THE STATIONERY OFFICE

THE BRITISH SURVEY OF

Fertiliser Practice

FERTILISER USE ON FARM CROPS FOR CROP YEAR 1997

MAFF Ministry of Agriculture Fisheries and Food

FMA Fertiliser Manufacturers Association

THE SCOTTISH OFFICE

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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 based upon returns from a sample of farms, a new sample being chosen each year. The Survey is co-ordinated by the Data Library at the University of Edinburgh, which is also responsible for the design, statistical analysis and quality control monitoring. ADAS Consulting Ltd carried out the farm interviewing in 1997.

July 1998

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

The authors of the report would like to thank all those involved for their assistance and support in the design, conduct and analysis of the 1997 British Survey of Fertiliser Practice.

The agronomic interpretation of the Survey results benefited from advice from Chris Dawson (Chris Dawson Associates) - agronomic consultant to the Fertiliser Manufacturers' Association.

The authors would also like to thank the sponsors for their continuing support.

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EXECUTIVE SUMMARY

The British Survey of Fertiliser Practice is a nationally-representative survey, based on the selection, each year, of a random stratified sample of farms from mainland Britain. In 1997, approximately 1200 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. This report also contains a summary report of cropping and grassland areas from the Agricultural Census. Information is also collected on applications of sulphur fertiliser products, organic manures and lime.

The main findings from the 1997 Survey for Great Britain were:

- Total nitrogen use on tillage crops increased by 3 - 4 kg/ha, representing a recovery back to 1994 - 1995 levels. This rise in overall application rate was caused by increases in the levels of nitrogen use, mainly as extra straight nitrogen, on cereals, oilseed rape and sugar beet. The change in nitrogen rate for oilseed rape was associated with a continuing return towards production of the autumn, rather than spring sown crop.

- There was a large apparent increase in overall nitrogen use on grassland, by an estimated 5 - 8 kg/ha. This increase in 1997 continues the partial recovery in the nitrogen application rate for grass, following the large drop in 1992. The increase in nitrogen rate in 1997 was associated with a further rise in compound nitrogen use, which has been increasing steadily over recent years, as well as a rise in straight nitrogen[1].

- Overall phosphate use increased on grassland, by 2 kg/ha, and by 3 kg/ha on tillage crops.

- Potash application rates increased appreciably, by 6 - 7 kg/ha, on both tillage crops and grassland.

- The percentage of crop area treated with sulphur fertiliser increased slightly on cereals, but not on oilseed rape. Sulphur use since 1993, when the Survey first started to collect data on sulphur applications, has increased. Because of deficiency risks in susceptible crops, 13% of the cereal area and 30% of the oilseed rape area are now treated with sulphur.

- Sulphur was only applied to 5% of the total grassland area, although 8% of the grassland area actually cut for silage was treated, reflecting the much greater risk of deficiency with intensive cutting regimes.

The recent increases in the reported overall rates of nitrogen, phosphate and potash applied to tillage crops and to grassland should be seen in the context of a longer term decline since 1985. Recent application rates are still below the rates reported in the first half of the 1985 to 1997 period, for which survey statistics are available in Great Britain.

[1]The percentage of grassland that was cut for silage, with its higher nitrogen requirement, rose in 1997, possibly because the dry, cold spring in many areas reduced first cut silage yields and more second or later cuts were taken, to meet forage requirements.

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 Survey is 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[1], to assess the amount of fertiliser used.

Rates of fertiliser application for 1997 are reported in detail in Section D. The 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 on 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 - see Burnhill, Chalmers and Fairgrieve (1995).[2] Publications with information on past survey results and trends include those by Chalmers, Kershaw and Leech (1990)[3], Church and Lewis (1977)[4] and Yates and Boyd (1965)[5].

TRENDS

Commentary on use and longer term trends is set out in Section B. Recent and past changes in agricultural policies and practice affect fertiliser usage and, where there is evidence of this, interpretative commentary is 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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[1] MAFF, SOAEFD and the Welsh Office *The Digest of Agricultural Census Statistics UK 1996, TSO*, London, 1997 ISBN 0 11 243039 2 (£25)

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

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

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

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

SAMPLING

The 1997 British Survey of Fertiliser Practice involved the random selection of a nationally representative sample of 1187 farm holdings in Great Britain (994 from England and Wales and 193 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 1997, recording information on fertiliser use during the 1996/97 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 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 used to cover mainland Britain, Anglesey and the Isle of Wight.

2. The **survey year** ran from 1st October 1996 to 30th September 1997, corresponding to the 1997 growing year or the post-1996 harvest year. The actual recording period for fertiliser application 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 has had a uniform cropping and fertiliser history since October 1996. Two 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 Payments Scheme was recorded, but was not included in analyses unless it was used to grow an industrial crop. Fallow land other than set-aside was always recorded in the survey.

4. In the report, **tillage** is defined as all crops except grass, forestry and glasshouse crops. **Grass** refers to all forms of grass 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 or **P** for phosphate, K_2O or **K** for potash, SO_3 for sulphur and **FYM** for farmyard manure. The phrase **total use** includes both straight and compound products.

6. For each fertiliser-nutrient, the **overall application rate** is calculated by the ratio of the total quantity of nutrient used, in kilograms (kg), to the total extent of crop area, in hectares (ha). When combined with knowledge of the national total crop area estimates from the Agricultural Census, these overall application rates provide a means of estimating tonnages of fertiliser used during the survey year.

7. The **average field rate** (of application) is the 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.

8. 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.

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 due 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, then, cannot be greater than the average field rate of application.

A3 CROP AREAS

Table A1 provides a summary of recent census estimates for areas of individual major crops, crop groupings, tillage and grassland categories and illustrates percentage changes in relative cropping areas over the past five years. Tillage crops covered 46% of the total crops and grass area in 1997, with the remainder in managed grassland, of which almost four-fifths was at least five years old.

Table A1.1 Cropping and grassland areas ('000 ha) in Great Britain, 1995/96-96/97

Crop	1995/96 000's ha	1996/97 000's ha	% change since 1996	% change since 1992	1996/1997 crop areas as % of total tillage area
Wheat	1970	2029	3	-2	41
Barley - winter	742	832	12	7	17
- spring	492	490	-0	2	10
Total Cereals[1]	*3314*	*3467*	*5*	*1*	*70*
Oilseed rape - winter	301	374	24	-3	8
- spring	53	68	28	105	1
Sugar beet	199	196	-2	-1	4
Potatoes[2]	167	158	-7	-7	3
Peas/beans[3]	178	197	11	-5	4
Maize/other fodder	179	180	1	41	4
Vegetables	131	125	-5	-6	3
Total tillage[4]	*4697*	*4959*	*6*	*0*	*100*
Set-aside[5]	507	306	-40	91	6
					1996/97 grass areas as % of total grass area
Grassland					
less than 5 years old	1193	1203	1	-13	21
5 years and older	4692	4604	-2	-1	79
Total grass[6]	*5885*	*5807*	*-1*	*-4*	*100*
Total crops and grass[7]	*10581*	*10765*	*2*	*-2*	-

[1]including minor cereals (oats, rye, triticale, mixed corn)

[2]early + maincrop potatoes

[3]harvested dry

[4]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.

[6]managed grassland, excluding rough grazing

[7]total tillage + total grassland

Source: Annual MAFF/SOAEFD/Welsh Office 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.

Seventy percent (3.5 Mha) of all the land used for tillage was cropped with cereals in 1997, and of that, 58% (2 Mha) was used for wheat production. The area planted with winter barley increased by 12% in 1997. There was a similar percentage increase in the area producing peas and beans for livestock feed.

In 1997 an area equivalent to 6% of the total tillage area was classified as set-aside, including industrial crops. This set-aside area was down 40% from around five hundred thousand hectares in 1996 to three hundred thousand in 1997.

Over the five year period from 1991/92 to 1996/97 there has been little net change in most tillage crop areas. Within this period, however, the planting areas for both winter and spring oilseed rape have changed markedly in response to CAP reform and the Arable Area Payments Scheme. There has also been a rapid increase in the growing of forage maize for silage as a fodder crop on dairy farms. The area of grassland reseeded within the last 5 years has declined by 13%; otherwise grassland areas have remained stable.

The weather pattern over most of England and Wales in the 1996/97 season was characterised by a dry autumn, which caused some crop establishment problems on heavy textured soils, and a relatively dry winter over most of southern Britain. The limited winter drainage resulted in less nitrate leaching than usual, so that available soil nitrogen reserves in the main arable areas were estimated to be higher than average and some small cutbacks in application rates of spring nitrogen fertiliser were advocated by advisory organisations. The subsequent dry, cold spring reduced the yield potential of many crops with poorly developed root systems or which had been grown on drought prone soils, but most main dressings of nitrogen fertiliser had already been applied before realistic assessments could be made of the effects of the spring weather on actual yield potential.

In Scotland, the autumn weather was generally mild, with above average rainfall in October and November. The relatively dry winter was followed by a warm and drier than average spring across most parts of the country.

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 1993 to 1997. 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 survey estimates of overall application rates relate to usage on farms during the 1996/97 growing season: they form the basis for estimating quantities of fertiliser used in Great Britain. The estimates of the average field rates provide a better indication than overall rates of actual usage levels and of any variation in agronomic practice on the farm.

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 9.0 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 1997 and 1996 Reports, in conjunction with the summary tables of annual fertiliser use in the main text of the 1995 report[1].

Data from the 1997 Agricultural Census have provided information on crop areas. These have been summarised in Table A1. They have allowed reporting of the estimates of application rates which are adjusted according to the distribution of the areas of major crop found nationally. These adjusted rates ('post stratified estimates'), together with an explanation of their derivation, are given in Section C, along with other comments on methodology. This is the first year that these have been calculated and consideration is now 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 this main section, although they do moderate the estimate of the overall rates of total nitrogen on grass and of straight nitrogen on all tillage and grass.

Nutrient rates and commentary in the text of this report are based on non-post-stratified estimates.[2]

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

[2] See section C, page 36.

B1 RECENT TRENDS, 1993 - 1997

B1.1 Overview of fertiliser use on all crops and grass

The statistics reported in Table B1.1 for the all crops and grassland category are illustrated in Figure B1.1 Definitions of terms used are set out in the previous section, Section A.

Table B1.1 Overall nitrogen usage (kg/ha) in Great Britain, 1993 – 1997

Total nitrogen

	tillage	*grass*	*all crops and grass*
1993	137	112	124
1994	147	116	130
1995	149	118	132
1996	145	115	128
1997	149	123	136

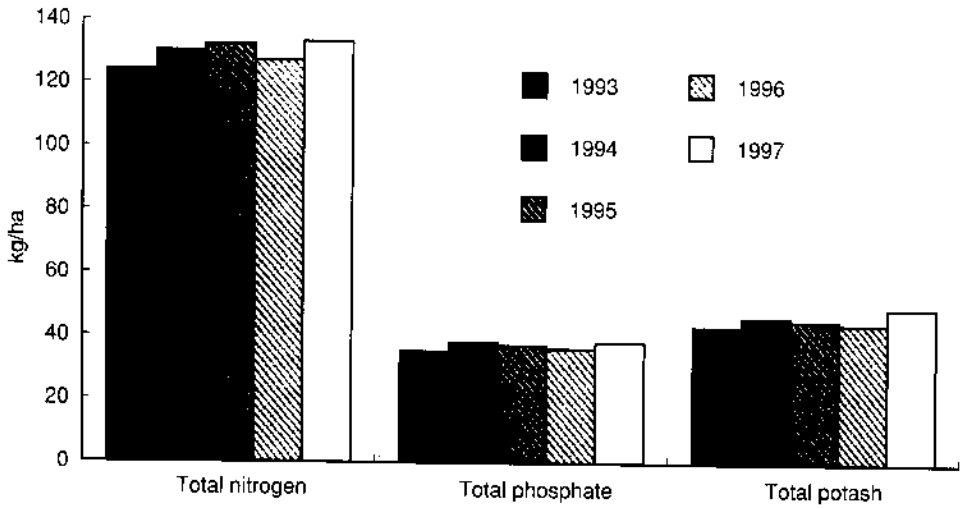
Straight nitrogen

	tillage	*grass*	*all crops and grass*
1993	113	56	82
1994	120	51	84
1995	125	52	85
1996	121	53	84
1997	126	54	88

Compound nitrogen

	tillage	*grass*	*all crops and grass*
1993	24	56	41
1994	26	65	47
1995	25	66	47
1996	24	62	45
1997	24	69	47

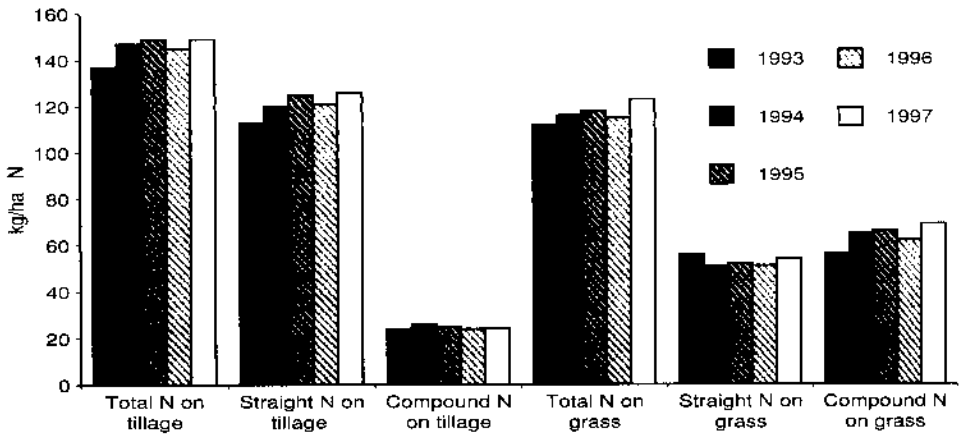
Figure B1.1 Overall fertiliser usage (kg/ha) on all crops and grass,Great Britain 1993 - 1997



B1.1.1 NITROGEN

The overall rate for total nitrogen use on all crops and grass in mainland Britain recovered in 1997, up on last year's estimate by 8 kg/ha. This increase in total nitrogen usage reflected a 4 kg/ha increase in overall nitrogen rates on tillage crops, up 3%, but was largely due to an apparent increase of 8 kg/ha in the rate applied to grassland, up 7% (Table B1.1; Figure B1.1). The proportion of the crop area dressed with fertiliser also increased, especially the area of grassland in Scotland receiving compound nitrogen.

Figure B1.2 Overall rates of nitrogen usage (kg/ha), Great Britain 1993 - 1997



Tillage Crops

The 4 kg/ha increase in the overall nitrogen application rate to tillage crops in 1997 represents a recovery to the 1995 level of 149 kg/ha due to increased use of straight nitrogen (Fig B1.2). Overall straight application rates have risen steadily since 1993, except in 1996, to a five year high of 126 kg/ha. The proportion of the total crop areas receiving both forms of nitrogen fertiliser also increased slightly.

There has been little net change in the overall use of compound nitrogen on tillage crops during this period (Table B1.1). However, there was a reduction in the average field rates applied in both England Wales and Scotland, resulting in a 3 kg/ha reduction in the corresponding figure for all of Great Britain .

Grassland

The overall rate of straight nitrogen on grassland has increased steadily since the drop observed in 1994, and at 54 kg/ha, is nearly back to the 1993 level. Compound nitrogen rates rose substantially by 7 kg/ha to 69 kg/ha, continuing a trend of increased usage observed since 1993 (Table B1.1).

The percentages of grassland receiving dressings of straight and compound nitrogen have remained comparatively stable at around 42% and 66% respectively, although there was a slight increase in the compound dressing area in 1997 (Table B1.10).

B1.1.2 PHOSPHATE AND POTASH

The annual overall rate of phosphate applications on tillage crops increased by 3 kg/ha, or 6% in 1997, having remained very steady over the previous four years (Table B1.2). This rise may be attributed to an increased percentage of the crop area receiving dressings of the more commonly used compound phosphate fertilisers, allied with a 7 kg/ha rise in the average field rate of straight phosphate applied to 5% of the tillage crop area.

Phosphate usage on grassland also rose, back to a level comparable to those reported since 1994 (Table B1.2).

Table B1.2 Overall usage of phosphate and potash (kg/ha), Great Britain 1993 - 1997

Total phosphate				Total potash			
	tillage	*grass*	*all crops and grass*		*tillage*	*grass*	*all crops and grass*
1993	52	21	35	1993	60	29	43
1994	53	24	38	1994	63	31	46
1995	53	24	37	1995	61	31	45
1996	52	23	36	1996	61	30	44
1997	55	25	39	1997	67	35	50

Overall potash rates had fluctuated between 1993 and 1996, but rose by 5 - 6 kg/ha in 1997, on both tillage crops and grassland. Apart from phosphate use on tillage crops, the application rates recorded in 1997 for these two nutrients were at similar levels to those reported during the mid to late 1980s for tillage and grassland categories (Table B2.2).

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 1997 are presented in Section D.

Small apparent changes in fertiliser use on individual crops should be treated with some caution as these estimates are based on a smaller number of farms and fields than the summary 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 usage (kg/ha) on major tillage crops, Great Britain 1993 - 1997

Total nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape*	*sugar beet*
1993	185	92	137	185	180	110
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

Straight nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	173	40	124	30	160	86
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

Compound nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	12	52	13	158	20	24
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

Total phosphate

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	52	47	52	182	52	58
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

Total potash

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	49	55	61	256	50	139
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

[1]Note: All 1997 figures for maincrop potatoes include second early crops

Table B1.4 Average field rates (kg/ha) on major tillage crops, Great Britain 1993 - 1997

Total nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes* [1]	*oilseed rape*	*sugar beet*
1993	186	94	138	191	181	115
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

Straight nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	178	72	131	114	170	105
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

Compound nitrogen

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	47	66	46	172	45	72
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

Total phosphate

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	68	52	66	191	64	74
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

Total potash

	winter wheat	*spring barley*	*winter barley*	*maincrop potatoes*	*oilseed rape*	*sugar beet*
1993	71	60	73	268	66	156
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

[1]Note: All 1997 figures for maincrop potatoes include second early crops

B1.2.1 NITROGEN

There was a general increase in total nitrogen use on cereals, oilseed rape and sugar beet, but not on maincrop potatoes, in 1997.

Winter Wheat

The overall rate of total nitrogen applied to winter wheat had been around 185 kg/ha for most of the 1993 - 1996 period (Table B1.3). In 1995 the rate had risen to 193 kg/ha and it rose again in 1997, to 192 kg/ha. The average field rate, which is a more direct measure of average farmer practice, follows a similar pattern (Table B1.4). The rises observed in Britain in 1995 and 1997 for winter wheat were both caused by an upward shift in the distribution of nitrogen rates on the crop.

The increase in 1997 in the overall rate of straight nitrogen, to its highest recorded level since 1993, accounted for the rise in total nitrogen use (Table B1.3). The overall application rate of compound nitrogen for winter wheat increased slightly, but then dropped back again, between 1993 and 1997.

Table B1.5 Average field application rates (kg/ha) of nitrogen on cereals by market use, Great Britain 1993 - 1997

Total nitrogen

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
1993	198	183	95	93	118	145
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

- Nitrogen fertiliser requirements for winter wheat depend on the intended market for the crop being grown, as well as upon average yield potential, soil type and the degree of residual nitrogen fertility from previous cropping [1]. Milling varieties are usually grown as second wheats 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 first winter wheats 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.

