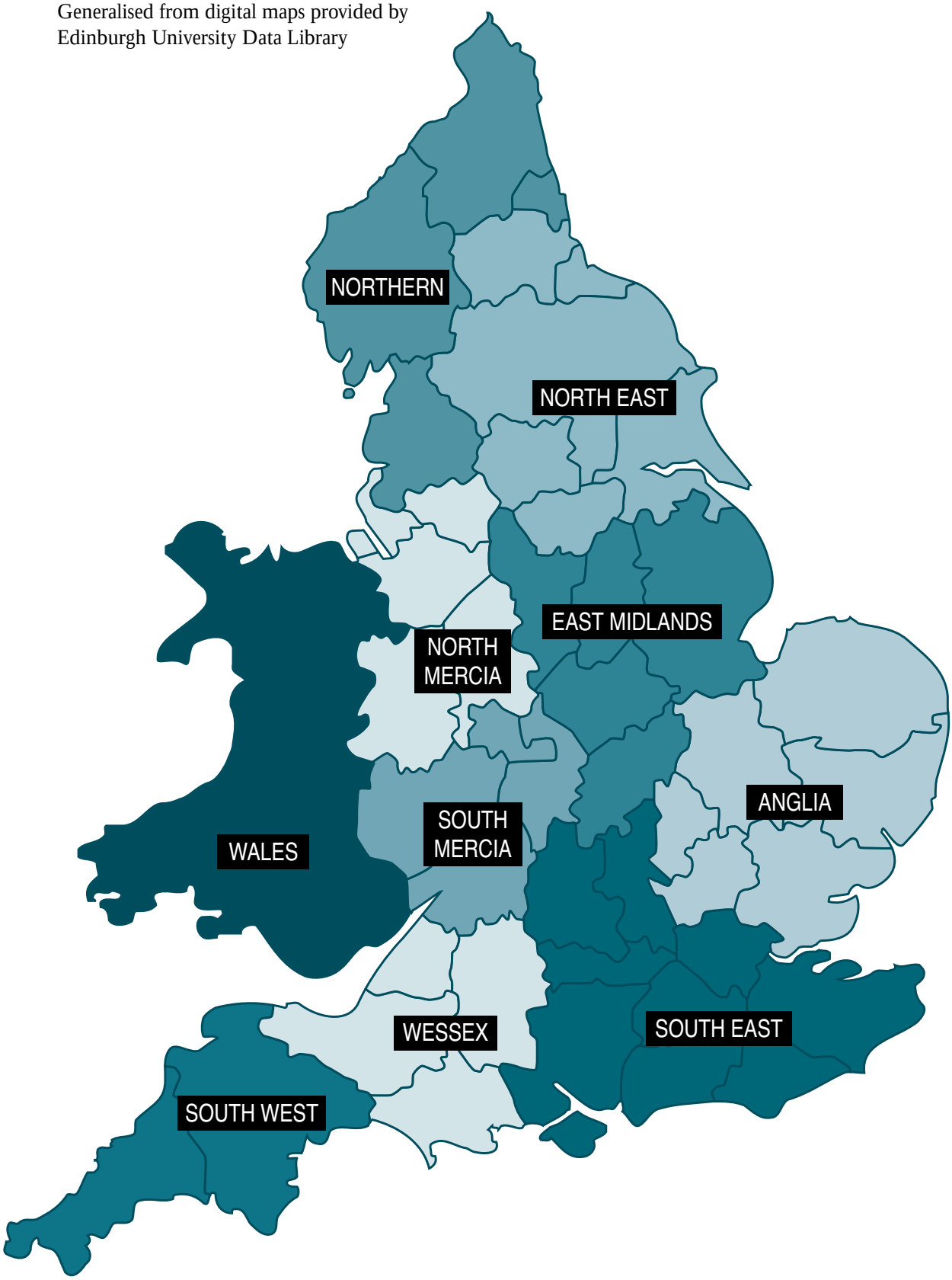
NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

APPENDIX TO SECTION D

CONTENTS

BRITISH SURVEY OF FERTILISER PRACTICE
1998 BSFP Regions[17] in England and Wales

Generalised from digital maps provided by
Edinburgh University Data Library



[17] MAFF administrative regions have been revised since April 1996 as a result of changes to county boundaries and nomenclature brought about by the introduction of unitary local authorities. The BSFP regions marked above are based on the 1995 MAFF administrative regions.