The influence of this agronomic practice is reflected in the statistics derived from the British Survey of Fertiliser Practice (BSFP) in that, between 1993 and 1997, the mean average field application rate of nitrogen on milling wheats has been around 16 kg/ha higher than the average rate on non-milling (feed/seed) varieties (Table B1.5). Over the last five years the mean values for average field rates on milling and non-milling winter wheats have been 204 and 188 kg/ha respectively.

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

Crop area estimates from this Survey suggest that the proportion of the winter wheat area in Great Britain which was grown for potential milling use dropped from 20% to 16% in 1997 as part of a more general decline (Table B1.6)[1].

Table B1.6 Percentage distribution of cereal crop by market use (% crop area), Great Britain 1993 - 1997

	winter wheat		*spring barley*		*winter barley*	
	milling	*non-milling*	*malting*	*non-malting*	*malting*	*non-malting*
1993	24	76	50	50	29	71
1994	26	74	53	47	29	71
1995	20	80	63	37	32	68
1996	20	80	65	35	30	70
1997	16	84	65	35	33	67

Spring Barley

The overall rate of total nitrogen on spring barley in 1997 was little changed, at 95 kg/ha (Table B1.3). An increase (5 kg/ha) in the total nitrogen rate for the crop in Scotland was mostly offset by a decrease (4 kg/ha) in England and Wales. Total nitrogen use has been fairly consistent over the last five years, ranging from 92 to 95 kg/ha, apart from a peak of 99 kg/ha in 1995. Overall rates of straight nitrogen increased temporarily in 1994 and 1995, but otherwise have remained at around 40 kg/ha since 1993; compound nitrogen rates have risen only slightly.

The average field rates of total nitrogen have on average been 4 kg/ha higher on spring barley grown for malting, than rates applied to spring barley grown for non-malting (feed/seed) purposes (Table B1.5). Estimates from this survey suggest that 63 - 65% of the spring barley area in Great Britain was grown for malting in the last three years (Table B1.6)[2].

- On face value, this may be 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 is done in order to reduce the risk of high grain nitrogen content which would adversely affect subsequent malt quality.

  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)[3]. However, feed crops are often grown within mixed rotations, which tend to have a higher soil nitrogen fertility, and consequently would need less nitrogen fertiliser. This difference may explain why the average field rate is consistently higher on malting than on other types of spring barley, and would be in accord with good agricultural practice.

[1] Estimates by the Home Grown Cereals Authority (HGCA) indicate that only 11%, and 9% of the total winter wheat area grown in the United Kingdom (UK) was planted to Group 1 varieties (i.e. favoured for breadmaking) in 1996 and 1997 respectively, but 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. (HGCA Weekly Digest, Volume 24, No1 7 July 1997)

[2] The corresponding HGCA estimates for the UK rose from 64% in 1995 to 78% in 1997. (HGCA Weekly Digest, Volume 24, No.1, 7 July 1996)

[3] Anon. (1994) *Fertiliser Recommendations for Agricultural and Horticulural Crops. MAFF Reference Book 209 (Sixth edition)* London: HMSO.

Winter Barley

In 1997 the overall rate for total nitrogen on winter barley increased by 3 kg/ha to 143 kg/ha, representing a recovery after the small drop in the previous year (Table B1.3). This reflected increases in overall application rates on the crop in both England and Wales (3 kg/ha) and in Scotland (2 kg/ha).

Overall rates for both straight and compound nitrogen have shown little net change since 1993, despite some annual fluctuations. The average field rates for straight nitrogen have increased over this period (Table B1.4), back to the same level recorded in 1992 (137 kg/ha).

Nitrogen requirements for winter barley, as for a spring sown crop, depend on a range of agronomic factors, including the intended market for the grain. Field rates of nitrogen applied to winter barley have, over the last five years, averaged 24 kg/ha (20 to 27 kg/ha) lower on malting than on non-malting (feed/seed) crops (Table B1.5).

- 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, following a previous cereal crop, and consequently they would receive more nitrogen fertiliser than malting crops grown in the same situation. The Survey estimates for the proportion of the crop area grown for malting in Great Britain have been fairly steady at 29 - 33% since 1993 (Table B1.6)[1].

Maincrop Potatoes

The two groupings used within the Survey for the different categories of potato crop were revised in 1997, so that second early crops are now included with maincrop instead of early potatoes, because of their similarity in cropping practice and fertiliser requirements. This change should provide a more robust estimate of fertiliser use on the main crop, but may undermine year-on-year comparisons with earlier data for this crop.

Overall total rates of nitrogen for maincrop potatoes have varied widely over the last five years, from 169 to 194 kg/ha (Table B1.3), reflecting the variation in the average field rate (Table B1.4). In 1997, the overall nitrogen rate for Great Britain was little changed (down 2 kg/ha), at 169 kg/ha, and the average field rate unchanged at 184 kg/ha. The reduction of 7 kg/ha in overall nitrogen use in England and Wales was partly offset by a countervailing increase of 10 kg/ha on the smaller area of the Scottish crop.

Most fertiliser nitrogen for potatoes is applied in the form of compound, rather than straight nitrogen products, and it was the overall rate of compound nitrogen that fell by 7 kg/ha in 1997. The overall rate of straight nitrogen increased in 1997, due to an increase in the dressing cover for this type of fertiliser product.

Oilseed Rape

The increase of 15 kg/ha in the overall rate for total nitrogen on oilseed rape, as a combined category for the autumn and spring sown crops, to 203 kg/ha in 1997 (Table B1.3), resulted in the highest recorded rate for total nitrogen use over the 1993 to 1997 period. This rate was the same as the pre-1993 rates, i.e. before nitrogen inputs dropped as a result of the 1992 Transitional Oilseeds Scheme and the subsequent Arable Area Payments Scheme. The corresponding average field rate showed a smaller increase of 5 kg/ha, to 204 kg/ha in 1997, which was also the highest recorded level since 1993 (Table B1.4).

[1]Recent HGCA estimates indicated that 26-31% of the crop area was grown for malting between 1995 and 1997.

Changes in total nitrogen rate on oilseed rape since 1993 largely reflect the changing use of straight nitrogen (Table B1.3). The overall rate of compound nitrogen increased slightly in 1994 and 1995, but subsequently dropped back to the same level as reported for 1993. The average field rate for straight nitrogen has increased since 1993, particularly over the last three years, but the equivalent rate for compound nitrogen has stabilised at 50 kg/ha.

These changes in overall nitrogen rates on oilseed rape since 1993 can mostly be attributed to a return in recent years to production of an autumn sown crop, which receives a much higher average field rate of nitrogen, and follow the temporary increase in the proportion of spring sown oilseed rape reported for 1993 and 1994 (Table B1.7). Average field rates of total nitrogen since 1993 have been relatively stable on both winter and spring oilseed rape, apart from a temporary increase for the spring sown crop in 1996 (Table B1.7).

Table B1.7 Average field application rates of nitrogen (Kg/ha) on winter and spring oilseed rape and percentage distribution of crop areas, Great Britain 1993 - 1997

	Total nitrogen (kg/ha)		% crop area	
	winter	*spring*	*winter*	*spring*
1993	212	121	66	34
1994	212	121	66	34
1995	210	121	79	21
1996	212	127	81	19
1997	215	120	88	12

Overall nitrogen use on oilseed rape increased by 16 kg/ha in England and Wales in 1997 due to a 6 kg/ha increase in the average field rate and a rise in the percentage of the crop area dressed (from 95% to 100%), reflecting the resurgence of the autumn sown crop over spring sown varieties. Overall total nitrogen applications in Scotland remained unchanged from the 1996 level of 175 kg/ha.

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 have fluctuated over the past five years, although the increases in 1997, of 3 and 5 kg/ha respectively, were small (Tables B1.3 and B1.4). The overall nitrogen rate had been relatively stable, ranging between 115 and 122 kg/ha between 1988 and 1992. However, the more recent trend in nitrogen use since 1992 is still unclear because of large annual fluctuations. Overall rates of both straight and compound nitrogen have varied to some extent since 1993, but the increase in total nitrogen use in 1997 was largely due to greater use of compound products.

- Part of the reason for apparent fluctuations in estimates of nutrient application rates may lie in the reporting process; it is recognised that information on the nutrient content of bulk fertilisers, often applied by contractors, are 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.

B1.2.2 PHOSPHATE AND POTASH

Phosphate

The overall phosphate rate for tillage crops in 1997 was up 3 kg/ha to 55 kg/ha (Table B1.2). This was mainly due to increases in the rates of phosphate fertiliser applied to cereal crops and sugar beet, particularly in compound form.

Overall rates of phosphate applied to winter wheat have been relatively consistent over the period since 1993, at 51 to 53 kg/ha (Table B1.3), with corresponding field average rates of about 68 kg/ha (Table B1.4). Overall phosphate rates for spring barley had been stable at 47 kg/ha, apart from a drop to 42 kg/ha in 1994, but increased by 4 kg/ha in 1997. Similarly, on winter barley, the overall rate had been very stable, at around 52 kg/ha, between 1993 and 1996, but with an increase of 6 kg/ha in 1997.

Annual estimates for phosphate use on maincrop potatoes have been 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. The drop in 1997 of 5 kg/ha, to 173 kg/ha, the lowest recorded overall level over the last five years, may also have been influenced by the change in the grouping of potato crop categories as outlined in Section B1.2.1. For oilseed rape, the overall phosphate rate had shown little variation, between 49 and 52 kg/ha, during the 1993 - 1996 period and only dropped by 1 kg/ha in 1997. Overall use of phosphate on sugar beet had declined between 1993 and 1996, but there was an increase of 10 kg/ha in 1997 to 50 kg/ha.

Potash

The appreciable rise in overall potash use on tillage crops in 1997, from 61 to 67 kg/ha (Table B1.2), resulted from increased application rates on all the major crops except for maincrop potatoes (Table B1.3).

Overall application rates of potash had been relatively consistent on cereal crops and oilseed rape between 1993 and 1996; on average about 52 kg/ha for winter wheat, 55 kg/ha for spring barley, 62 kg/ha for winter barley and 50 kg/ha for oilseed rape. In 1997, however, overall potash rates rose by 3 kg/ha on winter wheat and spring barley, 10 kg/ha on winter barley and 3 kg/ha on oilseed rape (Table B1.3).

Annual potash use on maincrop potatoes varied from 248 to 256 kg/ha between 1993 and 1996, with less fluctuation (8 kg/ha range) than for phosphate (16 kg/ha range); in 1997, the potash rate rose by just 1 kg/ha, to 248 kg/ha. The overall potash rate on sugar beet had declined significantly, from 139 kg/ha in 1993 to 96 kg/ha in 1996, but recovered to 133 kg/ha in 1997, largely as a result of an increased average field rate.

B1.2.3 SULPHUR

- Sulphur is one of the essential nutrients for plant growth and there is an increasing risk of sulphur deficiency in susceptible crops. The available sulphur supply for crops depends upon soil reserves, including sulphur released through the mineralization of organic matter, together with sulphur inputs from atmospheric deposition (wet and dry) and dressings of organic manures or fertiliser products containing sulphur. Plants obtain a significant amount of their sulphur requirement from atmospheric sources. Environmental measures taken to reduce sulphur dioxide emissions and associated atmospheric pollution from industrial sources, have caused a sharp decline in atmospheric sulphur deposition in Britain over the past twenty five years. This trend is expected to continue into the future, which will further reduce the background supply of sulphur. Crops with a large sulphur requirement, such as oilseed rape, cereals and intensively cut

grass, are at particular risk from sulphur deficiency when grown in long term arable, or lay/arable rotations, with little or no input of organic manure, on sandy or shallow soils which are in areas where atmospheric deposition is now less than 50 kg/ha sulphur (as SO_3) per annum[1]. Sulphur deficiency risk is greater in Scotland than elsewhere in Great Britain, because of the very low rates of atmospheric sulphur deposition there.

Fertilisers containing sulphur, mainly in water soluble sulphate form, are now an important agronomic input for crops which have a critical sulphur requirement. The survey has gathered detailed information on sulphur fertiliser use since 1993. The results show that the percentage crop areas receiving fertiliser-sulphur have increased for both cereals and oilseed rape over the past five years (Table B1.8). In 1997, 13 - 14% of all the major cereal crop areas, and nearly one third of the total oilseed rape area, received additional sulphur.

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 so prone to deficiency.

Average field rates for winter cereals and spring barley have increased since 1993 and, in 1997, were all very similar at around 39 kg/ha SO_3. These rates were almost identical to the application rate of 40 kg/ha SO_3 (as a water soluble form) recommended for potentially deficient cereal crops. The average field rate of sulphur for oilseed rape has generally increased over the 1993 - 1997 period, despite some annual variation, but is still below the recommended rate of 75 kg/ha (Table B1.8).

Table B1.8 Dressing cover (% area) and average application rate (kg/ha SO_3) of sulphur on major tillage crops, Great Britain 1993 - 1997

Dressing cover (%)

	Winter wheat	*Spring barley*	*Winter barley*	*Oilseed rape*
1993	4	6	3	8
1994	6	7	7	11
1995	11	11	11	22
1996	8	7	10	30
1997	13	14	13	30

Average field rate (kg/ha)

	Winter wheat	*Spring barley*	*Winter barley*	*Oilseed rape*
1993	20	17	24	32
1994	28	32	34	63
1995	29	30	29	45
1996	46	26	47	48
1997	38	39	40	63

Greater proportions of crop areas in Scotland were dressed with fertiliser containing sulphur in 1997 compared to the previous year: 26% of oilseed rape; about 26% of winter wheat; 18% of winter barley and 21% of spring barley. These figures reflect the more widespread need for additional sulphur in Scotland, because of the relative lack of polluted air found there.

[1]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 0369 9277

B1.3 Fertiliser use on grassland

Overall fertiliser usage, previously shown in Table B1.1, is repeated below in summary form as Table B1.9. The corresponding estimates of dressing cover for each nutrient are shown in Table B1.10.

Table B1.9 Overall fertiliser application rates (kg/ha) on grassland, Great Britain 1993 - 1997

	Straight nitrogen	*Compound nitrogen*	*Total nitrogen*	*Total phosphate*	*Total potash*
1993	56	56	112	21	29
1994	51	65	116	24	31
1995	52	66	118	24	31
1996	53	62	115	23	30
1997	54	69	123	25	35

Table B1.10 Dressing cover (%) on grassland, Great Britain 1993 - 1997

	Straight nitrogen	*Compound nitrogen*	*Total nitrogen*	*Total phosphate*	*Total potash*
1993	44	59	80	61	40
1994	39	64	81	64	42
1995	43	66	84	68	44
1996	42	66	86	68	47
1997	42	68	86	70	69

The overall rate of nitrogen applied to grassland was up in 1997, part of a continuing recovery since 1993 (Table B1.9). The alternative estimates reported in Table C6, based on Census areas, suggest lower estimates for nitrogen application rates.

B1.3.1 NITROGEN

The rise in the overall rate for nitrogen on grassland in Great Britain between 1993 and 1997 was due to increased use of compound nitrogen. This was also largely true for the significant increase noted in 1997 alone. The increase in overall compound rates since 1993 was brought about by a general increase in the dressing cover, combined in 1997, with an increase in the average field rate (Table B1.10).

In England and Wales there were sizeable (5 kg/ha) increases apparent in average field rates of both compound and straight nitrogen fertiliser, with only slight reductions in dressing cover.

Scottish farmers registered a far stronger preference for compound nitrogen fertiliser use on grassland, with field rates showing an apparent increase of 15 kg/ha in 1997. In contrast, field rates for straight nitrogen were sharply down by 15 kg/ha; the effects of this latter change in rate were masked by a 7% increase in dressing cover.

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 in 1997 on dairy, other livestock and mixed farms in England

and Wales and Scotland are presented in Section D tables. The Survey estimates for annual distributions of the total grassland area between grazing and cutting management regimes since 1993 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, rather than to derive accurate crop areas.

Table B1.11 Grassland utilisation (% of grass area), Great Britain 1993 - 1997

	grazed [1]	*silage* [2]	*hay* [2]
1993	96	28	11
1994	87	29	12
1995	91	29	14
1996	88	30	12
1997	91	35	13

The corresponding fertiliser usage for the different cutting and grazing categories is presented in Table B1.12. The differences in average field rates for nitrogen illustrate the influence of grassland management practice on fertiliser inputs.

Nearly all grassland, on average about 90% over the past five years, is grazed at some stage, although the proportion of grassland area cut for silage recorded by the Survey has increased over this period, rising sharply in 1997 from 30 to 35% (Table B1.11). This increase in grassland use for silage production, with much higher inputs of nutrients (Table B1.12), is significant. It is not explained by changes in livestock numbers and forage production requirements, as the total number of cattle (dairy plus beef) in Great Britain decreased by 4% in 1997, whilst sheep numbers increased by only 1%, compared to 1996. A much smaller proportion of the grassland area, on average about 12%, is cut for hay, as an alternative means of conserving forage.

- The effects of seasonal weather conditions on herbage production would also be expected to influence grassland utilisation. A very dry and relatively cold spring in many areas during 1997 resulted in low first cut yields of silage. Consequently, larger areas than normal were taken for second or later cuts, to compensate for the initial shortfall in silage production. This effect could account for the above average percentage of grassland that was cut for silage in 1997.

Overall rates of total nitrogen on grazed grass have risen over the last five years, despite temporary fluctuations (Table B1.12). Rates on silage have also fluctuated, the average field rate decreasing to 185 kg/ha. On grass cut for hay, the average field rate had been relatively stable at 107 - 110 kg/ha since 1993, but dropped sharply in 1997 to 99 kg/ha, reflecting a decrease in England and Wales.

The increases observed in overall rates of total nitrogen on grazed grass in 1997 were related to a recovery in the rates of compound nitrogen (Table B1.13). For the overall rates on grass cut for silage, there would appear to be two explanations: an increase in the average field rate of straight nitrogen, and an increase in the dressing cover for compound nitrogen. On grass cut for hay, the drop in total nitrogen rate was associated with a reduction in straight nitrogen use.

[1] may also be cut
[2] may also be grazed

Table B1.12 Fertiliser application rate (kg/ha) by grassland utilisation, Great Britain 1993 - 1997

Total nitrogen

	Overall application rate				*Average field rate*		
	grazed[1]	*silage*[2]	*hay*[2]		*grazed*[1]	*silage*[2]	*hay*[2]
1993	111	174	91	1993	138	180	109
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

Total phosphate

	Overall application rate				*Average field rate*		
	grazed[1]	*silage*[2]	*hay*[2]		*grazed*[1]	*silage*[2]	*hay*[2]
1993	20	32	20	1993	33	42	34
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

Total potash

	Overall application rate				*Average field rate*		
	grazed[1]	*silage*[2]	*hay*[2]		*grazed*[1]	*silage*[2]	*hay*[2]
1993	28	57	24	1993	46	71	40
1994	27	61	23	1994	44	73	42
1995	28	61	26	1995	44	72	42
1996	27	58	26	1996	42	69	40
1997	32	64	28	1997	47	75	41

Average field rates for nitrogen application have not shown any consistent change on either grazed or cut grassland over the past five years, although the rate for straight nitrogen on silage appears to be showing signs of sustained recovery, following the general low in 1995 which was associated at the time with a possible switch to compound nitrogen (Tables B1.12; B1.13).

[1]may also be cut
[2]may also be grazed

Table B1.13 Straight and compound nitrogen use (kg/ha) by grassland utilisation, Great Britain 1993 - 1997

Straight nitrogen

	Overall application rate				*Average field rate*		
	grazed[1]	*silage*[2]	*hay*[2]		*grazed*[1]	*silage*[2]	*hay*[2]
1993	55	78	47	1993	126	131	105
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

Compound nitrogen

	Overall application rate				*Average field rate*		
	grazed[1]	*silage*[2]	*hay*[2]		*grazed*[1]	*silage*[2]	*hay*[2]
1993	56	95	43	1993	94	126	76
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

B1.3.2 PHOSPHATE AND POTASH

Overall rates of phosphate and potash application on grassland have both increased since 1993 (Table B1.9). The increases observed for both nutrients in 1997 reflect increased application rates on grassland in both England and Wales and in Scotland (see Figures B2.7; B2.8).

Overall phosphate use has increased slightly on grazed grass over recent years. However, overall phosphate rates have not followed the same pattern on cut grassland, when compared with pre-1993 levels, apart from the one exception of a 3 kg/ha increase on grass cut for hay in 1997 (Table B1.12).

Overall potash use on grassland, whether cut or grazed, was relatively stable between 1993 and 1996 (Table B1.12). However, the overall potash rate increased appreciably in 1997, by 5 - 6 kg/ha on both grazed and silage-cut grassland, resulting in a large increase of 5 kg/ha for the all grass rate. Overall potash use also rose slightly, by 2 kg/ha, on grass cut for hay in 1997.

Average field rates for phosphate and potash have been relatively consistent on both grazed and cut grassland categories since 1993 (Table B1.12); any marked changes in overall application rates over this period have been associated mainly with changes in dressing cover.

[1]may also be cut
[2]may also be grazed

B1.3.3 SULPHUR

Only a small proportion of all grassland, currently about 5%, receives any application of sulphur fertiliser (Table B1.14). Grassland cut intensively for silage is, however, at greater risk of sulphur deficiency than grass which is used for hay production or grazing[1]. This difference in deficiency risk is reflected in the dressing covers for the three management categories, as 8% of grass cut for silage was treated with sulphur fertiliser in 1997, compared with only 4 - 5% for grass used for grazing or hay (Table B1.14). However, there is no evidence of any significant increase in the extent of area dressed with sulphur over the past five years, even on grassland used for silage production. This apparently static level of usage on grassland contrasts with the trend for increasing use of sulphur on those main arable crops which are susceptible to sulphur deficiency.

- The proportion of heavier textured soil types which occurs in the main grassland farming areas, and the sulphur which is available in slurry dressings on 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 may also be a contributory factor.

Table B1.14 Sulphur use on grassland, Great Britain 1993 - 1997

Dressing cover %

	grazed	*silage*	*hay*	*all grass*
1993	2	5	1	2
1994	4	8	2	4
1995	4	8	4	5
1996	3	6	1	3
1997	4	8	5	5

Average application rate (kg/ha SO_3)

	grazed	*silage*	*hay*	*all grass*
1993	34	39	20	35
1994	39	42	35	38
1995	33	35	40	34
1996	40	45	24	42
1997	34	43	27	38

Average field rates of sulphur (as SO_3) have varied within each grassland management category since 1993, although the rates on cut grass may have actually risen slightly (Table B1.14). The application rates are similar to the recommended rate of 40 kg/ha SO_3 for each silage cut considered to be at risk from sulphur deficiency.

[1]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.

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 was carried out separately for England &Wales and for Scotland. Survey statistics from these earlier surveys have been collated in order to report an aggregated series for total nitrogen, phosphate and potash use for the thirteen year period, 1985 to 1997. Other series are presented for England and Wales dating from 1970, and for Scotland from 1983.

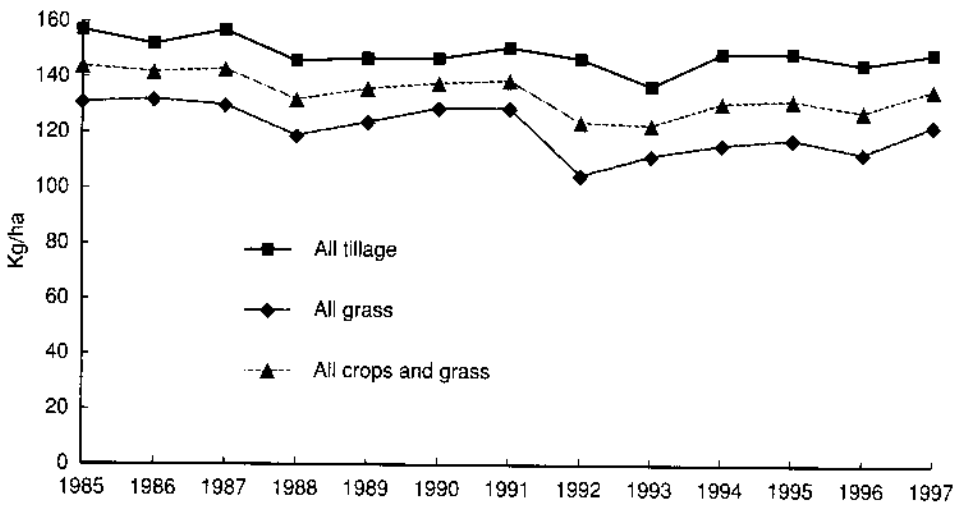
B2.1 Longer Term Trends for Nitrogen

B2.1.1 NITROGEN USE IN GREAT BRITAIN

Table B2.1 Total overall nitrogen rates (kg/ha) for Great Britain 1985 - 1997

	all tillage	*all grass*	*all crops and grass*
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

Figure B2.1 Overall use of total nitrogen (kg/ha), Great Britain 1985 - 1997



The overall application rates for total nitrogen in Great Britain shown in Figure B2.1 are taken from Table B2.1.

The nitrogen rate for the all tillage category shows an overall decline over the period, 1985 to 1997, from 157 to 149 kg/ha. The annual rates for tillage can be characterised with four time frames:

1985 to 1987	- rates as high as 157 kg/ha
1988 to 1990	- a sharp fall to lower rates, around 147 kg/ha
1991 to 1993	- a partial recovery to 151 kg/ha, followed by a decline to 137 kg/ha
1994 to 1997	- another partial recovery to 149 kg/ha, despite a temporary drop to 145 kg/ha in 1996.

Within this context, rates observed over the most recent four year period have been relatively stable. There has been some recovery in overall application rates on tillage, although to a lower level than that observed in the mid 1980s.

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 1997	- a sharp fall to 105 kg/ha, with a gradual recovery to 123 kg/ha, although with a slight setback to 113 kg/ha in 1996.

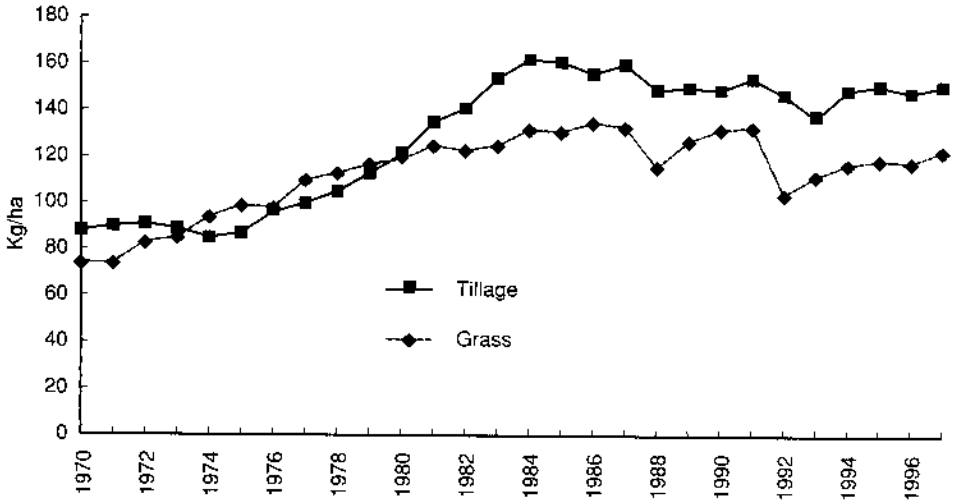
The figure of 123 kg/ha recorded for 1997 is not high in relation to the longer term trend. The 1997 results can also be seen as part of a recovery from the fall reported in 1992.

The series for the overall application rate of total nitrogen on the all crops and grass category is, therefore, an aggregation of two separate rates which would seem to have moved differently. Consequently, it is clear that the overall rates of total nitrogen recently observed on all crops and grass, although higher than in the 1991-1992 period, are still well below the rates recorded in the mid-to late 1980s. The mean rate during the 1994-1997 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 rate 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 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.

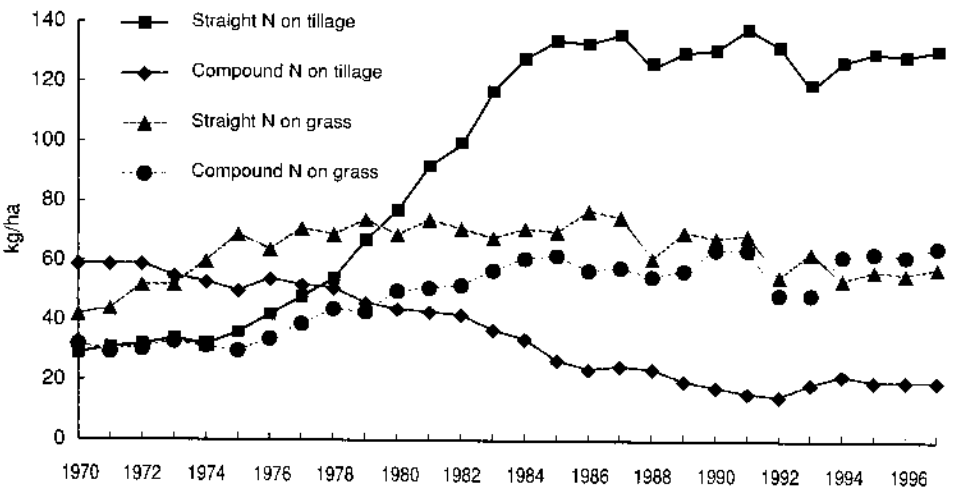
Figure B2.2 Overall use of total nitrogen (kg/ha), England and Wales 1970 - 1997



The changes in total nitrogen rate on tillage crops in England and Wales since 1970 largely reflect the pattern of straight nitrogen use. Most of the total nitrogen input is now applied in this form (Figures B2.2; 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. The rate of compound nitrogen use on tillage crops, on the other hand, has been in long term decline from 1970 until 1992, although with indications of a slight upturn since 1992.

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, due to the introduction of the Arable Area Payments Scheme and widespread adoption of rotational set-aside on arable farms. Associated price reductions for rapeseed, which encouraged more spring cropping and also lowered optimum nitrogen requirements for oilseed rape, were a further contributory factor.

Figure B2.3 Overall use of Straight and compound nitrogen (kg/ha), England & Wales 1970 - 1997



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 after the notable falls in the 1988 and 1992 seasons (Figure B2.3). The overall

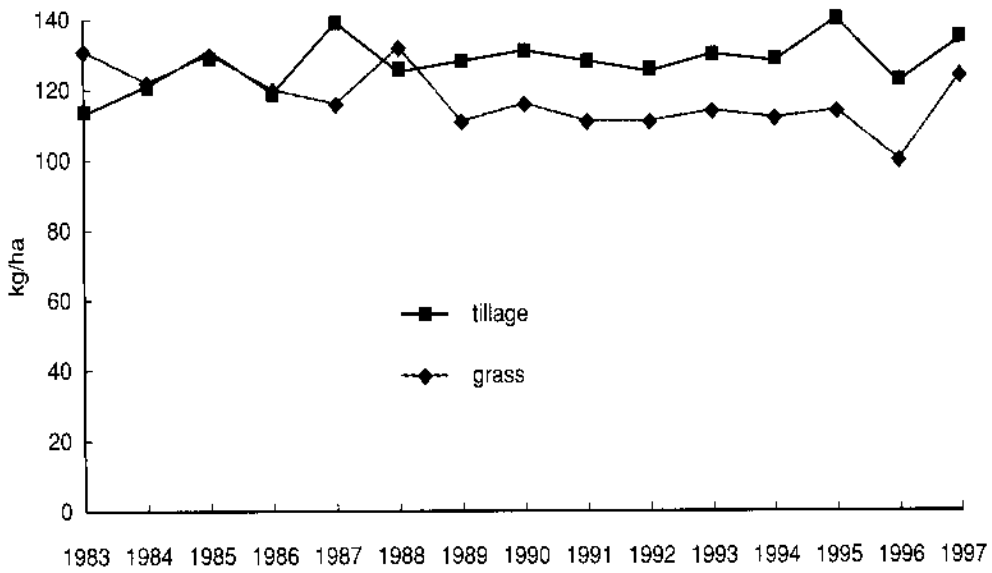
rate of compound nitrogen also rose from the mid-1970s until the mid-1980s, then slowly declined before rising again to a high in 1990 of 64 kg/ha. The application rate then fell dramatically in 1992 but recovered in 1994. Since then, the compound nitrogen rate on grassland in England and Wales has slightly exceeded the rate for straight nitrogen.

- 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.

B2.1.3 NITROGEN USE IN SCOTLAND

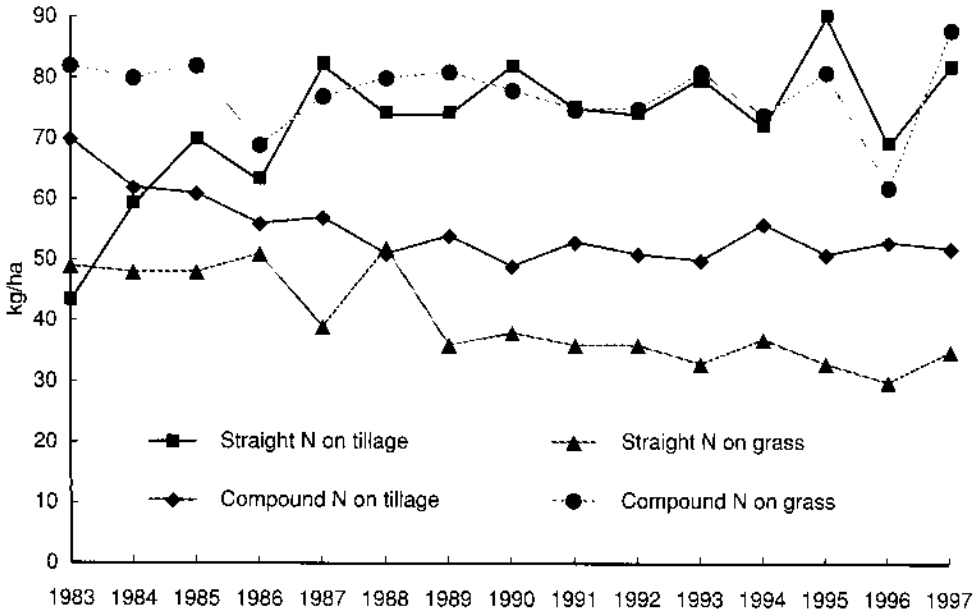
Data for total nitrogen use on tillage crops and grassland since 1983, the first year that the Survey was carried out in Scotland, are presented in Figure B2.4. The trends differ from those for England and Wales. The total nitrogen rates show larger annual fluctuations on both tillage and grassland during the first period from 1983 to 1987, ranging from 113 to 139 kg/ha and 116 to 131 kg/ha respectively. Both sets of nitrogen rates then remained fairly stable until 1994, but since then have again fluctuated widely. Total nitrogen rates on tillage crops are typically about 40% lower in Scotland than in England and Wales, largely because of differences in cropping practice and associated nitrogen requirements. Malting spring barley and mixed rotations are more common in Scotland, whereas in England and Wales winter wheat and oilseed rape are grown on a much higher proportion of the total tillage area.

Figure B2.4 Overall use of total nitrogen (kg/ha), Scotland 1983 - 1997



Before 1985, more nitrogen was applied in Scotland in compound than in straight form. However, the overall rate of compound nitrogen on tillage crops declined during the 1980s and, despite annual fluctuations since 1988, now represents about 40% of total nitrogen use on tillage crops. By contrast, the large apparent rise in the total nitrogen rate for grassland in 1997 was primarily due to a sizeable increase in the area of grassland receiving higher rates of compound nitrogen fertiliser.

Figure B2.5 Overall use of straight and compound nitrogen (kg/ha), Scotland 1983 - 1997



About two-thirds of total nitrogen use on grassland in Scotland was in compound, rather than straight form (Figure B2.5). Overall use of straight nitrogen fell sharply on grassland in both 1987 and 1989, and has shown a further gradual decline since then. 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.

B2.2 Longer Term Trends for Phosphate and Potash

B2.2.1 PHOSPHATE AND POTASH USE IN GREAT BRITAIN

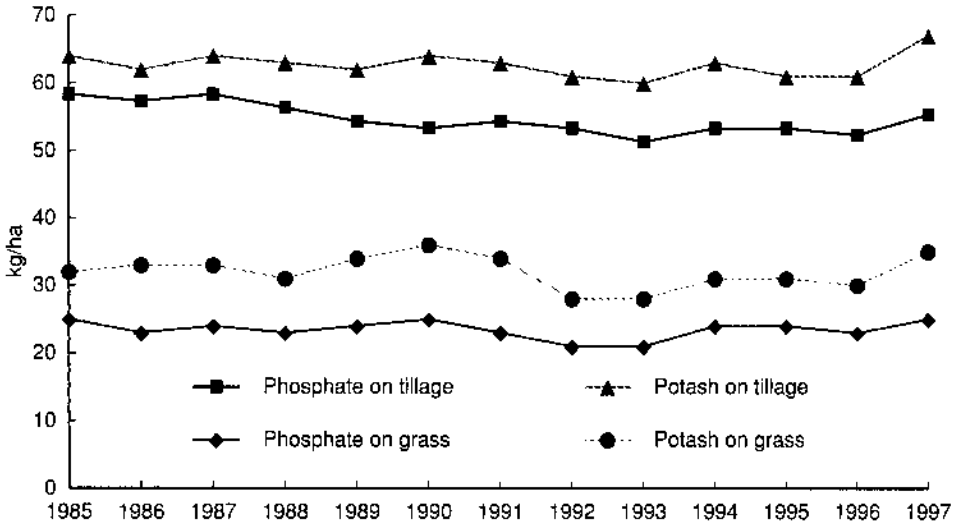
Annual overall rates of phosphate and potash use on all crops and grass since 1985 are illustrated in Figure B2.6, using the data presented in Table B2.2 .

Overall rates of phosphate and potash applied to grassland are approximately fifty percent less than those used on tillage crops. Phosphate rates on tillage and grassland have been relatively stable over the thirteen year period illustrated in Fig B2.6, slight increases in phosphate application rates in recent years ending the gradual decline in phosphate use up to 1993.