BRITISH SURVEY OF FERTILISER PRACTICE
1998 BSFP Regions[18] in Scotland

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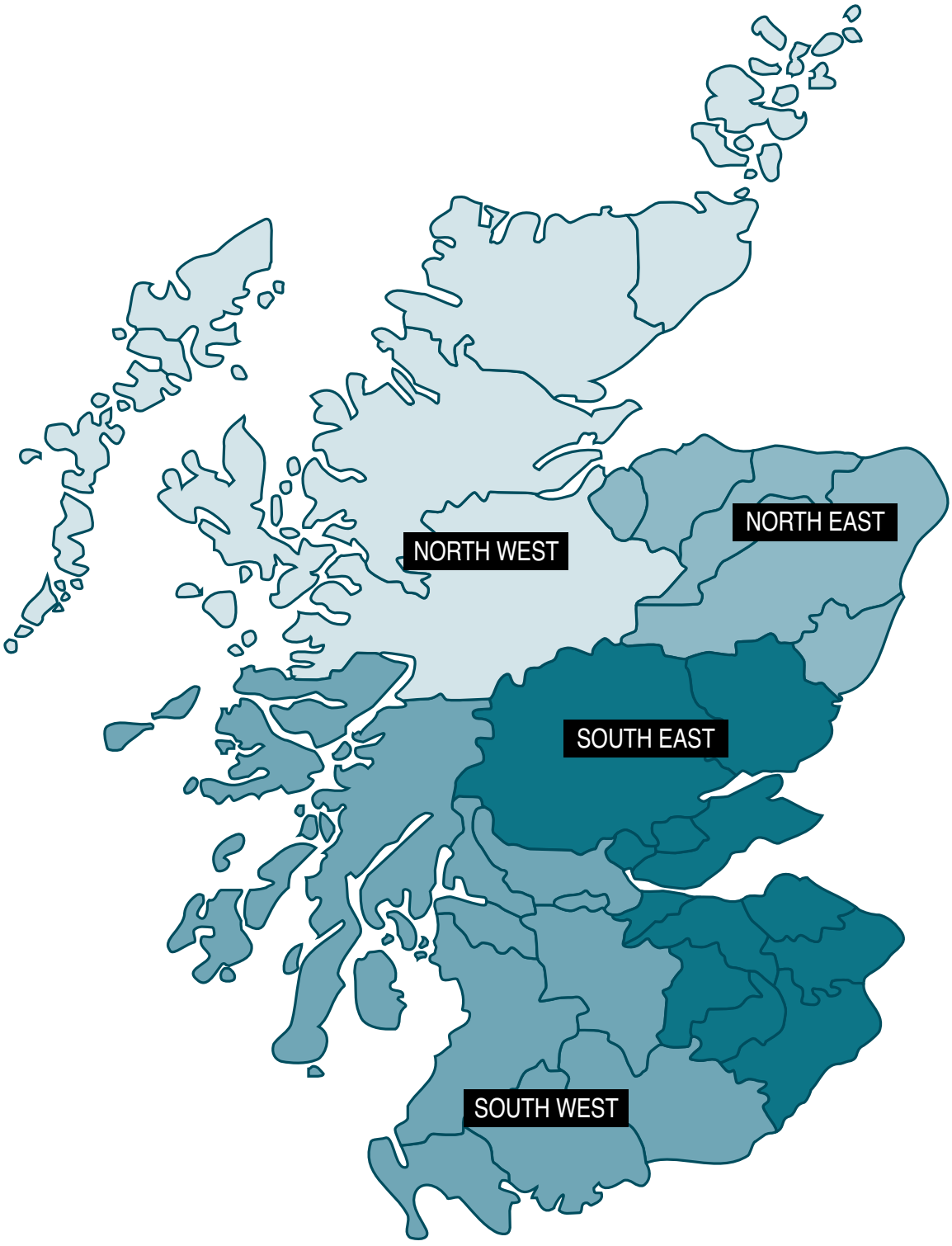

[18] SOAEFD administrative regions have been revised since April 1996 as a result of changes to county boundaries and nomenclature brought about by the introduction of unitary local authorities. The BSFP regions marked above are based on the 1995 SOAEFD administrative regions.

Table GB3.1 Product type as percentage of all product used by crop group, Great Britain 1998

column %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	all crops and grass
Calcium Ammonium Nitrate	0.7	1.2	0.0	0.2	2.7	0.0	1.2	0.2	0.1	0.7	0.1	0.2	0.8
Urea	1.0	5.5	0.0	0.7	7.6	0.1	4.6	1.0	1.3	0.8	6.1	1.1	3.2
Ammonium Nitrate	22.4	51.1	7.8	21.3	46.8	1.3	41.9	34.1	31.3	35.7	23.2	33.7	38.6
Other Straight N	2.1	6.1	1.5	3.4	10.1	0.1	5.6	1.8	2.5	1.8	6.3	1.8	4.1
Triple Superphosphate	0.2	1.6	0.2	0.2	2.0	0.1	1.4	0.3	0.4	0.2	4.3	0.3	1.0
Single Superphosphate	0.3	0.0	0.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Other Straight P	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Muriate of Potash	2.5	1.9	4.3	0.8	1.0	0.3	2.2	0.4	0.7	0.2	0.9	0.4	1.4
Other Straight K	0.3	0.2	1.0	11.5	0.1	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.6
NP	0.5	0.8	4.8	0.1	1.1	0.2	1.2	3.0	3.1	1.7	0.0	3.0	1.9
NK	3.2	0.9	0.7	1.3	0.2	0.1	1.1	7.6	14.3	4.6	4.5	8.0	3.8
PK	5.5	18.6	6.4	42.1	11.1	1.8	18.2	3.3	3.4	5.6	10.0	3.4	12.3
Very High N	2.0	1.1	0.0	0.3	0.6	0.1	1.0	20.6	15.4	12.7	0.7	20.0	8.6
High N	26.0	1.6	0.0	0.9	2.2	0.4	3.5	20.5	16.9	30.8	39.2	20.3	10.3
High P	0.1	0.3	3.6	0.0	0.3	0.0	0.5	0.0	0.0	0.1	0.0	0.0	0.3
High K	11.2	2.5	51.2	8.3	1.8	0.5	6.9	1.4	2.2	0.7	2.8	1.4	4.7
Low N	3.6	4.6	11.9	1.8	6.9	0.2	5.1	0.7	1.1	0.4	1.4	0.7	3.3
Low P	1.4	0.4	2.2	3.9	0.2	0.2	1.0	3.1	5.3	2.8	0.0	3.5	2.0
Equal NPK	16.3	0.6	3.0	0.0	4.5	0.1	2.4	1.0	0.9	0.6	0.0	1.0	1.8
Other fertiliser	0.0	0.1	0.0	2.1	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.1	0.2
Total Product ('000 tonnes)	**205**	**1861**	**200**	**201**	**368**	**192**	**3026**	**1914**	**1045**	**167**	**26**	**2036**	**5064**