Table B2.2 Overall phosphate and potash application rates (kg/ha), Great Britain 1985 - 1997

	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

Figure B2.6 Overall phosphate and potash use (kg/ha), Great Britain 1985 - 1997



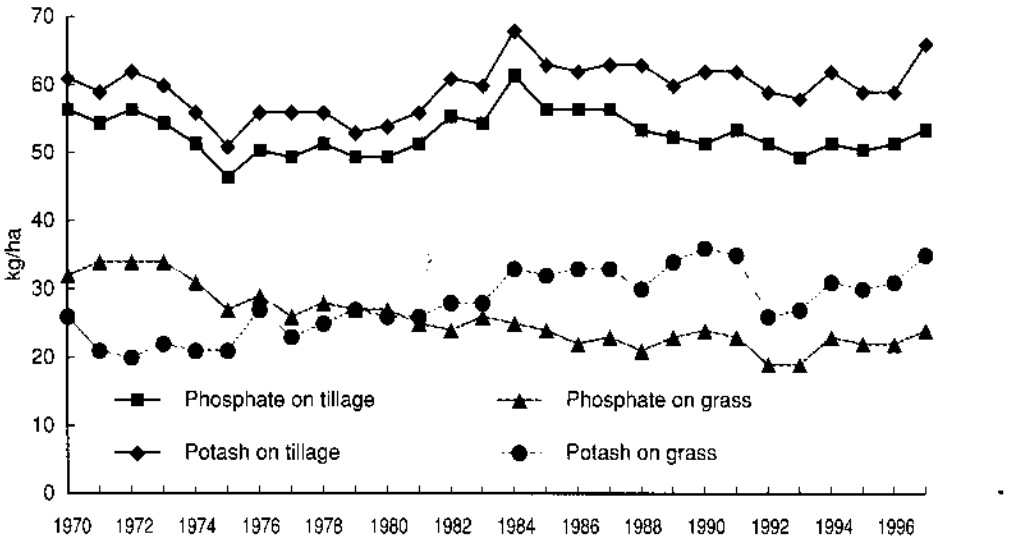
Fluctuations in potash rates have been more evident, but have only varied within a comparatively small range. Application rates on grassland have followed a very similar pattern to that seen in tillage crops. However, large increases in the overall rates on crops and grassland reported in 1997 are made more prominent when contrasted with the gradual decline observed since 1985.

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 IN ENGLAND AND WALES

Phosphate and potash rates on tillage crops show a very similar pattern of annual fluctuations and have only marginally declined over the last twenty seven years (Figure B2.7). Compared with the early 1970s, overall application rates on tillage crops during the last ten years suggest no net change in potash use despite the peak in 1984, but a slight decrease in phosphate use, over the longer term period.

Figure B2.7 Overall total phosphate and potash use (Kg/ha), England and Wales 1970 - 1997



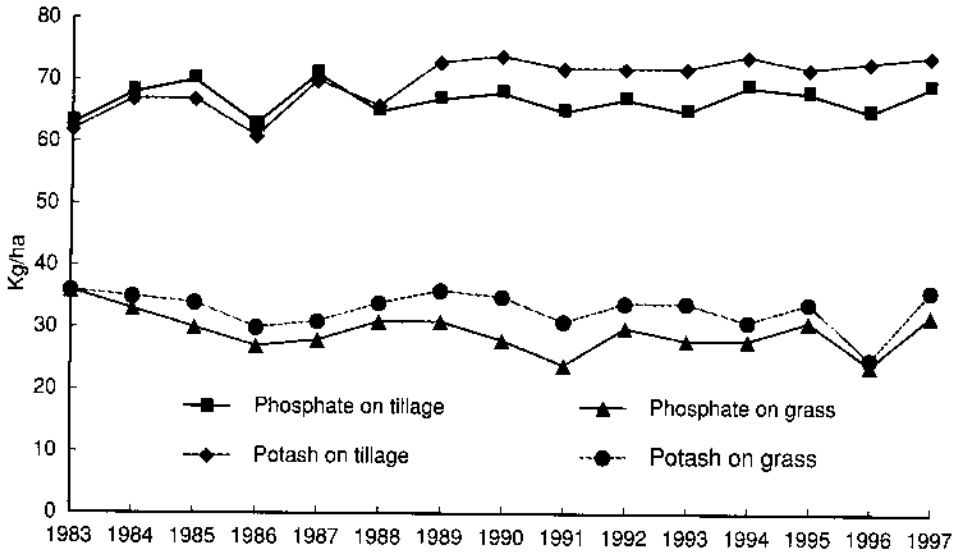
The overall phosphate rate on grassland was 32 kg/ha in 1970 (Figure B2.7), but then declined steadily to its lowest level in 1992. Rates have increased steadily since then.

There is a much greater complexity for potash rates, with a general increase in the period 1974 - 1986, followed by a period of higher rates until a fall in 1992 and signs of sustained recovery since then.

B2.2.3 PHOSPHATE AND POTASH USE IN SCOTLAND

Overall rates of phosphate and potash have been relatively stable since 1983, apart from the large drop in application rates of both nutrients for grassland in 1996 (Figure B2.8). It may be noted that, in Scotland, application rates for both of these nutrients tend to be slightly higher than those for England and Wales, both on tillage crops and on grassland (see Figure B2.7).

Figure B2.8 Overall total phosphate and potash use (kg/ha), Scotland 1983 - 1997



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 year 1997, England and Wales

	farm holdings in population in 1996	*total crops & grass in 1996*	*notional sampling fraction*	*target size of sample*	*achieved size of sample*	*achieved sample fraction*
England & Wales		(column %)	(%)			(%)
Livestock						
(MAFF 'robust' types 4 - 7)						
crops & grass area						
20-50 ha	24536	9.3	0.46	112	94	0.38
51-100 ha	17987	14.3	0.96	172	152	0.85
101-200 ha	9431	12.4	1.57	148	132	1.40
200+ ha	2652	11.8	5.35	142	116	4.37
Crops & mixed						
(MAFF robust types 1,2,8)						
crops & grass area						
20-50 ha	10445	4.0	0.46	48	43	0.41
51-100 ha	10743	8.8	0.98	105	89	0.83
101-200 ha	9431	15.0	1.91	180	135	1.43
200+ ha	5903	23.9	4.84	286	220	3.73
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	0	0.00
101-200 ha	76	0.1	1.8	8	5	6.58
200+ ha	23	0.1	4.3	4	4	17.39
Total for England and Wales	91876	100%		1225	994	

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

Table C1.SC Sampling characteristics for the year 1997, Scotland

	farm holdings in population in 1996	*total crops & grass in 1996*	*notional sampling fraction*	*target size of sample*	*achieved size of sample*	*achieved sample fraction*
Scotland		(column %)	(%)			(%)
Cereal/ general cropping/ horticulture (SOAEFD 'robust' groups 1-3))						
crops & grass area						
20-50 ha	1041	2.9	0.77	8	6	0.57
51-100 ha	1303	7.8	1.53	20	13	1.00
101-200 ha	1138	13.1	2.80	32	28	2.46
200+ ha	434	11.3	6.45	28	18	4.14
Livestock & mixed (SOAEFD 'robust' groups 4-8)						
crops & grass area						
20-50 ha	2905	8.2	0.69	20	17	0.58
51-100 ha	3418	20.0	1.46	50	36	1.05
101-200 ha	2133	23.8	2.81	60	52	2.44
200+ ha	553	12.8	5.80	32	23	4.34
Total for Scotland	12925	100%		250	193	

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 Table 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 in the sample by MAFF and SOAEFD. This resulted in a target sample of 1474, of which 1187 farms were successfully surveyed, an achieved 'sampling fraction' of 1.1% of farms (Table C2).

Table C2 Summary sampling characteristics 1997

	farm holdings in population in 1996	*total crops & grass in 1996 (million ha)*	*target size of sample*	*achieved size of sample*	*achieved sample fraction (%)*
England & Wales	91876	8.8	1225	994	1.1
Scotland	12925	1.7	249	193	1.5
Great Britain	104801	10.5	1474	1187	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 1474 farms in the target sample for the 1997 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 1187 farms: 992 of these responses were from the 'main' sample and 195 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 1997 this was 69%, which was lower than in previous years (Tables C3 and C4). The net response rate to the reserve sample was 55%, 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 unwelcomed 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

		invalid returns[1]		1996 %	1997 %
issued from Main Sample	1446				
response to Main Sample	992		crude response rate	79.9	**68.6**
non-response	454	of which 4 were invalid	net response rate	81.7	**68.9**
issued from Reserve Sample	355				
response to Reserve Sample	195		crude response rate	73.6	**54.9**
non-response	144	of which 1 was invalid	net response rate	75.7	**55.2**
achieved sample size	1187		achieved rate	94.5	**82.1**

Table C4 Analysis of non-response 1993 - 1997

		1993 %	1994 %	1995 %	1996 %	1997 %
a)	**net response rate**					
	main sample	86	81	84	82	**69**
	reserve sample	85	71	67	76	**55**
	'overall' achieved rate	86	80	81	80	**66**
b)	**refusal rate**	11	16	14	16	**26**
	main reasons for refusal (% of refusal rate)					
	too busy	34	38	28	42	**28**
	not interested	11	21	29	21	**32**
	don't do surveys	9	9	15	6	**4**
	want payment	5	5	5	3	**2**
	too much paperwork (IACS)	20	7	6	14	**2**
	other	21	20	17	14	**32**
c)	**non-contact rate**	3	4	4	8	**5**
d)	**achieved sample size**					
	from main sample	1291	1169	1190	1140	**992**
	from reserve sample	208	207	173	209	**195**
	in total	1499	1376	1363	1349	**1187**

[1]Farms found not to conform to Survey Specifications are classified as 'invalid'.

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 (Kg/ha) for application rates for the major crops in 1997

	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	
Great Britain											
winter wheat	2.8	1.1	2.4	3.6	2.9	3.1	2.1	4.1	0.9	1.3	2271
oilseed rape	3.2	1.8	3.5	4.9	3.4	3.5	2.7	3.5	1.5	0.9	540
winter barley	4.6	3.3	1.5	3.1	2.3	4.1	3.3	2.6	2.0	0.8	1016
spring barley	3.3	1.5	3.0	1.7	2.2	2.9	2.3	1.7	1.5	2.1	498
m/c potatoes[1]	3.3	4.0	6.9	5.7	9.4	5.0	12.8	9.4	5.6	13.1	209
sugar beet	3.9	2.8	5.5	2.1	5.9	4.4	3.7	6.0	1.9	7.5	326
all tillage crops	2.8	1.8	1.7	2.6	1.4	3.3	3.2	1.3	0.6	1.4	6187
all grass	3.7	1.2	2.7	0.9	1.1	4.4	4.6	2.5	0.5	0.7	3729
England & Wales											
winter wheat	3.5	1.4	2.3	4.4	3.5	3.7	2.4	3.3	1.7	1.9	2202
oilseed rape	3.9	2.3	3.7	6.2	4.4	4.2	2.4	4.4	2.1	1.4	488
winter barley	4.6	3.7	1.6	3.3	2.5	4.1	3.6	3.6	2.0	0.9	951
spring barley	6.2	5.4	1.4	4.6	3.5	5.6	6.8	0.8	3.6	2.8	319
m/c potatoes[1]	2.7	3.3	5.3	7.3	10.2	5.0	13.9	8.5	7.4	13.8	192
sugar beet	3.9	2.8	5.5	2.1	5.9	4.4	3.7	6.0	1.9	7.5	326
all tillage crops	3.2	1.6	1.6	3.4	2.0	3.9	3.5	1.1	1.0	1.8	5676
all grass	4.1	1.0	3.2	0.8	1.2	5.2	4.4	2.9	0.3	0.5	3217
Scotland											
winter wheat	7.3	15.3	8.1	8.6	7.9	7.2	14.1	8.1	5.5	5.0	69
oilseed rape	3.9	6.9	4.2	6.9	6.8	3.9	10.1	3.0	5.0	4.8	52
winter barley	5.0	6.1	5.2	5.9	9.2	5.0	4.4	6.3	2.2	5.9	65
spring barley	1.4	3.8	3.6	3.9	3.1	1.4	3.0	2.4	3.8	3.0	179
m/c potatoes[1]	6.4	22.6	19.8	12.3	21.6	5.9	30.5	18.6	10.3	18.1	17
all tillage crops	2.7	6.8	4.6	4.9	3.9	3.0	4.8	2.8	3.9	2.9	511
all grass	4.8	3.1	2.6	1.6	1.9	4.4	6.4	2.3	1.2	2.7	512

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 show up 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

[1]Includes second early crops

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 1997, in Great Britain, the estimated overall application rate of total nitrogen use on winter wheat was 192 kg/ha. This is large relative to the value of the corresponding standard error of 2.8 kg/ha, indicating reliability (good precision), a 'relative error' near to 1.45% (the ratio of 2.8 to 192, as a percentage). The application of straight nitrogen on winter barley, in England and Wales, provides another example of precision: the estimated overall application rate was 127 kg/ha, with a corresponding standard error of 3.7 kg/ha, a 'relative error' of 2.9%. The application of nitrogen on spring wheat, in Britain, is estimated with much less precision: 130 kg/ha with a corresponding standard error of 13.1 kg/ha, resulting in a much larger 'relative error' of 10.1% due, in part, to the small number (47) of fields of spring wheat 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 186.4 (192 - 2 x 2.8) and an upper bound of 197.6 (192 + 2 x 2.8). 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 spring wheat 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 given dressing-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 1997, was estimated at 59 kg/ha, an apparent increase from 56 kg/ha in 1995. The difference is 3 kg/ha. The standard error in 1997 was 2.3 kg/ha. The observed difference of 3 kg/ha is not greater than 3 times 2.3 (= 6.9) 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[1], 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.

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

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 1997 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 6).

Table C6 Re-estimation of overall total fertiliser use (kg/ha), Great Britain 1997

Overall application rates (kg/ha)

		straight nitrogen	compound nitrogen	total nitrogen	total phosphate	total potash
all tillage		*126*	*24*	*149*	*55*	*67*
	revised estimate	124	24	148	55	67
all grass		*54*	*69*	*123*	*25*	*35*
	revised estimate	52	68	120	24	34
all crops and grass		*88*	*47*	*136*	*39*	*50*
	revised estimate	85	48	133	39	49

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). Non-post-stratified estimates are based on BSFP area estimates of tillage and grass areas.

Consideration is now being given to the regular inclusion of the adjusted estimates 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 this main section, although they do moderate the estimate of the overall rates of total nitrogen on grass and of straight nitrogen on all tillage and grass.

SECTION D - TABLES

CONTENTS

The numbering of these tables corresponds to the numbering used in the 1993 - 1997 BSFP Reports

GREAT BRITAIN TABLES 1997

ENGLAND AND WALES TABLES 1997

SCOTLAND TABLES 1997

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

Table GB1.1 Total fertiliser use, Great Britain 1997

	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	99	61	61	10	131	38	46	130	23	28	47
Winter wheat	100	78	75	13	193	68	75	192	53	56	2271
Spring barley	99	90	92	28	96	57	64	95	51	59	498
Winter barley	99	89	89	16	144	65	78	143	58	70	1016
Oats	98	88	90	14	110	59	67	108	52	60	142
Rye/Triticale	98	79	92	17	138	68	71	135	54	65	22
Seed potatoes	74	74	74	27	109	188	174	80	139	128	15
Early potatoes	85	85	85	17	179	222	199	152	188	168	11
2nd Early/Maincrop potatoes	92	93	93	33	184	186	267	169	173	249	209
Sugar Beet	98	79	93	25	112	63	143	110	50	133	326
Spring oilseed rape	99	81	81	25	120	64	77	118	51	63	82
Winter oilseed rape	100	80	77	11	215	64	70	215	52	54	458
Linseed	96	49	38	3	71	62	62	68	30	24	118
Forage maize	90	82	58	87	63	70	111	57	57	64	153
Rootcrops for stockfeed	96	88	93	45	81	84	92	78	74	86	107
Leafy forage crops	94	78	81	38	90	54	51	84	42	41	65
Arable silage/other fodder crops	80	95	100	31	109	49	74	87	46	74	21
Peas - human consumption	2	34	44	7	12	61	81	0	21	36	72
Peas - animal consumption	8	54	53	9	54	64	75	4	34	40	141
Beans - animal consumption	7	53	55	10	25	64	71	2	34	39	121
Vegetables (brassicae)	100	64	74	23	145	59	140	145	38	104	56
Vegetables (other)	84	58	76	30	135	89	127	113	52	96	70
Soft fruit	66	48	52	24	64	62	87	43	30	45	22
Top fruit	82	68	55	5	64	37	56	52	25	31	66
Other tillage	42	33	34	25	122	70	219	52	23	74	78
All tillage	94	80	78	19	159	69	85	149	55	67	6187
Grass under 5 years	89	71	71	41	168	40	63	149	29	45	1236
Grass 5 years and over	85	69	69	45	132	34	46	113	23	31	2493
All grass	86	70	69	44	142	36	51	123	25	35	3729
All crops & grass	90	74	74	32	151	53	68	136	39	50	9916

Source: British Survey of Fertiliser Practice 1997

Table GB1.2 Use of straight fertiliser, Great Britain 1997

	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	91	•	•	111	•	•	101	•	•	47
Winter wheat	97	7	5	185	85	87	179	6	4	2271
Spring barley	57	2	5	71	106	67	40	2	4	498
Winter barley	92	4	5	138	83	87	127	3	5	1016
Oats	72	1	2	103	90	98	74	1	2	142
Rye/Triticale	91	•	13	137	•	75	125	•	10	22
Seed potatoes	32	•	23	38	•	147	12	•	34	15
Early potatoes	7	7	7	171	251	289	12	18	21	11
2nd Early/Maincrop potatoes	30	3	11	101	147	227	30	4	25	209
Sugar Beet	86	2	19	100	102	137	85	2	26	326
Spring oilseed rape	71	7	10	114	77	135	81	5	13	82
Winter oilseed rape	97	5	4	202	82	103	196	4	4	458
Linseed	87	7	5	65	86	91	57	6	5	118
Forage maize	34	6	28	71	67	131	25	4	37	153
Rootcrops for stockfeed	28	1	7	102	259	102	29	3	7	107
Leafy forage crops	33	6	4	79	116	105	26	7	4	65
Arable silage/other fodder crops	16	•	6	134	•	150	21	•	9	21
Peas - human consumption	•	•	10	•	•	116	•	•	11	72
Peas - animal consumption	1	7	8	202	79	112	3	5	9	141
Beans - animal consumption	2	6	6	65	86	92	1	5	5	121
Vegetables (brassicae)	42	•	•	105	•	•	44	•	•	56
Vegetables (other)	57	•	8	83	•	146	47	•	11	70
Soft fruit	27	2	5	80	90	106	22	2	6	22
Top fruit	63	25	20	49	51	48	31	13	9	66
Other tillage	37	•	10	120	•	147	44	•	15	78
All tillage	80	5	7	156	85	107	126	4	7	6187
Grass under 5 years	52	1	2	137	99	106	72	1	2	1236
Grass 5 years and over	38	2	2	124	86	95	47	1	2	2493
All grass	42	2	2	129	89	98	54	1	2	3729
All crops & grass	60	3	4	146	86	105	88	3	4	9916

Source: British Survey of Fertiliser Practice 1997

Table GB1.3 Use of compound fertiliser, Great Britain 1997

	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	49	61	61	59	38	46	29	23	28	47
Winter wheat	26	73	71	49	66	73	13	48	52	2271
Spring barley	79	90	90	69	55	62	54	49	56	498
Winter barley	31	86	85	49	64	77	15	55	65	1016
Oats	46	87	88	74	59	66	34	51	58	142
Rye/Triticale	28	79	79	36	68	70	10	54	56	22
Seed potatoes	67	74	50	101	188	187	68	139	94	15
Early potatoes	77	77	77	180	219	190	140	170	147	11
2nd Early/Maincrop potatoes	87	91	90	160	185	249	139	169	224	209
Sugar Beet	30	77	76	82	62	140	25	47	107	326
Spring oilseed rape	57	74	74	65	62	67	37	46	49	82
Winter oilseed rape	39	77	74	47	62	67	18	47	49	458
Linseed	27	43	33	43	58	58	12	25	19	118
Forage maize	79	77	34	41	69	79	32	53	27	153
Rootcrops for stockfeed	74	88	89	67	80	88	49	70	78	107
Leafy forage crops	75	76	76	77	46	48	58	35	37	65
Arable silage/other fodder crops	70	95	94	94	49	69	66	46	65	21
Peas - human consumption	2	34	34	12	61	71	0	21	24	72
Peas - animal consumption	6	47	46	22	62	67	1	29	31	141
Beans - animal consumption	6	48	50	13	60	67	1	29	34	121
Vegetables (brassicae)	71	64	74	141	59	140	101	38	104	56
Vegetables (other)	53	58	71	125	89	120	66	52	85	70
Soft fruit	41	46	47	51	60	84	21	28	39	22
Top fruit	48	48	36	44	26	59	21	12	21	66
Other tillage	18	33	34	41	70	176	7	23	59	78
All tillage	38	76	73	63	67	81	24	51	60	6187
Grass under 5 years	70	71	71	110	39	61	77	27	43	1236
Grass 5 years and over	68	68	68	97	32	44	66	22	30	2493
All grass	68	69	69	101	34	49	69	23	33	3729
All crops & grass	54	72	71	88	51	65	47	37	46	9916

Source: British Survey of Fertiliser Practice 1997

Table GB1.4 Use of lime, Great Britain 1997

	Crop area receiving dressing (%)					Average field rate of CaO equivalent (tonne/ha)					Fields in sample
	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	
Spring wheat	2.3	•	•	•	2.3	1.1	•	•	•	1.1	47
Winter wheat	7.3	0.5	0.5	0.5	8.8	1.2	0.7	1.6	0.7	4.1	2271
Spring barley	9.9	0.8	0.6	0.8	11.9	0.8	0.8	0.4	0.8	2.8	498
Winter barley	9.5	0.7	0.4	0.7	11.2	0.9	1.0	1.7	1.0	4.5	1016
Oats	10.7	7.1	•	7.1	24.8	1.1	0.8	•	0.8	2.8	142
Rye/Triticale	14.6	•	•	•	14.6	1.2	•	•	•	1.2	22
Seed potatoes	•	•	•	•	•	•	•	•	•	•	15
Early potatoes	•	•	•	•	•	•	•	•	•	•	11
2nd Early/Maincrop potatoes	0.8	1.5	0.9	1.5	4.7	1.3	1.0	3.2	1.0	6.6	209
Sugar Beet	18.3	•	3.4	•	21.7	1.4	•	1.9	•	3.3	326
Spring oilseed rape	3.9	3.1	•	3.1	10.2	0.6	0.9	•	0.9	2.5	82
Winter oilseed rape	11.4	0.8	0.2	0.8	13.3	1.1	0.5	4.6	0.5	6.7	458
Linseed	4.0	•	•	•	4.0	0.7	•	•	•	0.7	118
Forage maize	27.0	•	•	•	27.0	0.7	•	•	•	0.7	153
Rootcrops for stockfeed	14.4	•	•	•	14.4	0.7	•	•	•	0.7	107
Leafy forage crops	11.6	1.4		1.4	14.5	1.2	0.1	•	0.1	1.3	65
Arable silage/other fodder crops	12.4	•	•	•	12.4	1.1	•	•	•	1.1	21
Peas - human consumption	2.5	2.8	•	2.8	8.2	2.8	0.3	•	0.3	3.4	72
Peas - animal consumption	6.2	•	•	•	6.2	0.8	•	•	•	0.8	141
Beans - animal consumption	6.8	0.7	•	0.7	8.3	1.4	0.8	•	0.8	2.9	121
Vegetables (brassicae)	2.2	•	•	•	2.2	1.1	•	•	•	1.1	56
Vegetables (other)	8.3	•	•	•	8.3	1.8	•	•	•	1.8	70
Soft fruit	•	•	•	•	•	•	•	•	•	•	22
Top fruit	5.1	•	•	•	5.1	1.3	•	•	•	1.3	66
Other tillage	0.2	•	•	•	0.2	2.4	•	•	•	2.4	78
All tillage	9.0	0.7	0.5	0.7	10.9	1.1	0.8	1.7	0.8	4.3	6187
Grass under 5 years	8.2	0.5	•	0.5	9.3	0.9	0.8	•	0.8	2.4	1236
Grass 5 years and over	6.0	1.7	0.1	1.7	9.4	0.9	0.5	0.5	0.5	2.4	2493
All grass	6.6	1.4	0.0	1.4	9.4	0.9	0.5	0.5	0.5	2.4	3729
All crops and grass	7.8	1.0	0.3	1.0	10.1	1.0	0.6	1.6	0.6	3.8	9916

Source: British Survey of Fertiliser Practice 1997

Table GB3.0 Product and nutrient use by month of application, Great Britain 1997

(a) Product use

row%	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total product ('000 tonnes)
Straight N	0	5	34	38	11	5	3	3	1	0	0	0	2272
Straight P	2	5	15	14	9	1	3	3	20	19	5	3	57
Straight K	9	12	18	14	3	1	1	3	8	9	8	14	85
Compounds	1	4	26	20	10	8	5	4	8	10	3	1	2758
All fertilisers	1	4	29	28	10	6	4	3	5	6	2	1	5173

(b) Nutrient use

row%	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total nutrient ('000 tonnes)
N	0	4	33	34	12	7	5	3	1	1	0	0	1198
P_2O_5	2	5	24	17	6	3	3	4	14	18	3	2	347
K_2O	3	6	22	15	7	6	4	4	11	16	4	3	444
Total	**1**	**5**	**29**	**27**	**10**	**6**	**4**	**3**	**6**	**7**	**1**	**1**	**1989**

Note: 'product use' refers to total tonnage of the products used by farmers in the survey year 1997
'nutrient use' refers to the tonnage of each nutrient contained in the products used (eg 100 kg of a 20:10:10 compound contains 20 kg of N, 10kg 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 1997

Table EW1.1 Total fertiliser use, England and Wales 1997

	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	99	60	60	10	129	38	45	128	23	27	46
Winter wheat	100	77	74	13	192	67	74	191	52	54	2202
Spring barley	97	79	84	21	93	50	63	91	40	53	319
Winter barley	99	88	89	14	142	64	78	141	57	69	951
Oats	98	86	88	12	113	59	68	111	51	60	122
Rye/Triticale	98	76	91	2	128	67	70	125	51	64	19
Seed potatoes	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	92	93	94	30	186	191	274	171	178	257	192
Sugar Beet	98	79	93	25	112	63	143	110	50	133	326
Spring oilseed rape	99	72	73	30	135	69	89	133	49	65	60
Winter oilseed rape	100	79	76	9	214	65	71	214	51	54	428
Linseed	96	49	38	3	72	63	63	69	31	24	117
Forage maize	90	82	58	87	63	70	111	57	57	64	153
Rootcrops for stockfeed	93	80	89	42	84	61	84	79	49	75	59
Leafy forage crops	92	71	74	35	84	44	48	77	31	35	50
Arable silage/other fodder crops	70	93	100	36	99	49	85	69	45	85	11
Peas - human consumption	2	35	45	7	12	61	81	•	22	37	70
Peas - animal consumption	8	53	53	9	54	64	75	4	34	40	139
Beans - animal consumption	7	53	55	10	25	64	71	2	34	39	121
Vegetables (brassicae)	100	77	92	3	160	49	137	160	38	126	50
Vegetables (other)	81	59	80	23	149	84	125	121	49	100	62
Soft fruit	60	39	43	29	69	68	104	41	26	44	21
Top fruit	81	66	53	5	66	39	59	54	26	31	65
Other tillage	42	33	34	25	122	70	219	52	23	74	78
All tillage	93	78	76	17	163	68	86	151	53	66	5676
Grass under 5 years	87	66	67	39	172	41	65	149	27	44	1012
Grass 5 years and over	84	67	67	44	134	33	47	113	22	32	2205
All grass	85	67	67	43	145	35	52	123	24	35	3217
All crops & grass	89	72	72	30	154	53	70	137	38	50	8893

Source: British Survey of Fertiliser Practice 1997

Table EW1.2 Use of straight fertiliser, England and Wales 1997

	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	91	•	•	110	•	•	100	•	•	46
Winter wheat	97	7	4	185	85	88	179	6	4	2202
Spring barley	59	1	6	85	129	84	50	1	5	319
Winter barley	92	3	6	137	85	86	127	3	5	951
Oats	74	1	3	105	90	98	78	1	2	122
Rye/Triticale	90	•	15	128	•	75	115	•	11	19
Seed potatoes	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	31	3	13	99	147	227	31	4	28	192
Sugar Beet	86	2	19	100	102	137	85	2	26	326
Spring oilseed rape	87	10	15	122	77	135	105	8	20	60
Winter oilseed rape	97	5	5	203	82	103	197	4	5	428
Linseed	88	7	5	65	86	91	57	6	5	117
Forage maize	34	6	28	71	67	131	25	4	37	153
Rootcrops for stockfeed	41	0	12	106	375	102	44	2	12	59
Leafy forage crops	38	4	5	80	116	117	30	4	6	50
Arable silage/other fodder crops	13	•	9	80	•	150	11	•	13	11
Peas - human consumption	•	•	10	•	•	116	•	•	12	70
Peas - animal consumption	1	7	8	202	79	112	3	5	9	139
Beans - animal consumption	2	6	6	65	86	92	1	5	5	121
Vegetables (brassicae)	20	•	•	159	•	•	31	•	•	50
Vegetables (other)	55	•	9	88	•	146	49	•	13	62
Soft fruit	32	3	6	80	90	106	26	2	7	21
Top fruit	66	27	21	49	51	48	33	14	10	65
Other tillage	37	•	10	120	•	147	44	•	15	78
All tillage	82	5	7	160	84	110	131	4	8	5676
Grass under 5 years	55	1	2	143	97	104	78	1	2	1012
Grass 5 years and over	39	1	2	129	87	102	50	1	2	2205
All grass	43	1	2	134	89	103	58	1	2	3217
All crops & grass	62	3	4	151	86	109	94	3	5	8893

Source: British Survey of Fertiliser Practice 1997

Table EW1.3 Use of compound fertiliser, England and Wales 1997

	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	47	60	60	59	38	45	28	23	27	46
Winter wheat	24	72	70	50	65	72	12	46	51	2202
Spring barley	61	78	79	68	49	61	41	39	48	319
Winter barley	28	86	85	50	63	76	14	54	64	951
Oats	40	85	87	81	59	67	33	50	58	122
Rye/Triticale	26	76	76	40	67	70	10	51	53	19
Seed potatoes	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	86	91	90	163	190	254	141	173	229	192
Sugar Beet	30	77	76	82	62	140	25	47	107	326
Spring oilseed rape	38	63	62	73	67	73	27	42	45	60
Winter oilseed rape	35	76	73	46	62	67	16	47	49	428
Linseed	27	43	33	43	58	59	12	25	19	117
Forage maize	79	77	34	41	69	79	32	53	27	153
Rootcrops for stockfeed	57	80	82	61	59	76	35	47	63	59
Leafy forage crops	67	68	69	70	40	43	47	27	30	50
Arable silage/other fodder crops	58	93	91	100	49	79	58	45	72	11
Peas - human consumption	2	35	35	12	61	71	•	22	25	70
Peas - animal consumption	6	47	45	22	62	67	1	29	30	139
Beans - animal consumption	6	48	50	13	60	67	1	29	34	121
Vegetables (brassicae)	88	77	92	147	49	137	129	38	126	50
Vegetables (other)	53	59	74	137	84	117	72	49	87	62
Soft fruit	30	36	37	53	66	103	16	24	38	21
Top fruit	45	45	33	47	27	63	21	12	21	65
Other tillage	18	33	34	41	70	176	7	23	59	78
All tillage	32	73	71	63	66	82	20	49	58	5676
Grass under 5 years	64	65	66	111	39	63	71	25	42	1012
Grass 5 years and over	66	67	67	96	32	45	63	21	30	2205
All grass	65	66	67	100	34	50	65	22	33	3217
All crops & grass	49	70	69	88	51	66	43	35	46	8893

Source: British Survey of Fertiliser Practice 1997

Table EW1.4 Use of lime, England and Wales 1997

	Crop area receiving dressing (%)					Average field rate of CaO equivalent (tonne/ha)					Fields in sample
	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	
Spring wheat	2.4	•	•	•	2.4	1.1	•	•	•	1.1	46
Winter wheat	7.7	0.5	0.5	0.5	9.3	1.2	0.7	1.6	0.7	4.1	2202
Spring barley	10.0	1.6	1.2	1.6	14.4	0.8	0.8	0.4	0.8	2.7	319
Winter barley	9.4	0.7	0.4	0.7	11.3	0.9	1.0	1.7	1.0	4.5	951
Oats	11.9	8.1	•	8.1	28.0	1.1	0.8	•	0.8	2.8	122
Rye/Triticale	17.2	•	•	•	17.2	1.2	•	•	•	1.2	19
Seed potatoes	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	0.8	1.7	1.0	1.7	5.2	1.4	1.0	3.2	1.0	6.7	192
Sugar Beet	18.3	•	3.4	•	21.7	1.4	•	1.9	•	3.3	326
Spring oilseed rape	5.2	4.6	•	4.6	14.3	0.6	0.9	•	0.9	2.4	60
Winter oilseed rape	12.1	0.9	0.3	0.9	14.0	1.1	0.5	4.6	0.5	6.7	428
Linseed	4.0	•	•	•	4.0	0.7	•	•	•	0.7	117
Forage maize	27.0	•	•	•	27.0	0.7	•	•	•	0.7	153
Rootcrops for stockfeed	12.6	•	•	•	12.6	0.7	•	•	•	0.7	59
Leafy forage crops	7.8	1.9	•	1.9	11.6	1.0	0.1	•	0.1	1.2	50
Arable silage/other fodder crops	12.9	•	•	•	12.9	0.9	•	•	•	0.9	11
Peas - human consumption	2.6	2.9	•	2.9	8.4	2.8	0.3	•	0.3	3.4	70
Peas - animal consumption	6.2	•	•	•	6.2	0.8	•	•	•	0.8	141
Beans - animal consumption	6.8	0.7	•	0.7	8.3	1.4	0.8	•	0.8	2.9	121
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	50
Vegetables (other)	7.2	•	•	•	7.2	2.3	•	•	•	2.3	62
Soft fruit	•	•	•	•	•	•	•	•	•	•	21
Top fruit	5.4	•	•	•	5.4	1.3	•	•	•	1.3	65
Other tillage	0.2	•	•	•	0.2	2.4	•	•	•	2.4	78
All tillage	9.3	0.8	0.6	0.8	11.4	1.1	0.8	1.7	0.8	4.3	5676
Grass under 5 years	8.5	0.7	•	0.7	9.9	0.9	0.8	•	0.8	2.4	1012
Grass 5 years and over	5.6	1.7	0.1	1.7	9.0	0.8	0.5	0.5	0.5	2.4	2205
All grass	6.4	1.4	0.0	1.4	9.2	0.9	0.6	0.5	0.6	2.5	3217
All crops and grass	7.8	1.1	0.3	1.1	10.3	1.0	0.6	1.6	0.6	3.9	8893

Source: British Survey of Fertiliser Practice 1997

Table EW1.5 Percentage of crop area by field application rate – N, England and Wales 1997

row %	0	<25	25-	50-	75-	kg/ha 100-	125-	150-	200-	250-	300-	400+	Fields in sample
Spring wheat	1	•	11	7	2	20	22	36	•	•	•	•	46
Winter wheat	•	•	1	1	2	2	9	38	38	6	2	•	2202
Spring barley	2	•	9	21	24	27	13	4	•	•	•	•	319
Winter barley	1	1	2	2	10	20	20	37	6	1	•	1	951
Oats	2	•	1	9	34	20	10	22	•	1	•	•	122
Rye/Triticale	2	•	•	6	5	32	33	21	•	•	•	•	19
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	8	2	2	5	1	2	4	38	32	2	4	1	192
Sugar Beet	2	1	7	6	19	27	28	9	2	•	•	•	326
Spring oilseed rape	1	•	5	6	7	18	34	23	5	•	2	•	60
Winter oilseed rape	•	•	•	3	1	•	3	25	48	15	3	•	428
Linseed	4	4	20	30	30	8	3	2	•	•	•	•	117
Forage maize	10	27	9	17	19	13	3	2	•	•	•	•	153
Rootcrops for stockfeed	7	5	17	20	18	22	2	6	4	•	•	•	59
Leafy forage crops	8	3	10	26	24	7	15	6	•	•	•	•	50
Arable silage/other fodder crop	30	2	1	1	42	13	11	•	•	•	•	•	11
Peas - human consumption	98	2	•	•	•	•	•	•	•	•	•	•	70
Peas - animal consumption	92	6	•	1	•	•	•	•	1	•	•	•	139
Beans - animal consumption	93	6	•	2	•	•	•	•	•	•	•	•	121
Vegetables (brassicae)	•	•	1	25	4	•	11	24	17	15	2	•	50
Vegetables (other)	19	•	8	1	12	2	9	28	16	2	1	•	62
Soft fruit	40	1	17	31	2	•	1	7	•	•	•	•	21
Top fruit	19	4	24	7	38	8	1	•	•	•	•	•	65
Other tillage	58	•	8	4	4	2	12	11	•	1	•	•	78
All tillage	7	1	3	4	8	9	11	28	23	4	1	•	5676
Grass under 5 years	13	1	8	9	10	8	7	11	13	10	9	2	1012
Grass 5 years and over	56	2	12	16	9	6	8	11	7	6	5	1	2205
All grass	15	1	11	14	10	7	8	11	9	7	6	2	3217
All crops & grass	13	1	7	9	8	8	9	19	15	5	3	1	9387