Source: British Survey of Fertiliser Practice 1998

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

Table GB3.2 Use of product type by crop group, Great Britain 1998

row %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	total product ('000 tonnes)
Calcium Ammonium Nitrate	3.6	52.8	0.2	1.0	23.6	6.3	87.6	12.2	2.8	3.3	0.1	12.4	42
Urea	1.3	62.3	0.1	0.9	17.0	3.6	85.2	12.2	0.8	8.7	1.0	14.8	165
Ammonium Nitrate	2.4	48.6	0.8	2.2	8.8	2.1	64.8	33.4	3.0	16.8	0.3	35.1	1958
Other Straight N	2.1	54.8	1.5	3.3	18.0	2.0	81.7	16.9	1.5	12.6	0.8	18.3	208
Triple Superphosphate	0.8	60.6	1.1	1.1	14.7	6.6	84.8	12.7	0.8	8.3	2.2	15.1	52
Single Superphosphate	14.3	32.0	0.0	21.9	8.3	0.0	76.5	23.5	0.0	9.5	0.0	23.4	4
Other Straight P	0.0	19.1	7.1	0.0	1.7	4.6	32.5	62.2	0.0	20.9	0.0	67.5	4
Muriate of Potash	6.8	47.7	11.6	2.3	5.0	14.3	87.7	10.5	0.5	11.0	0.3	12.2	76
Other Straight K	2.0	14.6	6.4	70.2	1.3	4.2	98.6	0.8	0.0	0.6	0.0	1.4	33
NP	1.1	15.8	9.6	0.2	4.1	7.6	38.4	58.8	2.9	33.4	0.0	61.6	100
NK	3.4	9.3	0.8	1.4	0.4	1.9	17.0	74.0	3.9	76.2	0.6	83.0	197
PK	1.8	55.7	2.1	13.6	6.6	9.0	88.7	10.2	1.5	5.8	0.4	11.2	623
Very High N	0.9	4.8	0.0	0.1	0.5	0.9	7.3	89.9	4.8	36.7	0.0	92.7	440
High N	10.2	5.9	0.0	0.4	1.6	2.6	20.7	75.3	9.9	34.0	2.0	79.3	522
High P	1.4	31.4	39.9	0.0	7.4	14.0	94.0	5.2	1.0	2.1	0.0	6.0	18
High K	9.6	19.5	42.6	7.0	2.9	6.3	87.8	11.3	0.5	9.6	0.3	12.2	241
Low N	4.4	50.8	14.1	2.1	15.0	4.2	90.5	8.3	0.5	7.1	0.2	9.5	170
Low P	2.9	7.5	4.2	7.6	0.9	8.2	31.3	58.1	4.6	53.9	0.0	68.7	105
Equal NPK	35.5	13.4	6.4	0.0	17.7	4.2	77.2	20.5	1.2	10.3	0.0	22.8	94
Other fertilisers	0.4	15.5	7.8	4.7	0.0	6.3	77	21.2	0.1	5.9	0.0	23	92
All Fertilisers	**4.0**	**36.7**	**3.9**	**4.0**	**7.3**	**3.8**	**59.8**	**37.8**	**3.3**	**20.6**	**0.5**	**40.2**	**5064**

Source: British Survey of Fertiliser Practice 1998

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

Table GB3.3 Product use by month of application, Great Britain 1998

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Calcium Ammonium Nitrate	1.6	38.3	32.1	14.7	6.1	4.1	1.0	0.0	1.1	0.0	0.4	0.0	42
Urea	0.0	14.2	34.3	30.8	11.2	5.2	2.9	0.1	0.5	0.4	0.0	0.0	165
Ammonium Nitrate	0.1	8.1	31.0	32.4	15.1	4.8	3.8	3.2	0.7	0.3	0.0	0.0	1958
Other Straight N	0.6	16	36.8	25.9	14.2	3.1	1.9	0.6	0.0	0.3	0.0	0.0	208
Triple Superphosphate	2.6	15.2	8.5	7.7	10.4	0.0	1.0	7.6	19.8	18.3	7.6	0.8	52
Single Superphosphate	6.4	6.2	12.3	14.6	0.0	0.0	14.0	0.0	0.0	46.2	0.0	0.0	4
Other Straight P	0.0	0.0	9.1	20.6	10.8	0.1	0.1	2.6	0.0	35.6	0.0	20.8	4
Muriate of Potash	5.9	22.3	14.2	6.8	6.9	0.9	0.6	3.4	18.0	15.0	3.6	1.8	76
Other Straight K	2.8	20.9	7.9	1.8	0.2	3.7	3.2	0.0	16.0	18.1	18.6	6.4	33
NP	0.1	11.5	37.2	17.5	16.8	3.6	4.2	2.3	1.6	3.9	0.0	0.6	100
NK	0.2	3.4	6.4	7.9	37.5	21.0	16.8	2.8	2.1	1.5	0.0	0.0	197
PK	3.5	12.8	8.3	3.5	1.8	1.2	0.7	3.2	24.3	28.4	9.6	2.2	623
Very High N	0.1	4.0	21.6	29.5	17.0	12.9	7.4	6.1	0.9	0.0	0.0	0.0	440
High N	0.2	7.0	26.2	37.0	17.9	4.5	3.0	3.4	0.3	0.1	0.0	0.0	522
High P	0.2	19.0	11.5	20.8	44.7	0.7	0.0	0.2	2.5	0.0	0.0	0.0	18
High K	3.3	18.4	32.2	22	15.1	0.3	0.3	0.4	3.0	2.3	1.4	0.6	241
Low N	0.1	12.8	18.9	6.9	5.3	0.0	0.7	8.3	22.3	20.6	3.6	0.0	170
Low P	0.0	5.7	19.0	23.1	20.8	16.1	8.6	6.4	0.0	0.0	0.0	0.0	105
Equal NPK	0.5	13.2	32.5	21	15.4	2.0	0.5	6.7	4.7	3.0	0.0	0.0	94
Other fertilisers	13.4	11.7	0.0	1.4	4.0	3.3	3.5	0.0	18.4	25.9	11.7	6.5	9
All Fertilisers	**0.9**	**10.0**	**25.1**	**24.6**	**14.2**	**5.2**	**3.7**	**3.4**	**5.1**	**5.3**	**1.6**	**0.4**	**5064**

Source: British Survey of Fertiliser Practice 1998

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

Table EW3.1 Product type as percentage of all product used by crop group, England and Wales 1998

column %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	all crops and grass
Calcium Ammonium Nitrate	1.0	1.1	0.0	0.2	2.4	0.0	1.1	0.3	0.8	0.1	0.2	0.3	0.8
Urea	1.2	5.4	0.0	0.7	7.4	0.2	4.6	0.9	0.8	1.2	6.2	1.0	3.2
Ammonium Nitrate	32.0	52.0	8.2	21.3	48.8	1.4	43.7	37.7	38.0	35.0	22.5	37.4	41.3
Other Straight N	2.2	5.9	1.6	3.4	9.7	0.1	5.5	2.0	1.8	2.6	6.4	2.0	4.2
Triple Superphosphate	0.1	1.8	0.2	0.2	2.3	0.1	1.6	0.4	0.2	0.4	4.3	0.4	1.1
Single Superphosphate	0.1	0.0	0.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Other Straight P	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Muriate of Potash	4.1	2.0	4.7	0.8	1.0	0.3	2.3	0.4	0.2	0.8	0.9	0.5	1.6
Other Straight K	0.6	0.2	1.1	11.5	0.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.7
NP	0.1	0.8	5.2	0.1	1.2	0.2	1.3	2.7	1.3	2.5	0.0	2.7	1.8
NK	5.7	1.0	0.8	1.3	0.1	0.1	1.1	8.4	4.5	15.4	4.6	8.7	4.1
PK	11.1	19.1	6.9	42.1	11.9	2.0	19.6	3.8	5.6	3.9	10.1	4.0	13.6
Very High N	3.2	1.0	0.0	0.3	0.6	0.0	0.9	17.0	12.1	12.7	0.3	16.5	6.9
High N	24.4	1.6	0.0	0.9	2.2	0.4	2.6	19.7	29.4	15.7	39.9	19.5	9.1
High P	0.2	0.3	3.2	0.0	0.4	0.0	0.5	0.0	0.1	0.0	0.0	0.0	0.3
High K	7.0	2.6	49.6	8.3	1.6	0.5	6.6	1.5	0.6	2.4	2.8	1.5	4.6
Low N	0.9	3.3	11.9	1.8	6.0	0.1	3.9	0.8	0.5	1.3	1.2	0.9	2.7
Low P	1.1	0.3	2.1	3.9	0.1	0.2	1.0	2.7	3.0	4.3	0.0	2.9	1.7
Equal NPK	4.0	0.6	3.2	0.0	3.3	0.1	1.3	0.7	0.3	0.6	0.0	0.7	1.0
Other fertilisers	0.0	0.1	0.4	2.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.2
Total Product ('000 tonnes)	**96**	**1733**	**184**	**201**	**327**	**175**	**2716**	**1605**	**149**	**888**	**26**	**1700**	**4417**

Source: British Survey of Fertiliser Practice 1998

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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CORRECTIONS:
Some estimates for 'grass for hay', 'grass for silage', 'grass not spec', 'all grass' and 'total product' have been amended