Source: British Survey of Fertiliser Practice 1997

Table EW1.6 Percentage of crop area by field application rate – P_2O_5, England and Wales 1997

row %	kg/ha												Fields in sample
	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	
Spring wheat	40	22	20	13	4	.	.	.	.	.	.	.	46
Winter wheat	23	4	10	35	24	4	.	.	.	.	.	.	2202
Spring barley	21	10	31	23	13	1	.	1	.	.	.	.	319
Winter barley	12	4	15	39	25	3	.	1	.	.	.	.	951
Oats	14	5	22	27	30	1	.	.	.	.	.	.	122
Rye/Triticale	24	2	20	19	35	.	.	.	.	.	.	.	19
Seed potatoes	.	.	.	.	.	.	.	.	.	.	.	.	6
Early potatoes	.	.	.	.	.	.	.	.	.	.	.	.	9
2nd Early/Maincrop potatoes	7	2	.	6	6	7	4	23	26	14	5	.	192
Sugar Beet	21	5	21	35	9	4	2	2	.	.	.	.	326
Spring oilseed rape	28	2	11	30	21	7	.	1	.	.	.	.	60
Winter oilseed rape	21	4	13	36	22	3	1	.	.	.	.	.	428
Linseed	51	2	10	24	9	3	.	.	.	.	.	.	117
Forage maize	18	5	7	43	20	4	1	.	2	.	.	.	153
Rootcrops for stockfeed	20	10	32	17	13	7	1	1	.	.	.	.	59
Leafy forage crops	29	13	37	14	1	5	.	1	.	.	.	.	50
Arable silage/other fodder crop	7	29	14	49	1	.	.	.	.	.	.	.	11
Peas - human consumption	65	.	10	17	6	1	.	.	.	.	.	.	70
Peas - animal consumption	47	1	10	23	16	2	.	.	.	.	.	.	139
Beans - animal consumption	47	.	10	29	12	3	.	.	.	.	.	.	121
Vegetables (brassicae)	23	23	13	30	3	4	4	.	.	.	.	.	50
Vegetables (other)	41	.	8	29	3	9	3	8	.	.	.	.	62
Soft fruit	61	3	2	4	29	.	.	.	.	.	.	.	21
Top fruit	34	32	19	6	2	7	.	.	.	.	.	.	65
Other tillage	67	4	9	3	14	3	.	.	1	.	.	.	78
All tillage	22	4	13	33	21	4	1	1	1	.	.	.	5676
Grass under 5 years	34	18	30	12	3	1	.	.	.	.	.	.	1012
Grass 5 years and over	33	27	28	8	3	1	.	.	.	.	.	.	2205
All grass	33	24	28	9	3	1	.	.	.	.	.	.	3217
All crops & grass	29	14	20	20	11	2	.	1	1	.	.	.	9387

Source: British Survey of Fertiliser Practice 1997

Table EW1.7 Percentage of crop area by field application rate – K_2O, England and Wales 1997

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
Spring wheat	40	21	16	9	10	3	•	•	•	•	•	•	46
Winter wheat	26	3	9	27	24	9	2	1	•	•	•	•	2202
Spring barley	16	4	28	23	17	9	2	1	•	•	•	•	319
Winter barley	11	1	12	28	31	11	2	3	•	•	•	•	951
Oats	12	5	17	26	31	8	1	•	1	•	•	•	122
Rye/Triticale	9	•	17	25	49	•	•	•	•	•	•	•	19
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	6
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	9
2nd Early/Maincrop potatoes	6	•	1	1	3	6	2	5	11	29	27	9	192
Sugar Beet	7	•	3	8	14	18	12	24	9	3	2	1	326
Spring oilseed rape	27	•	9	21	19	17	•	3	4	•	•	•	60
Winter oilseed rape	24	4	12	28	19	9	2	1	•	•	•	•	428
Linseed	62	1	10	16	8	3	•	•	•	•	•	•	117
Forage maize	42	2	3	12	12	4	4	17	5	•	•	•	153
Rootcrops for stockfeed	11	13	12	17	9	24	5	9	•	1	•	•	59
Leafy forage crops	26	9	37	17	4	7	•	•	•	•	•	•	50
Arable silage/other fodder crop	•	29	12	26	1	•	•	32	•	•	•	•	11
Peas - human consumption	55	•	4	17	18	1	2	3	•	•	•	•	70
Peas - animal consumption	47	•	10	17	17	5	2	1	1	•	•	•	139
Beans - animal consumption	45	1	6	28	13	7	•	•	•	•	•	•	121
Vegetables (brassicae)	8	23	2	•	2	11	•	27	26	1	•	•	50
Vegetables (other)	20	•	1	21	4	19	17	8	7	3	1	•	62
Soft fruit	57	4	•	1	13	0	24	•	•	•	•	•	21
Top fruit	47	18	13	•	10	11	1	•	•	•	•	•	65
Other tillage	66	•	•	2	2	3	•	4	1	19	2	•	78
All tillage	24	3	10	23	21	9	2	4	1	1	1	•	5676
Grass under 5 years	33	13	17	14	9	6	4	3	1	•	•	•	1012
Grass 5 years and over	33	23	23	8	6	3	2	2	•	•	•	•	2205
All grass	33	20	22	10	6	4	3	2	•	•	•	•	3217
All crops & grass	30	11	16	16	14	6	2	3	1	1	•	•	9387

Source: British Survey of Fertiliser Practice 1997

Table EW2.1 Average fertiliser practice by grassland utilisation, England and Wales 1997

	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	78	59	57	27	123	30	32	97	18	18	1678
Grazed - mown	94	78	81	63	161	40	67	151	31	54	1267
All grazings	85	66	67	42	140	35	49	119	23	33	2945
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	1
Cut for seed not grazed	100	69	69	•	128	71	83	128	49	57	11
All cut for seed	100	78	78	•	134	86	93	134	67	73	12
Cut for silage grazed	96	80	83	67	178	43	73	170	34	61	957
Cut for silage not grazed	100	82	91	65	221	41	91	220	34	83	184
All cut for silage	96	80	85	66	184	43	76	178	34	64	1141
Cut for hay grazed	85	68	69	57	93	31	38	79	21	26	389
Cut for hay not grazed	80	58	58	58	90	32	45	71	19	26	72
All cut for hay	85	67	68	58	93	31	38	79	21	26	461
All mowings	94	77	81	63	167	40	70	157	31	57	1511
All grass	85	67	67	43	145	35	52	123	24	35	3217

Source: British Survey of Fertiliser Practice 1997

Table EW2.2 Percentage of grass area by field application rate – N, England and Wales 1997

row %	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
						kg/ha							
Grazed - not mown	26	2	14	15	9	6	6	8	3	4	5	1	1678
Grazed - mown	5	1	7	13	10	7	10	14	16	10	8	1	1267
All grazings	18	2	11	14	9	6	8	10	8	6	6	1	2945
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	1
Cut for seed not grazed	•	•	10	3	•	56	•	27	4	•	•	•	11
All cut for seed	•	•	8	3	•	47	•	39	3	•	•	•	12
Cut for silage grazed	3	1	6	10	8	6	10	15	18	12	9	1	957
Cut for silage not grazed	1	•	4	3	3	8	4	17	25	12	21	2	184
All cut for silage	2	1	6	9	7	6	9	16	19	12	11	1	1141
Cut for hay grazed	13	2	12	26	12	8	12	8	6	1	•	•	389
Cut for hay not grazed	19		35	9	7	7	3	14	3	4	•	•	72
All out for hay	14	2	15	24	11	8	11	9	6	1	•	•	461
All mowings	5	1	7	11	9	7	9	14	16	10	9	1	1511
All grass	17	2	11	14	9	6	8	10	9	7	7	1	3217

Source: British Survey of Fertiliser Practice 1997

Table EW2.3 Percentage of grass area by field application rate – P_2O_5, England and Wales 1997

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
Grazed - not mown	46	24	21	6	1	.	.	.	.	.	.	.	1678
Grazed - mown	24	20	32	15	5	2	1	1	1	.	.	.	1267
All grazings	38	22	25	9	3	1	.	1	.	.	.	.	2945
Cut for seed grazed	.	.	.	.	.	.	.	.	.	.	.	.	1
Cut for seed not grazed	42	.	.	16	34	8	.	.	.	.	.	.	11
All cut for seed	35	.	.	13	29	23	.	.	.	.	.	.	12
Cut for silage grazed	22	18	32	17	6	2	1	1	1	.	.	.	957
Cut for silage not grazed	25	15	30	22	4	1	2	.	1	.	.	.	184
All cut for silage	23	18	32	18	5	2	1	1	1	.	.	.	1141
Cut for hay grazed	32	27	26	7	2	1	2	1	2	.	.	.	389
Cut for hay not grazed	32	33	20	16	.	.	.	.	.	.	.	.	72
All cut for hay	32	28	25	8	2	1	1	1	2	.	.	.	461
All mowings	25	20	31	16	5	2	1	1	1	.	.	.	1511
All grass	38	22	25	10	3	1	.	1	.	.	.	.	3217

Source: British Survey of Fertiliser Practice 1997

Table EW2.4 Percentage of grass area by field application rate – K_2O, England and Wales 1997

row %	kg/ha 0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
Grazed - not mown	50	22	19	6	2	1	•	•	•	•	•	•	1678
Grazed - mown	20	15	22	13	12	7	6	4	1	1	•	•	1267
All grazings	39	19	20	9	6	3	3	2	•	•	•	•	2945
Cut for seed grazed	•	•	•	•	•	100	•	•	•	•	•	•	1
Cut for seed not grazed	42	•	•	16	8	35	•	•	•	•	•	•	11
All cut for seed	35	•	•	13	6	46	•	•	•	•	•	•	12
Cut for silage grazed	18	13	21	14	13	8	7	5	1	1	•	•	957
Cut for silage not grazed	11	6	9	22	12	13	7	15	4	•	•	•	184
All cut for silage	17	12	19	15	13	8	7	6	2	1	•	•	1141
Cut for hay grazed	30	27	24	11	5	1	•	•	•	1	•	•	389
Cut for hay not grazed	32	32	10	10	10	6	•	•	•	•	•	•	72
All cut for hay	30	27	22	11	6	2	•	•	•	1	•	•	461
All mowings	19	14	20	14	11	7	6	5	1	1	•	•	1511
All grass	37	19	19	9	6	4	3	2	1	•	•	•	3217

Source: British Survey of Fertiliser Practice 1997

Table EW3.0 Product and nutrient use by month of application, England and Wales 1997

(a) Product use

row%	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total product ('000 tonnes)
Straight N	0	5	34	38	10	5	3	3	1	0	0	0	2078
Straight P	3	5	17	7	9	1	3	4	22	22	6	3	49
Straight K	9	12	17	14	3	1	1	3	8	10	8	14	82
Compounds	2	4	27	17	10	7	5	4	8	12	3	2	2276
All fertilisers	1	5	30	26	10	6	4	3	5	6	2	1	4484

(b) Nutrient use

row%	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total nutrient ('000 tonnes)
N	0	5	34	33	12	7	5	3	1	1	0	0	1043
P_2O_5	2	5	23	14	6	2	2	4	15	20	4	2	291
K_2O	3	6	22	12	7	6	4	4	12	18	4	3	383
Total	1	5	29	25	10	6	4	3	6	8	2	1	1717

Note: 'product use' refers to total tonnage of the products used by farmers in the survey year 1997
'nutrient use' refers to the tonnage of each nutrient contained in the products used (eg 100 kg of a 20:10:10 compound contains 20 kg of N, 10kg 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 1997

Table EW5.1 Average fertiliser practice on dairy farms, England and Wales 1997

	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	.	.	.	.	.	.	.	.	.	.	5
Winter wheat	99	73	75	34	164	60	75	163	44	56	114
Spring barley	92	83	86	80	79	36	41	72	30	35	30
Winter barley	100	85	89	46	125	62	72	125	52	64	62
Oats	.	.	.	.	.	.	.	.	.	.	9
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	2
Seed potatoes	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	5
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	7
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	4
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	93	86	57	90	59	72	111	55	62	64	99
Rootcrops for stockfeed	100	55	90	58	54	31	60	54	17	54	10
Leafy forage crops	95	85	95	85	83	36	43	79	30	41	12
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	4
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	0
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	2
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	2
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	0
Soft fruit	.	.	.	.	.	.	.	.	.	.	0
Top fruit	.	.	.	.	.	.	.	.	.	.	0
Other tillage	.	.	.	.	.	.	.	.	.	.	5
All tillage	94	80	74	59	110	62	81	104	50	60	374
Grass under 5 years	97	75	80	55	225	43	85	219	33	67	317
Grass 5 years and over	93	71	73	65	194	39	67	181	27	49	546
All grass	95	72	75	62	203	40	73	192	25	74	863
All crops & grass	94	74	75	61	187	44	74	177	33	55	1237

Source: British Survey of Fertiliser Practice 1997

Table EW5.2 Average fertiliser practice on cattle & sheep farms, England and Wales 1997

	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	91	77	99	44	162	74	81	147	57	80	29
Spring barley	90	86	89	43	88	44	48	79	38	43	45
Winter barley	100	94	96	35	121	60	63	121	56	61	52
Oats	77	77	77	59	89	53	54	68	41	42	10
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	1
Seed potatoes	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	4
Sugar Beet	.	.	.	.	.	.	.	.	.	.	1
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	0
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	6
Linseed	.	.	.	.	.	.	.	.	.	.	2
Forage maize	86	82	74	90	80	62	115	69	51	85	14
Rootcrops for stockfeed	91	91	91	51	78	70	87	71	63	79	20
Leafy forage crops	96	60	60	20	70	42	41	68	25	25	15
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	3
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	90	82	87	43	116	59	69	104	49	60	204
Grass under 5 years	77	64	62	40	99	35	39	76	22	24	294
Grass 5 years and over	78	70	69	38	83	28	31	65	20	21	1071
All grass	78	69	68	38	86	29	32	67	20	22	1365
All crops & grass	79	69	69	39	88	32	35	70	22	24	1569

Source: British Survey of Fertiliser Practice 1997

Table EW5.3 Average fertiliser practice on other livestock/mixed farms, England and Wales 1997

	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	.	.	.	.	.	.	.	.	.	.	7
Winter wheat	100	76	75	24	181	61	66	181	46	50	322
Spring barley	99	84	86	38	89	43	59	88	36	50	64
Winter barley	100	89	91	29	144	59	78	144	53	71	160
Oats	100	89	91	5	120	58	66	120	52	60	40
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	1
Seed potatoes	.	.	.	.	.	.	.	.	.	.	3
Early potatoes	.	.	.	.	.	.	.	.	.	.	4
2nd Early/Maincrop potatoes	100	100	100	30	185	149	231	185	149	231	22
Sugar Beet	87	77	82	33	101	73	132	88	56	108	17
Spring oilseed rape	92	62	70	44	128	64	112	118	39	79	10
Winter oilseed rape	100	68	72	22	207	38	50	207	26	36	53
Linseed	.	.	.	.	.	.	.	.	.	.	6
Forage maize	82	75	50	66	70	53	109	57	40	54	24
Rootcrops for stockfeed	79	85	88	55	81	80	91	64	68	80	17
Leafy forage crops	80	49	49	55	85	42	44	68	21	22	13
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	1
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	4
Peas - animal consumption	19	35	36	43	116	51	91	21	18	33	23
Beans - animal consumption	11	50	44	17	65	70	60	7	35	26	17
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	0
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	3
Soft fruit	.	.	.	.	.	.	.	.	.	.	2
Top fruit	.	.	.	.	.	.	.	.	.	.	3
Other tillage	27	9	9	.	43	240	240	11	21	21	10
All tillage	94	78	78	27	158	61	75	149	48	58	826
Grass under 5 years	85	60	63	25	183	39	62	156	23	39	189
Grass 5 years and over	85	57	55	34	140	40	48	119	22	27	236
All grass	85	58	58	31	156	39	54	133	23	31	425
All crops & grass	90	69	69	29	157	53	67	142	37	46	1251

Source: British Survey of Fertiliser Practice 1997

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/horticulture farms, England and Wales 1997

	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	99	39	39	8	128	46	58	127	18	23	33
Winter wheat	100	78	73	9	196	68	75	195	53	55	1737
Spring barley	99	76	82	3	98	56	71	97	42	58	180
Winter barley	99	88	88	6	145	66	80	143	58	70	677
Oats	98	87	87	8	114	61	72	112	53	62	63
Rye/Triticale	96	63	88	4	123	64	62	118	40	55	15
Seed potatoes	•	•	•	•	•	•	•	•	•	•	3
Early potatoes	•	•	•	•	•	•	•	•	•	•	5
2nd Early/Maincrop potatoes	92	94	95	29	188	197	281	173	185	266	161
Sugar Beet	99	79	94	24	113	62	144	112	49	135	308
Spring oilseed rape	100	72	72	28	134	71	87	134	51	62	43
Winter oilseed rape	100	81	76	7	215	68	74	214	55	56	365
Linseed	96	49	38	1	71	64	64	68	31	24	109
Forage maize	48	34	47	76	108	77	106	52	26	50	16
Rootcrops for stockfeed	100	85	88	17	109	54	92	109	45	81	12
Leafy forage crops	92	88	92	•	101	54	57	94	47	53	10
Arable silage/other fodder crops	•	•	•	•	•	•	•	•	•	•	3
Peas - human consumption	2	35	43	5	12	62	75	0	22	32	66
Peas - animal consumption	6	57	56	3	19	66	74	1	38	42	114
Beans - animal consumption	7	53	56	8	13	63	73	1	33	41	102
Vegetables (brassicae)	100	69	89	1	196	68	185	196	47	165	48
Vegetables (other)	81	58	79	23	151	84	125	122	49	99	59
Soft fruit	54	42	46	21	77	66	101	42	28	47	19
Top fruit	81	65	51	5	66	39	60	53	25	31	62
Other tillage	51	42	42	26	126	66	219	65	27	92	62
All tillage	93	77	76	10	171	71	90	158	55	68	4272
Grass under 5 years	83	50	52	11	155	49	65	129	25	34	212
Grass 5 years and over	84	49	50	15	138	39	58	116	19	29	352
All grass	84	49	51	14	144	43	61	121	21	31	564
All crops & grass	92	74	73	10	168	68	87	154	51	64	4836

Source: British Survey of Fertiliser Practice 1997

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

Table SC1.1 Total fertiliser use, Scotland 1997

	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	93	94	20	206	86	90	205	80	85	69
Spring barley	100	100	100	35	98	61	65	98	61	65	179
Winter barley	100	92	88	40	164	83	86	164	76	76	65
Oats	99	99	99	28	90	56	62	89	56	62	20
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	3
Seed potatoes	.	.	.	.	.	.	.	.	.	.	9
Early potatoes	.	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	90	90	90	54	167	152	210	150	136	189	17
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	100	99	99	14	88	56	59	88	55	58	22
Winter oilseed rape	100	90	90	38	232	59	60	232	53	53	30
Linseed	.	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	51	77	113	103	77	113	103	48
Leafy forage crops	100	100	100	48	104	73	58	104	73	58	15
Arable silage/other fodder crops	100	100	100	22	122	48	51	122	48	51	10
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	2
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	6
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	8
Soft fruit	.	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	99	95	94	33	136	73	78	134	69	74	511
Grass under 5 years	96	93	87	49	153	38	55	147	36	48	224
Grass 5 years and over	91	79	75	48	120	37	38	109	29	28	288
All grass	93	84	80	48	132	37	45	124	32	36	512
All crops & grass	95	88	85	42	134	52	59	128	46	50	1023

Source: British Survey of Fertiliser Practice 1997

Table SC1.2 Use of straight fertiliser, Scotland 1997

	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	.	.	.	.	.	.	.	.	.	1
Winter wheat	98	5	7	186	80	76	183	4	5	69
Spring barley	55	3	5	57	101	49	31	3	2	179
Winter barley	93	4	2	144	57	128	133	3	3	65
Oats	54	.	.	82	.	.	45	.	.	20
Rye/Triticale	.	.	.	.	.	.	.	.	.	3
Seed potatoes	.	.	.	.	.	.	.	.	.	9
Early potatoes	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	23	.	.	118	.	.	27	.	.	17
Sugar Beet	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	39	.	.	75	.	.	30	.	.	22
Winter oilseed rape	100	.	.	183	.	.	183	.	.	30
Linseed	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	7	3	.	68	228	.	5	6	.	48
Leafy forage crops	19	15	2	74	115	31	14	17	1	15
Arable silage/other fodder crops	20	.	.	203	.	.	41	.	.	10
Peas - human consumption	.	.	.	.	.	.	.	.	.	2
Peas - animal consumption	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	6
Vegetables (other)	.	.	.	.	.	.	.	.	.	8
Soft fruit	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	0
All tillage	67	3	4	121	90	68	82	3	3	511
Grass under 5 years	45	2	0	107	104	150	48	2	1	224
Grass 5 years and over	31	3	2	89	82	47	28	2	1	288
All grass	36	2	1	97	88	58	35	2	1	512
All crops & grass	48	3	2	110	89	65	53	2	2	1023

Source: British Survey of Fertiliser Practice 1997

Table SC1.3 Use of compound fertiliser, Scotland 1997

	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	.	.	.	.	.	.	.	.	.	1
Winter wheat	60	91	92	38	84	86	22	76	80	69
Spring barley	96	100	100	69	59	63	66	59	63	179
Winter barley	74	88	88	42	83	83	31	73	73	65
Oats	86	99	99	52	56	62	44	56	62	20
Rye/Triticale	.	.	.	.	.	.	.	.	.	3
Seed potatoes	.	.	.	.	.	.	.	.	.	9
Early potatoes	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	90	90	90	137	152	210	123	136	189	17
Sugar Beet	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	99	99	99	59	56	59	58	55	58	22
Winter oilseed rape	90	90	90	55	59	60	49	53	53	30
Linseed	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	72	107	103	72	107	103	48
Leafy forage crops	98	98	98	92	57	59	90	56	58	15
Arable silage/other fodder crops	93	100	100	88	48	51	81	48	51	10
Peas - human consumption	.	.	.	.	.	.	.	.	.	2
Peas - animal consumption	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	6
Vegetables (other)	.	.	.	.	.	.	.	.	.	8
Soft fruit	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	0
All tillage	83	94	94	63	71	76	52	67	71	511
Grass under 5 years	91	92	87	108	37	54	99	34	47	224
Grass 5 years and over	78	79	75	105	34	37	82	27	28	288
All grass	83	84	80	106	35	44	88	29	35	512
All crops & grass	83	88	85	89	50	57	74	44	49	1023

Source: British Survey of Fertiliser Practice 1997

Table SC1.4 Use of lime, Scotland 1997

	Crop area receiving dressing (%)					Average field rate of CaO equivalent (tonne/ha)					Fields in sample
	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	Ground chalk/ limestone	Magnesian limestone	Sugar beet waste	Other	All	
Spring wheat	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	1.4	•	•	•	1.4	0.5	•	•	•	0.5	69
Spring barley	9.7	•	•	•	9.7	0.8	•	•	•	0.8	179
Winter barley	9.8	•	•	•	9.8	1.0	•	•	•	1.0	65
Oats	2.2	•	•	•	2.2	1.0	•	•	•	1.0	20
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	3
Seed potatoes	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	•	•	•	•	•	•	•	•	•	•	2
2nd Early/Maincrop potatoes	1.0	•	•	•	1.0	0.8	•	•	•	0.8	17
Sugar Beet	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	1.3	•	•	•	1.3	1.0	•	•	•	1.0	22
Winter oilseed rape	3.0	•	•	•	3.0	0.7	•	•	•	0.7	30
Linseed	•	•	•	•	•	•	•	•	•	•	1
Forage maize	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	17.3	•	•	•	17.3	0.6	•	•	•	0.6	48
Leafy forage crops	23.1	•	•	•	23.1	1.3	•	•	•	1.3	15
Arable silage/other fodder crops	11.4	•	•	•	11.4	1.5	•	•	•	1.5	10
Peas - human consumption	•	•	•	•	•	•	•	•	•	•	2
Peas - animal consumption	•	•	•	•	•	•	•	•	•	•	2
Beans - animal consumption	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	6
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	8
Soft fruit	•	•	•	•	•	•	•	•	•	•	1
Top fruit	•	•	•	•	•	•	•	•	•	•	1
Other tillage	•	•	•	•	•	•	•	•	•	•	0
All tillage	7.2	•	•	•	7.2	0.8	•	•	•	0.8	511
Grass under 5 years	6.9	•	•	•	7.0	0.9	0.3	•	0.3	1.5	224
Grass 5 years and over	8.4	1.9	•	1.9	12.2	1.0	0.4	•	0.4	1.8	288
All grass	7.9	1.2	•	1.2	10.2	1.0	0.4	•	0.4	1.7	512
All crops and grass	7.6	0.7	•	0.7	9.0	0.9	0.4	•	0.4	1.7	1023

Source: British Survey of Fertiliser Practice 1997

Table SC1.5 Percentage of crop area by field application rate - N, Scotland 1997

row %	0	<25	25-	50-	75-	kg/ha 100-	125-	150-	200-	250-	300-	400+	Fields in sample
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	0	1	0	•	0	4	4	21	63	7	•	•	69
Spring barley	0	2	4	16	29	36	6	5	0	•	1	•	179
Winter barley	•	•	•	1	6	5	25	47	14	3	•	•	65
Oats	1	•	27	10	21	19	13	9	•	•	•	•	20
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	3
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	2
2nd Early/Maincrop potatoes	10	7	•	•	7	4	11	38	3	20	•	•	17
Sugar Beet	•	•	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	•	15	•	30	9	26	10	10	•	•	•	•	22
Winter oilseed rape	•	•	•	•	•	5	6	8	28	49	4	•	30
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	1
Forage maize	•	•	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	•	1	15	34	32	13	2	3	•	•	•	•	48
Leafy forage crops	•	•	16	12	24	22	8	18	•	•	•	•	15
Arable silage/other fodder crops	•	•	•	5	46	23	11	•	•	7	7	•	10
Peas - human consumption	•	•	•	•	•	•	•	•	•	•	•	•	2
Peas - animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	2
Beans - animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	6
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	•	•	8
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	1
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	1
Other tillage	•	•	•	•	•	•	•	•	•	•	•	•	0
All tillage	1	2	4	11	16	21	8	14	17	5	1	•	511
Grass under 5 years	4	0	6	10	15	15	10	11	17	3	7	2	224
Grass 5 years and over	9	0	10	25	15	9	8	11	7	4	2	1	288
All grass	7	0	8	19	15	11	9	11	11	3	4	1	512
All crops & grass	6	1	6	16	15	14	8	12	13	4	3	1	1099

Source: British Survey of Fertiliser Practice 1997

Table SC1.6 Percentage of crop area by field application rate - P_2O_5, Scotland 1997

row %	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
						kg/ha							
Spring wheat	•	•	•	•	•	•	•	•	•	•	•	•	1
Winter wheat	7	1	3	18	55	14	1	•	•	1	•	•	69
Spring barley	•	6	22	56	10	3	1	1	•	•	•	•	179
Winter barley	8	•	7	13	58	13	1	•	•	•	•	•	65
Oats	1	2	34	45	18	•	•	•	•	•	•	•	20
Rye/Triticale	•	•	•	•	•	•	•	•	•	•	•	•	3
Seed potatoes	•	•	•	•	•	•	•	•	•	•	•	•	9
Early potatoes	•	•	•	•	•	•	•	•	•	•	•	•	2
2nd Early/Maincrop potatoes	10	7	•	•	7	4	3	69	•	•	•	•	17
Sugar Beet	•	•	•	•	•	•	•	•	•	•	•	•	0
Spring oilseed rape	1	11	13	71	5	•	•	•	•	•	•	•	22
Winter oilseed rape	10	3	18	52	15	1	•	•	•	•	•	•	30
Linseed	•	•	•	•	•	•	•	•	•	•	•	•	1
Forage maize	•	•	•	•	•	•	•	•	•	•	•	•	0
Rootcrops for stockfeed	•	1	5	10	26	26	16	13	1	•	•	2	48
Leafy forage crops	•	21	27	15	15	6	•	17	•	•	•	•	15
Arable silage/other fodder crops	•	7	54	29	7	2	•	•	•	•	•	•	10
Peas - human consumption	•	•	•	•	•	•	•	•	•	•	•	•	2
Peas - animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	2
Beans - animal consumption	•	•	•	•	•	•	•	•	•	•	•	•	0
Vegetables (brassicae)	•	•	•	•	•	•	•	•	•	•	•	•	6
Vegetables (other)	•	•	•	•	•	•	•	•	•	•	•	•	8
Soft fruit	•	•	•	•	•	•	•	•	•	•	•	•	1
Top fruit	•	•	•	•	•	•	•	•	•	•	•	•	1
Other tillage	•	•	•	•	•	•	•	•	•	•	•	•	0
All tillage	5	4	15	38	25	7	2	3	•	•	•	•	511
Grass under 5 years	7	25	43	16	6	3	•	•	•	•	•	•	224
Grass 5 years and over	21	28	35	9	4	3	1	1	•	•	•	•	288
All grass	16	27	38	11	5	3	•	1	•	•	•	•	512
All crops & grass	13	18	29	21	12	4	1	2	•	•	•	•	1099

Source: British Survey of Fertiliser Practice 1997

Table SC1.7 Percentage of crop area by field application rate - K_2O, Scotland 1997

row %	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
						kg/ha							
Spring wheat	.	.	.	.	.	.	.	.	.	.	.	.	1
Winter wheat	7	1	3	18	55	14	1	.	.	1	.	.	69
Spring barley	.	6	22	56	10	3	1	1	.	.	.	.	179
Winter barley	8	.	7	13	58	13	1	.	.	.	.	.	65
Oats	1	2	34	45	18	.	.	.	.	.	.	.	20
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	.	.	3
Seed potatoes	37	.	.	.	.	9	6	35	13	.	.	.	9
Early potatoes	.	.	.	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	10	7	.	.	7	4	3	69	.	.	.	.	17
Sugar Beet	.	.	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	1	11	13	71	5	.	.	.	.	.	.	.	22
Winter oilseed rape	10	3	18	52	15	1	.	.	.	.	.	.	30
Linseed	.	.	.	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	.	1	5	10	26	26	16	13	1	.	.	2	48
Leafy forage crops	.	21	27	15	15	6	.	15	.	.	.	.	15
Arable silage/other fodder crops	.	7	54	29	7	2	.	.	.	.	.	.	10
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	.	.	2
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	.	.	6
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	.	.	8
Soft fruit	.	.	.	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	.	.	.	0
All tillage	5	4	15	38	25	7	2	3	.	.	.	.	511
Grass under 5 years	7	25	43	16	6	3	.	.	.	.	.	.	224
Grass 5 years and over	21	28	35	9	4	3	1	1	.	.	.	.	288
All grass	16	27	38	11	5	3	.	1	.	.	.	.	512
All crops & grass	13	18	29	21	12	4	1	2	.	.	.	.	1099

Source: British Survey of Fertiliser Practice 1997

Table SC2.1 Average fertiliser practice by grassland utilisation, Scotland 1997

	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	92	82	76	39	103	29	28	94	24	21	248
Grazed - mown	100	92	87	70	199	52	73	199	48	64	133
All grazings	93	84	78	46	127	35	39	118	29	31	381
Cut for seed grazed	.	.	.	.	.	.	.	.	.	.	0
Cut for seed not grazed	.	.	.	.	.	.	.	.	.	.	0
All cut for seed	.	.	.	.	.	.	.	.	.	.	0
Cut for silage grazed	100	94	94	81	222	57	80	222	53	76	103
Cut for silage not grazed	93	88	88	60	162	48	65	150	42	57	94
All cut for silage	96	91	91	71	192	52	73	185	48	66	197
Cut for hay grazed	99	86	69	42	124	41	57	122	35	40	37
Cut for hay not grazed	89	84	84	43	131	49	51	117	41	42	51
All cut for hay	93	85	78	43	128	46	53	119	39	41	88
All mowings	97	90	88	64	177	49	67	171	45	59	255
All grass	93	84	80	48	132	37	45	124	32	36	512

Source: British Survey of Fertiliser Practice 1997

Table SC2.2 Percentage of grass area by field application rate – N, Scotland 1997

row %	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
						kg/ha							
Grazed - not mown	7	•	13	24	18	11	7	13	5	•	2	•	248
Grazed - mown	0	•	4	2	9	9	4	15	23	23	6	4	133
All grazings	6	•	11	20	16	11	6	13	9	5	3	1	381
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for seed not grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for silage grazed	•	•	1	1	4	7	4	17	26	28	7	5	103
Cut for silage not grazed	7	1	1	4	9	13	22	8	30	5	1	•	94
All cut for silage	4	•	1	3	7	10	14	12	28	15	4	2	197
Cut for hay grazed	1	•	13	7	29	21	5	15	9	•	1	•	37
Cut for hay not grazed	11	•	2	4	19	18	25	12	6	4	•	•	51
All cut for hay	8	•	5	5	21	19	20	12	7	3	•	•	88
All mowings	3	•	3	4	11	11	14	12	24	13	3	2	255
All grass	6	•	9	18	15	11	9	12	12	4	3	1	512

Source: British Survey of Fertiliser Practice 1997

Table SC2.3 Percentage of grass area by field application rate – P_2O_5, Scotland 1997

row %	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+	Fields in sample
						kg/ha							
Grazed - not mown	7	•	13	24	18	11	7	13	5	•	2	•	248
Grazed - mown	•	•	4	2	9	9	4	15	23	23	6	4	133
All grazings	6	•	11	20	16	11	6	13	9	5	3	1	381
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for seed not grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for silage grazed	•	•	1	1	4	7	4	17	26	28	7	5	103
Cut for silage not grazed	7	1	1	4	9	13	22	8	30	5	1	•	94
All cut for silage	4	•	1	3	7	10	14	12	28	15	4	2	197
Cut for hay grazed	1	•	13	7	29	21	5	15	9	•	1	•	37
Cut for hay not grazed	11	•	2	4	19	18	25	12	6	4	•	•	51
All cut for hay	8	•	5	5	21	19	20	12	7	3	•	•	88
All mowings	3	•	3	4	11	11	14	12	24	13	3	2	255
All grass	6	•	9	18	15	11	9	12	12	4	3	1	512

Source: British Survey of Fertiliser Practice 1997

Table SC2.4 Percentage of grass area by field application rate – K_2O, Scotland 1997

row %	0	<25	25-	50-	75-	100- kg/ha	125-	150-	200-	250-	300-	400+	Fields in sample
Grazed - not mown	7	•	13	24	18	11	7	13	5	•	2	•	248
Grazed - mown	•	•	4	2	9	9	4	15	23	23	6	4	133
All grazings	6	•	11	20	16	11	6	13	9	5	3	1	381
Cut for seed grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for seed not grazed	•	•	•	•	•	•	•	•	•	•	•	•	0
All cut for seed	•	•	•	•	•	•	•	•	•	•	•	•	0
Cut for silage grazed	•	•	1	1	4	7	4	17	26	28	7	5	103
Cut for silage not grazed	7	1	1	4	9	13	22	8	30	5	1	•	94
All cut for silage	4	•	1	3	7	10	14	12	28	15	4	2	197
Cut for hay grazed	1	•	13	7	29	21	5	15	9	•	1	•	37
Cut for hay not grazed	11	•	2	4	19	18	25	12	6	4	•	•	51
All cut for hay	8	•	5	5	21	19	20	12	7	3	•	•	88
All mowings	3	•	3	4	11	11	14	12	24	13	3	2	255
All grass	6	•	9	18	15	11	9	12	12	4	3	1	512

Source: British Survey of Fertiliser Practice 1997

Table SC3.0 Product and nutrient use by month of application, Scotland 1977

(a) Product Use

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total product ('000 tonnes)
Straight N	2	2	29	39	12	5	5	4	1	0	0	0	194
Straight P	0	6	8	59	10	5	3	0	9	0	0	0	8
Straight K	8	4	55	22	7	2	0	1	0	0	0	0	4
Compounds	0	2	23	38	9	10	5	3	6	4	1	1	483
All fertilisers	1	2	25	38	10	8	5	3	4	3	0	1	688

(b) Nutrient Use

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total nutrient ('000 tonnes)
N	1	2	25	41	11	9	5	4	2	1	0	0	155
P_2O_5	0	2	25	33	7	5	3	3	10	7	1	2	56
K_2O	1	2	24	32	8	9	4	3	9	7	1	2	61
Total	1	2	25	37	10	8	4	3	5	3	0	1	272

Note: product use refers to total tonnage of the products used by farmers in the survey year 1997
nutrient use refers to the tonnage of each nutrient contained in the products used (eg 100kg of a 20:10:10 compound contains 20kg of N, 10kg of P_2O_5 and 10kg of K_2O;
100kg of ammonium nitrate, one of the the 'straight N' products, contains typically 34.5 kg of N)

Source: British Survey of Fertiliser Practice 1997

Table SC5.1 Average fertiliser practice on general cropping farms, Scotland 1997

	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	92	93	19	207	85	91	207	78	85	52
Spring barley	100	100	100	25	108	61	68	108	61	68	72
Winter barley	100	94	88	29	179	85	91	179	80	80	33
Oats	100	100	100	12	114	64	73	114	64	73	10
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	0
Seed potatoes	.	.	.	.	.	.	.	.	.	.	7
Early potatoes	.	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	90	90	90	55	168	152	211	150	136	189	14
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	100	100	100	7	85	56	59	85	56	59	14
Winter oilseed rape	100	88	88	39	230	59	59	230	52	52	26
Linseed	.	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	41	77	145	115	77	145	115	15
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	2
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	1
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	2
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	2
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	4
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	8
Soft fruit	.	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	99	93	93	26	150	76	83	148	70	77	268
Grass under 5 years	98	89	89	27	159	50	81	156	45	72	54
Grass 5 years and over	90	62	59	5	103	28	32	43	18	19	33
All grass	95	78	76	18	137	43	64	129	33	49	87
All crops & grass	98	90	89	25	148	70	80	144	63	71	355

Source: British Survey of Fertiliser Practice 1997

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 1997

	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	.	.	.	.	.	.	.	.	.	.	4
Spring barley	97	97	97	76	79	56	56	76	54	54	17
Winter barley	.	.	.	.	.	.	.	.	.	.	8
Oats	.	.	.	.	.	.	.	.	.	.	1
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	3
Seed potatoes	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	0
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	0
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	0
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	.	.	.	.	.	.	.	.	.	.	1
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	0
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	98	96	96	84	115	68	68	112	65	65	35
Grass under 5 years	100	97	98	77	258	54	80	258	52	78	49
Grass 5 years and over	98	97	95	66	179	42	48	175	41	46	106
All grass	98	97	96	68	198	45	56	195	43	54	155
All crops & grass	98	97	96	70	190	47	57	187	46	55	190

Source: British Survey of Fertiliser Practice 1997

Table SC5.3 Average fertiliser practice on mixed farms, Scotland 1997

	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	96	100	100	28	174	83	95	168	83	95	10
Spring barley	100	100	100	33	86	55	61	86	55	61	45
Winter barley	100	85	85	45	141	76	77	141	65	65	18
Oats	.	.	.	.	.	.	.	.	.	.	5
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	0
Seed potatoes	.	.	.	.	.	.	.	.	.	.	2
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	2
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	4
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	3
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	33	81	127	121	81	127	121	13
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	5
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	1
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	0
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	2
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	0
Soft fruit	.	.	.	.	.	.	.	.	.	.	0
Top fruit	.	.	.	.	.	.	.	.	.	.	0
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	99	96	96	35	109	65	70	108	62	67	110
Grass under 5 years	100	99	94	32	137	34	47	137	34	45	51
Grass 5 years and over	82	52	52	53	90	27	23	74	14	12	32
All grass	91	75	73	43	116	31	38	105	24	28	83
All crops & grass	94	83	82	40	113	46	53	106	39	43	193

Source: British Survey of Fertiliser Practice 1997

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 1997

	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	.	.	.	.	.	.	.	.	.	.	3
Spring barley	100	100	100	59	80	73	65	80	73	65	45
Winter barley	.	.	.	.	.	.	.	.	.	.	6
Oats	.	.	.	.	.	.	.	.	.	.	4
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	0
Seed potatoes	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	1
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	4
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	1
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	.	.	.	.	.	.	.	.	.	.	1
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	8
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	7
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	100	100	100	51	92	74	65	92	74	65	98
Grass under 5 years	93	91	80	50	126	32	39	118	29	31	70
Grass 5 years and over	91	80	74	46	98	36	35	89	29	26	117
All grass	92	84	76	48	108	34	36	99	29	28	187
All crops & grass	93	86	79	49	106	40	41	98	25	33	285

Source: British Survey of Fertiliser Practice 1997
NB Some of these estimates are based on very few fields in the sample and should be treated with great caution.