Table EW3.2 Use of product type by crop group, England and Wales 1998

row%	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	total product ('000 tonnes)
Calcium Ammonium Nitrate	2.6	53.2	0.2	1.0	21.5	7.1	85.9	13.8	3.2	3.7	0.1	14.0	37
Urea	0.8	64.6	0.1	1.0	16.6	4.0	87.3	11.0	0.9	7.7	1.1	12.6	145
Ammonium Nitrate	1.6	49.3	0.8	2.3	8.7	2.1	65.1	33.1	3.1	17.0	0.3	34.8	1827
Other Straight N	1.1	55.4	1.6	3.6	16.9	2.2	81.1	17.4	1.4	12.6	0.9	18.9	187
Triple Superphosphate	0.2	61.2	0.9	1.0	14.7	6.4	84.7	12.6	0.8	8.2	2.1	15.1	52
Single Superphosphate	3.2	36.2	0.0	24.7	9.3	0.0	73.4	26.5	0.0	10.7	0.0	26.5	4
Other Straight P	0.0	22.9	8.2	0.0	1.9	3.1	36.2	57.3	0.0	14.3	0.0	63.7	4
Muriate of Potash	5.4	48.4	12.0	2.3	4.9	14.8	88.1	9.9	0.5	10.6	0.3	11.7	73
Other Straight K	1.9	14.4	6.4	70.2	1.2	4.1	98.6	0.8	0.0	0.5	0.0	1.3	33
NP	0.1	17.9	11.6	0.2	5.0	8.4	43.4	53.6	2.5	27.4	0.0	56.5	82
NK	3.0	9.8	0.8	1.4	0.2	1.9	17.4	74.6	3.7	75.8	0.6	82.5	181
PK	1.7	55.0	2.1	14.0	6.4	9.1	88.5	10.3	1.3	5.8	0.4	11.3	604
Very High N	1.0	5.7	0.0	0.2	0.6	0.6	8.3	89.6	5.9	36.9	0.0	91.6	306
High N	5.8	7.1	0.0	0.4	1.7	2.8	18.0	78.1	10.8	34.4	2.5	81.9	406
High P	1.8	39.8	41.4	0.0	9.3	1.8	94.1	5.8	1.2	1.6	0.0	5.8	15
High K	3.3	22.0	44.2	8.1	2.6	6.8	87.1	11.8	0.5	10.6	0.3	12.8	207
Low N	0.7	46.9	17.9	2.9	16.1	2.5	87.3	11.1	0.6	9.8	0.2	12.6	122
Low P	1.4	8.3	5.0	10.2	0.4	10.1	35.7	56.5	5.7	49.8	0.0	64.2	78
Equal NPK	8.1	24.6	12.6	0.0	22.9	6.1	74.6	24.7	1.1	11.5	0.0	25.3	48
Other fertilisers	0.0	19.1	9.6	57.9	0.1	2.4	89.1	8.8	0.1	7.3	0.0	10.9	7
All fertilisers	**2.1**	**39.2**	**4.1**	**4.5**	**7.3**	**3.9**	**61.4**	**36.3**	**3.3**	**20.0**	**0.5**	**38.4**	**4417**

Source: British Survey of Fertiliser Practice 1998

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

Table EW3.3 Product use by month of application, England and Wales 1998

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total product ('000 tonnes)
Calcium Ammonium Nitrate	1.8	40.5	32.8	10.3	6.8	4.3	1.2	0.0	1.3	0.0	0.5	0.0	37
Urea	0.0	13.8	35.5	30.3	11.1	5.1	2.8	0.1	0.5	0.4	0.0	0.0	145
Ammonium Nitrate	0.1	8.4	31.0	32.0	15.3	4.9	3.6	3.1	0.7	0.2	0.0	0.0	1827
Other Straight N	0.7	15.6	37.6	25.1	14.6	2.8	2.1	0.7	0.0	0.3	0.0	0.0	187
Triple Superphosphate	2.6	15.4	8.6	7.2	10.1	0.0	0.9	7.7	19.9	18.5	7.7	0.8	52
Single Superphosphate	7.3	7.0	13.9	3.5	0.0	0.0	15.8	0.0	0.0	52.2	0.0	0.0	4
Other Straight P	0.0	0.0	10.9	7.4	10.6	0.0	0.0	3.1	0.0	42.7	0.0	24.9	4
Muriate of Potash	6.2	23.2	13.7	5.4	6.7	1.0	0.6	3.2	18.8	15.6	3.7	1.3	73
Other Straight K	2.8	20.9	7.9	1.8	0.2	3.7	3.2	0.0	16.1	18.0	18.6	6.4	33
NP	0.1	13.1	41.9	13.6	18.5	1.4	1.1	2.9	2.0	4.8	0.0	0.0	82
NK	0.2	3.5	6.6	6.6	39.4	18.3	17.9	3.0	2.3	1.6	0.0	0.0	181
PK	3.6	12.9	8.2	3.4	1.8	1.2	0.8	3.0	24.4	28.2	9.6	2.0	604
Very High N	0.0	5.5	22.5	28.7	17.0	11.9	7.2	5.7	1.0	0.0	0.0	0.0	306
High N	0.2	9.0	28.8	31.9	19.0	3.7	2.6	3.9	0.4	0.1	0.0	0.0	406
High P	0.3	22.9	14.6	22.5	35.9	0.0	0.0	0.3	3.1	0.0	0.0	0.0	15
High K	3.9	20.6	30.8	20.4	14.8	0.1	0.4	0.5	3.4	2.2	1.7	0.7	207
Low N	0.1	15.7	21.6	5.5	5.4	0.0	0.9	7.7	22.2	16.9	3.6	0.0	122
Low P	0.0	7.6	17.2	19.5	25.7	12.1	9.0	8.5	0.0	0.0	0.0	0.0	78
Equal NPK	1.0	24.4	21.7	7.0	22.3	0.7	0.8	8.8	6.6	6.1	0.0	0.0	48
Other fertilisers	16.5	14.4	0.0	0.0	4.9	0.0	4.4	0.1	5.3	31.9	14.5	8.1	7
All Fertilisers	**1.0**	**10.9**	**25.3**	**23.1**	**14.4**	**4.7**	**3.6**	**3.3**	**5.4**	**5.5**	**1.8**	**0.4**	**4417**

Source: British Survey of Fertiliser Practice 1998

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

Table EW4.1 Average fertiliser practice on tillage and grassland by MAFF region, 1998

		Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
		N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Wessex	All tillage	97	77	82	18	165	70	91	159	53	75	2994
	All grass	76	64	62	47	120	34	42	91	22	26	2694
	All crops & grass	83	68	69	37	138	48	63	115	33	43	5649
Anglia	All tillage	92	56	69	12	162	73	108	149	41	75	2262
	All grass	89	60	63	56	179	27	48	159	16	30	1044
	All crops & grass	91	57	67	27	167	57	89	153	32	60	3301
Northern	All tillage	91	67	61	10	174	68	77	158	46	47	2148
	All grass	86	54	62	33	129	33	48	110	18	29	348
	All crops & grass	90	65	61	15	165	62	70	148	40	43	2495
North East	All tillage	91	76	79	23	148	68	94	135	53	74	1542
	All grass	80	51	56	41	178	32	66	142	16	37	1191
	All crops & grass	86	65	68	32	161	54	83	138	35	56	2727
North Mercia	All tillage	93	67	64	7	158	77	95	147	52	61	4614
	All grass	76	43	41	15	133	48	47	101	21	19	504
	All crops & grass	1	64	61	8	156	74	91	142	48	56	5112
South Mercia	All tillage	90	74	74	20	162	66	77	145	49	57	1857
	All grass	68	37	40	34	150	43	56	102	16	23	990
	All crops & grass	80	58	60	26	158	60	71	127	35	42	2835
East Midland	All tillage	2	79	78	30	145	63	75	133	50	59	1947
	All grass	84	62	64	46	148	33	47	125	20	30	2112
	All crops & grass	87	69	70	40	147	46	59	128	32	41	4030
South East	All tillage	94	68	71	69	108	62	81	101	42	58	339
	All grass	69	62	61	45	120	33	43	83	20	26	2019
	All crops & grass	71	62	61	46	118	35	45	84	21	28	2341

Source: British Survey of Fertiliser Practice 1998

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

Table SC3.1 Product type as percentage of all product used by crop group, Scotland 1998

row %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	all crops and grass
Calcium Ammonium Nitrate	0.5	1.9	0.0	0.0	4.7	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.7
Urea	0.8	7.2	0.0	0.0	9.2	0.0	4.4	1.3	0.0	2.0	0.0	1.8	3.1
Ammonium Nitrate	14.0	39.0	3.5	0.0	30.4	0.6	25.8	15.6	15.6	10.7	61.8	15.1	20.2
Other Straight N	2.1	7.9	0.7	0.0	13.7	0.0	5.8	0.8	2.0	1.5	0.0	0.8	3.2
Triple Superphosphate	0.2	0.0	0.4	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Single Superphosphate	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Other Straight P	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.1	0.1
Muriate of Potash	1.0	0.7	0.0	0.0	0.6	0.0	0.7	0.2	0.0	0.3	0.0	0.2	0.4
Other Straight K	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NP	0.8	0.8	0.0	0.0	0.0	0.2	0.8	4.7	4.5	6.9	0.0	4.4	2.7
NK	0.9	0.3	0.0	0.0	0.6	0.0	0.6	3.4	5.2	8.0	0.0	4.1	2.4
PK	0.5	11.5	0.0	0.0	4.8	0.2	5.8	0.3	5.8	0.5	0.0	0.3	2.9
Very High N	0.9	2.9	0.0	0.0	0.4	0.5	2.1	39.1	17.7	30.8	24.5	37.8	20.7
High N	27.4	1.5	0.0	0.0	2.4	0.6	11.2	24.6	42.8	24.1	0.0	24.2	18.0
High P	0.0	0.0	8.4	0.0	0.0	0.7	1.1	0.0	0.0	0.0	0.0	0.0	0.6
High K	14.9	1.1	70.7	0.0	3.5	0.3	10.0	0.8	1.3	0.6	0.0	0.7	5.2
Low N	6.1	22.8	12.9	0.0	14.0	1.3	15.3	0.2	0.0	0.1	13.6	0.1	7.4
Low P	1.7	1.0	2.8	0.0	1.3	0.2	1.5	5.4	1.6	11.1	0.0	6.5	4.1
Equal NPK	27.2	0.7	0.1	0.0	13.8	0.3	12.0	2.4	3.0	2.6	0.0	2.8	7.2
Other fertilisers	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.0	0.0	0.0	0.4	0.3
Total Product ('000 tonnes)	**109**	**128**	**16**	**0**	**41**	**17**	**310**	**309**	**18**	**158**	**0**	**336**	**646**

Source: British Survey of Fertiliser Practice 1998

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

Table SC3.2 Use of product type by crop group, Scotland 1998

row %	spring cereal	winter cereal	potatoes	sugar beet	oilseed rape	other tillage	all tillage	grass for grazing	grass for hay	grass for silage	grass not spec	all grass	total product ('000 tonnes)
Calcium Ammonium Nitrate	10.9	50.1	0.0	0.0	38.9	0.0	100.0	0.0	0.0	0.0	0.0	0.0	4.9
Urea	4.3	45.8	0.0	0.0	18.9	0.0	69.2	20.6	0.0	15.9	0.0	30.7	20.0
Ammonium Nitrate	11.5	38.0	0.4	0.0	9.5	1.4	61.0	36.8	2.1	12.8	0.2	38.9	131.0
Other Straight N	10.9	48.4	0.5	0.0	27.0	0.0	87.0	12.0	1.7	11.5	0.0	12.9	20.9
Triple Superphosphate	49.7	6.4	10.7	0.0	10.4	12.8	90.1	9.8	0.0	9.8	0.0	9.8	0.6
Single Superphosphate	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.5
Other Straight P	0.0	0.0	1.6	0.0	0.0	11.7	13.3	86.6	0.0	53.6	0.0	86.6	0.7
Muriate of Potash	38.5	29.4	0.0	0.0	8.1	0.3	76.4	23.5	0.0	19.5	0.0	23.5	3.0
Other Straight K	0.0	77.2	0.0	0.0	22.7	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0
NP	5.3	6.0	0.0	0.0	0.0	3.6	15.0	82.8	4.5	61.1	0.0	84.9	17.7
NK	6.4	2.8	0.0	0.0	1.7	1.2	12.3	66.9	5.8	80.0	0.0	87.6	15.8
PK	2.9	76.0	0.0	0.0	10.2	4.2	93.5	6.1	5.3	4.7	0.0	6.1	19.2
Very High N	0.7	2.8	0.0	0.0	0.1	1.2	5.0	90.2	2.3	36.2	0.0	94.9	133.8
High N	25.5	1.7	0.0	0.0	0.8	1.7	29.9	65.4	6.5	32.6	0.0	70.0	116.3
High P	0.0	0.0	34.1	0.0	0.0	59.3	93.5	2.7	0.0	3.7	0.0	6.4	3.8
High K	47.8	4.2	32.7	0.0	4.3	3.1	92.2	7.7	0.7	2.9	0.0	7.7	33.9
Low N	13.7	60.4	4.2	0.0	11.9	8.3	98.7	1.2	0.0	0.3	0.1	1.2	48.3
Low P	6.9	5.1	1.6	0.0	2.1	2.4	18.3	62.3	1.0	65.5	0.0	81.6	26.8
Equal NPK	63.2	2.0	0.0	0.0	12.2	2.2	79.7	16.2	1.1	8.9	0.0	20.2	46.7
Other fertilisers	2.2	0.0	0.0	0.0	0.0	22.7	24.9	75.1	0.0	0.0	0.0	75.1	1.7
All Fertilisers	**16.7**	**19.7**	**2.4**	**0.0**	**6.3**	**2.6**	**47.9**	**47.7**	**2.7**	**24.3**	**0.0**	**52.0**	**646**

Source: British Survey of Fertiliser Practice 1998

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

Table SC3.3 Product use by month of application, Scotland 1998

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total product ('000 tonnes)
Calcium Ammonium Nitrate	0.0	22.0	26.8	47.4	0.5	2.9	0.0	0.0	0.0	0.0	0.0	0.0	4.9
Urea	0.0	17.2	25.6	35.0	11.6	6.2	3.6	0.0	0.5	0.0	0.0	0.0	20.0
Ammonium Nitrate	0.1	3.9	31.1	38.2	12.0	3.4	5.8	4.0	0.4	0.7	0.0	0.0	131.0
Other Straight N	0.0	20.1	29.6	33.1	10.5	6.0	0.0	0.0	0.0	0.4	0.0	0.0	20.9
Triple Superphosphate	0.0	0.0	0.0	45.6	38.0	0.0	9.8	0.0	6.4	0.0	0.0	0.0	0.6
Single Superphosphate	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Other Straight P	0.0	0.0	0.0	86.6	11.7	0.8	0.8	0.0	0.0	0.0	0.0	0.0	0.7
Muriate of Potash	0.0	0.0	24.9	40.9	12.5	0.0	0.0	8.5	0.0	0.0	0.3	12.6	3.0
Other Straight K	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
NP	0.0	4.2	15.4	35.5	8.94	13.6	18.2	0.0	0.0	0.0	0.0	3.8	17.7
NK	0.0	2.3	3.5	22.7	15.2	51.9	3.7	0.3	0.0	0.0	0.0	0.0	15.8
PK	0.0	8.5	10.9	5.5	0.2	0.2	0.0	10.7	20.7	34.9	8.0	0.0	19.2
Very High N	0.4	0.8	19.4	31.4	16.8	15.1	8.1	7.0	0.7	0.0	0.0	0.0	133.8
High N	0.0	0.3	17.2	54.8	13.9	7.4	4.6	1.5	0.0	0.0	0.0	0.0	116.3
High P	0.0	4.4	0.0	14.3	77.4	3.7	0.0	0.0	0.0	0.0	0.0	0.0	3.8
High K	0.0	5.2	40.6	31.5	17.3	1.4	0.0	0.0	0.5	3.0	0.0	0.0	33.9
Low N	0.0	5.6	12.2	10.5	5.0	0.2	0.2	9.7	22.3	30.1	3.5	0.0	48.3
Low P	0.0	0.0	24.1	33.8	6.6	27.7	7.4	0.2	0.0	0.0	0.0	0.0	26.8
Equal NPK	0.0	1.8	43.5	35.2	8.3	3.3	0.2	4.6	2.7	0.0	0.0	0.0	46.7
Other fertilisers	0.0	0.0	0.0	7.2	0.1	17.6	0.0	0.0	75.1	0.0	0.0	0.0	1.7
All fertilisers	**0.1**	**3.6**	**23.5**	**35.2**	**12.5**	**8.7**	**4.7**	**4.0**	**2.9**	**3.6**	**0.5**	**0.1**	**646**

Source: British Survey of Fertiliser Practice 1998

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

Table SC4.1 Average fertiliser practice, North East Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	0
Winter wheat	100	100	100	8	196	88	92	196	88	92	11
Spring barley	100	100	100	50	86	57	62	85	57	62	103
Winter barley	100	100	100	5	177	81	84	177	81	84	19
Oats	84	56	56	53	60	42	43	50	23	24	11
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	0
Seed potatoes	•	•	•	•	•	•	•	•	•	•	0
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	1
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	8
Winter oilseed rape	•	•	•	•	•	•	•	•	•	•	7
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	89	89	89	97	59	113	99	52	101	88	12
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	2
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	3
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	1
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	1
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	1
All tillage	98	95	95	43	106	65	68	104	61	64	180
Grass under 5 years	92	84	85	50	119	31	44	109	26	38	111
Grass 5 years and over	86	70	70	57	90	31	36	78	21	25	45
All grass	90	79	79	53	108	31	41	97	24	33	156
All crops & grass	94	86	86	48	107	48	55	100	42	47	336

Source: British Survey of Fertiliser Practice 1998

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

Table SC4.2 Average fertiliser practice, South East Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	100	90	90	22	190	77	85	190	69	76	45
Spring barley	100	97	97	37	104	53	55	104	52	54	63
Winter barley	100	82	81	48	155	91	96	165	75	78	36
Oats	•	•	•	•	•	•	•	•	•	•	8
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	1
Seed potatoes	•	•	•	•	•	•	•	•	•	•	1
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	2
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	8
Winter oilseed rape	100	82	82	7	184	63	83	184	52	68	16
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	100	100	100	44	83	120	79	83	120	80	11
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	7
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	1
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	0
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	0
Soft fruit	•	•	•	•	•	•	•	•	•	•	0
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	1
All tillage	95	87	86	26	152	73	79	145	63	68	201
Grass under 5 years	99	86	93	49	176	49	64	174	43	60	66
Grass 5 years and over	94	84	83	62	136	29	38	129	25	32	126
All grass	95	85	85	60	143	32	42	136	27	36	192
All crops & grass	95	85	85	48	146	46	55	139	40	47	393

Source: British Survey of Fertiliser Practice 1998

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

Table SC4.3 Average fertiliser practice, South West Scotland 1998

	Crop area receiving dressing (%)				Average field rate (kg/ha)			Overall application rate (kg/ha)			Fields in sample
	N	P_2O_5	K_2O	FYM	N	P_2O_5	K_2O	N	P_2O_5	K_2O	
Spring wheat	•	•	•	•	•	•	•	•	•	•	0
Winter wheat	100	93	93	10	183	83	88	183	77	82	29
Spring barley	100	100	100	20	101	53	74	101	53	74	85
Winter barley	100	97	97	15	155	86	87	155	83	85	17
Oats	100	100	100	19	80	55	56	80	55	56	16
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	4
Seed potatoes	•	•	•	•	•	•	•	•	•	•	4
Early potatoes	•	•	•	•	•	•	•	•	•	•	0
2nd Early/Maincrop potatoes	•	•	•	•	•	•	•	•	•	•	9
Sugar beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	•	•	•	•	•	•	•	•	•	9
Winter oilseed rape	100	89	89	11	221	73	79	221	65	70	14
Linseed	•	•	•	•	•	•	•	•	•	•	0
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	100	100	100	48	55	95	69	55	95	69	14
Leafy forage crops	•	•	•	•	•	•	•	•	•	•	5
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	1
Peas – human consumption	•	•	•	•	•	•	•	•	•	•	2
Peas – animal consumption	•	•	•	•	•	•	•	•	•	•	1
Beans – animal consumption	•	•	•	•	•	•	•	•	•	•	1
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	0
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	1
Soft fruit	•	•	•	•	•	•	•	•	•	•	2
Top Fruit	•	•	•	•	•	•	•	•	•	•	0
Other Tillage	•	•	•	•	•	•	•	•	•	•	0
All tillage	99	97	97	18	125	67	83	124	65	80	214
Grass under 5 years	80	67	70	46	149	49	64	119	33	44	45
Grass 5 years and over	87	83	78	23	102	29	31	89	24	24	81
All grass	85	78	76	29	114	33	40	97	26	30	126
All crops & grass	91	87	85	24	120	50	61	109	44	52	340

Source: British Survey of Fertiliser Practice 1998

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