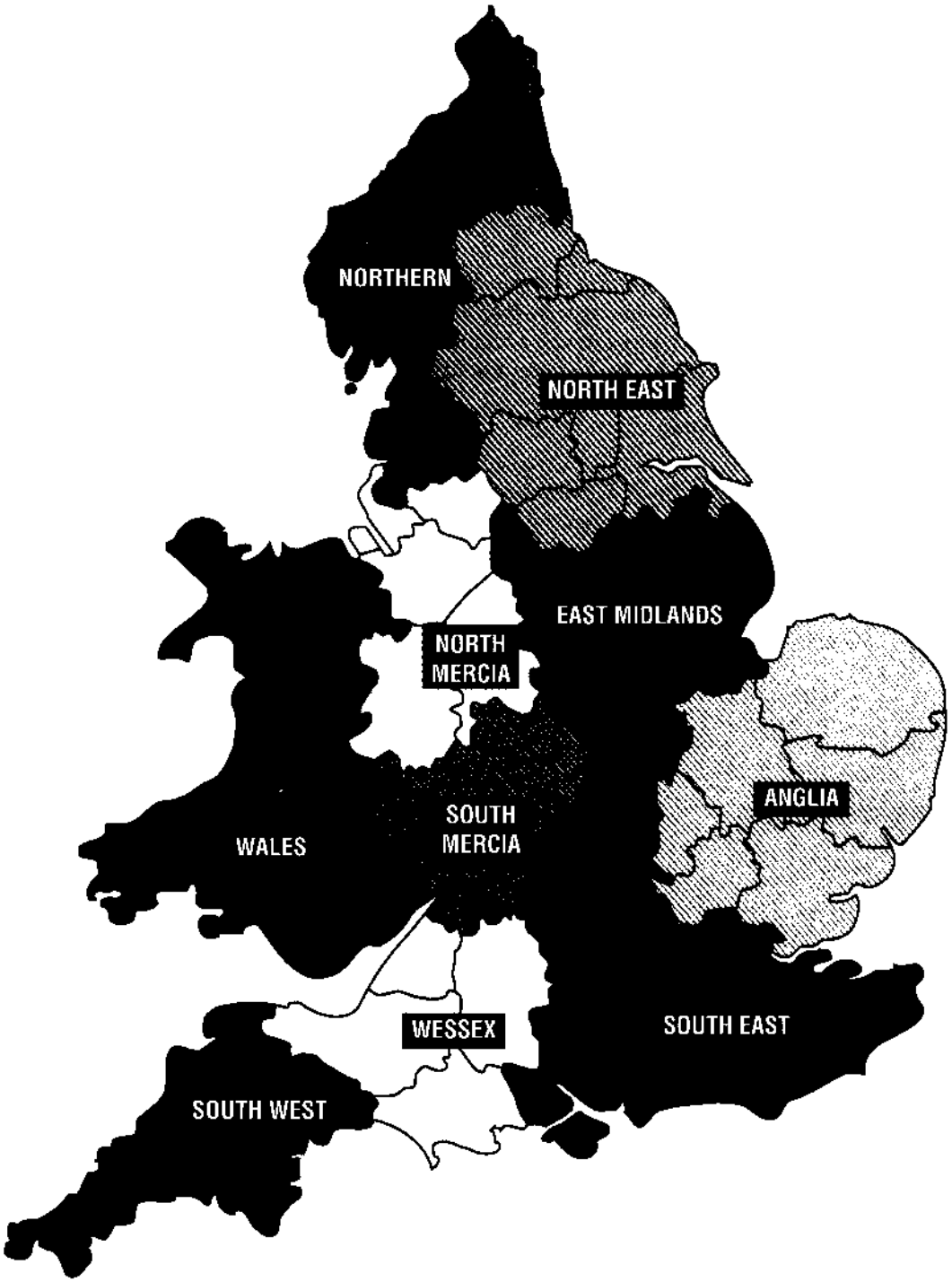
APPENDIX TO SECTION D

CONTENTS

BRITISH SURVEY OF FERTILISER PRACTICE

1997 BSFP Regions[1] in England and Wales

Generalised from digital maps provided by
Edinburgh University Data Library

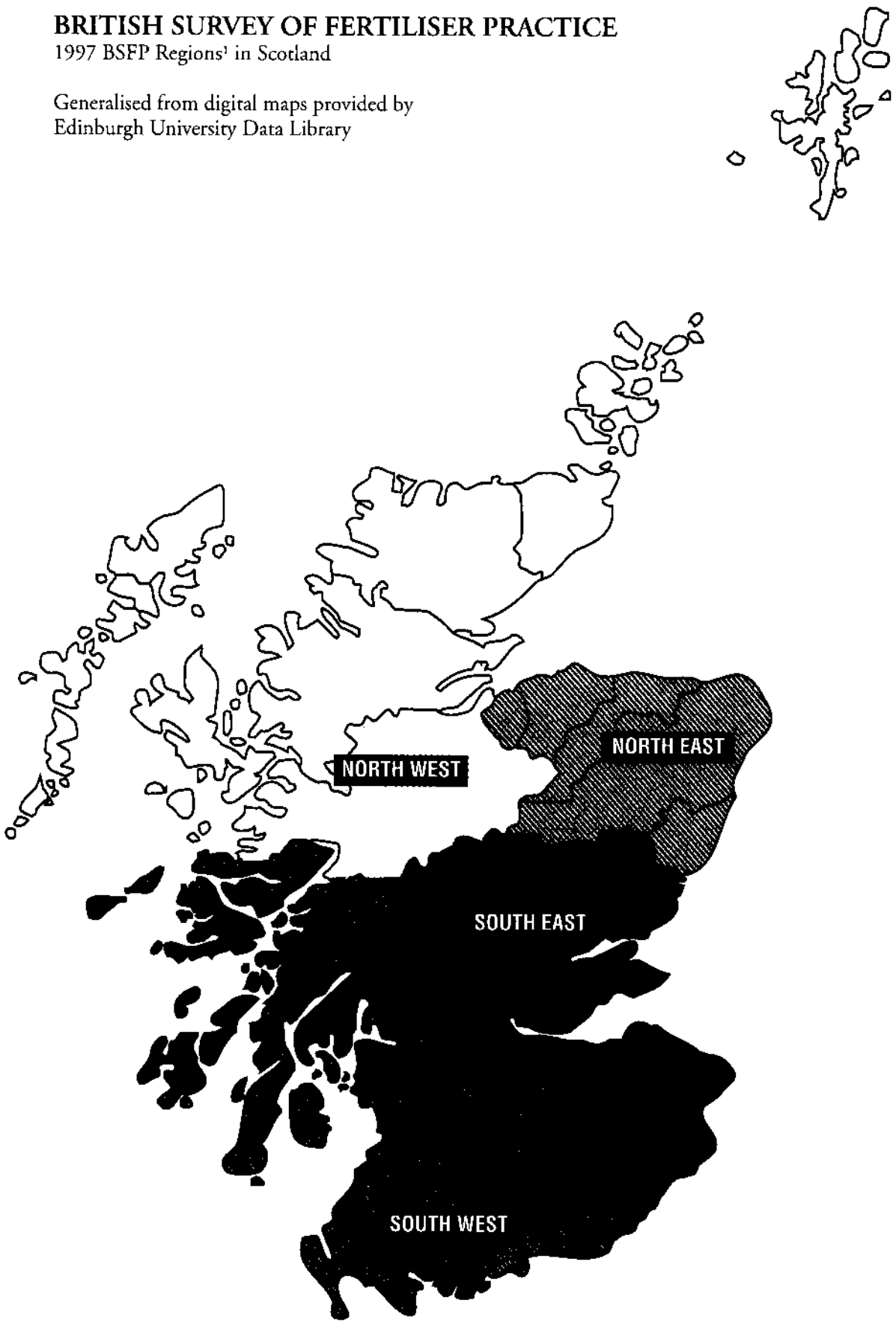


[1]MAFF administrative regions have been revised since April 1996 as a result of changes to county boundaries and nomenclature bought about by the introduction of unitary local authorities. The BSFP regions marked above are based on the 1995 MAFF administrative regions.

BRITISH SURVEY OF FERTILISER PRACTICE

1997 BSFP Regions[1] in Scotland

Generalised from digital maps provided by
Edinburgh University Data Library



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

Table GB3.1 Product type as percentage of all product used by crop group, Great Britain 1997

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	1.1	1.8	•	0.6	6.2	1.2	2.0	0.2	•	0.1	•	0.1	1.2
Urea	0.4	4.9	0.2	0.3	9.2	1.7	4.2	1.5	0.4	1.4	•	1.4	3.0
Ammonium Nitrate	21.8	50.0	5.5	20.1	40.7	17.3	40.5	34.5	24.6	26.3	37.8	29.7	35.9
Other Straight N	3.4	6.4	0.3	2.7	10.8	2.4	5.8	1.6	0.2	0.9	1.9	1.2	3.8
Triple Superphosphate	0.6	1.3	0.7	0.3	1.1	2.1	1.2	0.2	0.4	0.4	0.6	0.3	0.8
Single Superphosphate	0.4	•	•	•	•	0.5	0.1	0.1	•	•	•	•	0.1
Other Straight P	•	•	•	0.4	•	0.2	•	0.8	0.1	0.2	•	0.4	0.2
Muriate of Potash	1.1	0.9	3.1	1.7	1.1	6.6	1.5	0.2	0.5	0.8	0.5	0.5	1.1
Other Straight K	0.3	0.2	0.5	10.4	0.2	1.6	1.0	•	•	•	•	•	0.6
NP	1.4	0.6	2.1	0.9	1.0	7.8	1.3	3.3	3.2	2.6	•	2.9	2.0
NK	2.7	0.9	0.8	2.8	0.4	6.5	1.5	2.1	3.3	14.2	•	8.4	4.5
PK	7.5	20.6	7.8	43.4	12.2	19.7	19.6	2.6	2.5	3.2	6.3	2.9	12.4
Very High N	4.1	2.4	•	0.2	2.1	1.9	2.2	28.9	18.3	17.6	1.9	22.3	10.9
High N	23.3	1.3	3.0	0.1	1.8	6.6	3.3	20.6	40.1	20.0	3.0	21.2	11.0
High P	0.9	0.6	5.0	0.1	0.6	1.2	0.9	•	•	•	•	•	0.5
High K	9.3	1.5	49.3	8.8	1.1	9.1	5.5	0.8	2.5	3.6	1.1	2.3	4.1
Low N	4.4	5.8	13.1	0.9	6.1	5.7	5.7	0.3	0.2	0.5	0.7	0.4	3.4
Low P	1.2	0.4	1.5	5.1	0.1	4.7	1.1	1.1	2.0	7.4	45.9	4.6	2.6
Equal NPK	16.2	0.3	7.1	•	5.4	3.0	2.5	1.0	1.6	0.7	0.3	0.9	1.8
Total product ('000 tonnes)	**210**	**1879**	**154**	**201**	**304**	**197**	**2945**	**951**	**117**	**1151**	**12**	**2231**	**5177**

Source: British Survey of Fertiliser Practice 1997

Table GB3.2 Use of product type by crop group, Great Britain 1997

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	54.7	•	2.0	30.5	3.9	94.8	2.6	•	2.6	•	5.2	62
Urea	0.5	59.0	0.2	0.4	17.9	2.1	80.1	9.4	0.3	10.2	•	19.9	156
Ammonium Nitrate	2.5	50.6	0.5	2.2	6.7	1.8	64.2	17.7	1.6	16.3	0.3	35.8	1856
Other Straight N	3.6	61.3	0.2	2.8	16.6	2.4	86.9	7.8	0.1	5.1	0.1	13.1	198
Triple Superphosphate	2.8	57.5	2.4	1.6	8.1	9.7	82.1	5.5	1.2	11.0	0.2	17.9	42
Single Superphosphate	22.8	20.6	•	1.3	•	28.0	72.8	18.7	•	8.6	•	27.2	4
Other Straight P	•	1.6	•	8.0	•	3.1	12.7	66.6	1.2	19.4	•	87.3	11
Muriate of Potash	4.1	30.0	8.5	6.3	6.2	23.4	78.6	2.8	1.1	17.5	0.1	21.4	56
Other Straight K	2.4	10.5	2.3	69.9	2.0	10.8	97.9	1.0	•	1.1	•	2.1	30
NP	2.9	10.9	3.2	1.8	2.9	14.8	36.4	30.7	3.6	29.3	•	63.6	143
NK	2.4	7.6	0.5	2.4	0.5	5.5	19.0	8.6	1.7	70.7	•	81.0	231
PK	2.5	60.2	1.9	13.6	5.8	6.0	89.8	3.9	0.5	5.7	0.1	10.2	643
Very High N	1.5	8.1	•	0.1	1.1	0.7	11.5	48.7	3.8	35.9	•	88.5	564
High N	8.6	4.4	0.8	•	1.0	2.3	17.1	34.3	8.2	40.3	0.1	82.9	571
High P	7.3	43.8	30.0	0.7	6.8	9.2	97.9	0.1	•	2.0	•	2.1	26
High K	9.1	13.4	35.3	8.2	1.6	8.3	76.0	3.3	1.4	19.2	0.1	24.0	215
Low N	5.2	61.0	11.4	1.0	10.4	6.3	95.3	1.6	0.1	3.0	•	4.7	178
Low P	1.9	4.9	1.8	7.6	0.2	6.9	23.4	7.6	1.7	63.0	4.2	56.6	135
Equal NPK	36.6	6.8	11.8	•	17.8	6.4	79.4	10.1	2.0	8.4	•	20.6	93
All fertilisers	**4.1**	**36.3**	**3.0**	**3.9**	**5.9**	**3.8**	**56.9**	**18.4**	**2.3**	**22.2**	**0.2**	**43.1**	**5177**

Source: British Survey of Fertiliser Practice 1997

Table GB3.3 Product use by month of application, Great Britain 1997

Total %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Product ('000 tonnes)
Calcium Ammonium Nitrate	•	11.9	50.9	27.7	4.3	0.2	3.9	•	•	1.1	•	•	62
Urea	•	10.7	39.6	33.2	7.0	6.6	1.9	0.4	0.1	0.3	0.1	•	156
Ammonium Nitrate	0.4	4.3	31.8	38.9	11.5	5.0	3.7	3.2	0.8	0.4	•	0.1	1857
Other Straight N	2.1	4.9	44.3	37.8	6.6	0.8	2.4	0.9	•	•	0.2	•	198
Triple Superphosphate	3.3	1.5	12.8	11.0	11.5	0.7	3.5	4.1	24.7	20.8	4.1	2.0	42
Single Superphosphate	•	•	44.0	6.8	5.2	11.7	•	•	20.6	11.7	•	•	4
Other Straight P	•	22.1	16.8	29.4	•	0.0	2.2	0.3	1.6	12.1	8.9	6.7	11
Muriate of Potash	7.6	12.8	17.0	19.4	5.1	2.2	0.9	4.6	10.4	9.2	3.3	7.4	56
Other Straight K	11.4	10.8	20.2	3.8	0.2	0.1	•	•	2.9	9.8	15.4	25.3	30
NP	0.4	9.6	42.5	25.5	8.8	3.3	2.1	1.0	4.6	1.2	0.6	0.4	103
NK	•	2.7	10.9	7.5	23.3	35.4	15.8	3.4	0.7	0.2	•	•	231
PK	5.1	5.4	11.5	2.7	1.0	0.6	0.8	3.6	19.6	35.5	9.0	5.3	643
Very High N	•	1.4	29.8	32.8	12.4	10.6	7.1	4.7	0.7	0.3	•	•	564
High N	•	0.9	34.3	33.6	14.7	5.6	5.9	3.5	0.7	0.3	0.2	0.3	571
High P	•	15.3	37.9	19.3	3.9	•	•	•	17.3	6.3	•	•	26
High K	1.0	9.0	50.8	26.8	1.8	0.4	1.0	1.3	4.9	0.8	1.4	1.0	215
Low N	0.5	6.7	17.1	10.6	2.9	0.3	0.8	6.0	27.1	24.3	3.1	0.6	178
Low P	0.1	1.2	25.6	11.2	24.3	20.5	13.3	2.9	1.0	•	•	•	135
Equal NPK	•	4.6	38.5	32.0	5.4	1.9	2.1	7.7	4.3	2.7	0.9	•	93
All fertilisers	**1.1**	**4.5**	**29.4**	**28.0**	**10.0**	**6.1**	**4.3**	**3.3**	**4.7**	**6.0**	**1.5**	**1.0**	**5177**

Source: British Survey of Fertiliser Practice 1997

Table EW3.1 Product type as percentage of all product used by crop group , England and Wales 1977

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	0.1	1.8	•	0.6	6.7	0.4	2.0	0.2	•	0.2	•	0.2	1.2
Urea	0.6	5.1	0.1	0.3	9.8	1.8	4.6	1.9	0.5	1.4	•	1.6	3.3
Ammonium Nitrate	30.5	50.2	5.5	20.1	40.4	18.8	41.7	37.1	25.3	28.1	57.1	31.8	37.6
Other Straight N	4.2	6.6	0.3	2.7	11.5	2.2	6.1	1.9	0.2	0.7	3.9	1.2	4.1
Triple Superphosphate	0.3	1.4	0.7	0.3	1.2	2.3	1.2	0.3	0.3	0.4	2.1	0.4	0.9
Single Superphosphate	•	•	•	•	•	0.6	•	•	•	•	•	•	•
Other Straight P	•	•	•	0.4	•	0.1	•	0.8	•	•	•	0.3	0.2
Muriate of Potash	1.4	0.9	3.2	1.7	1.2	7.5	1.6	0.1	0.6	1.0	1.9	0.6	1.2
Other Straight K	0.7	0.1	0.5	10.4	0.2	1.9	1.1	•	•	•	•	•	0.6
NP	1.9	0.6	2.0	0.9	1.1	8.7	1.3	2.5	2.2	2.5	•	2.5	1.8
NK	1.9	0.9	0.8	2.8	0.3	7.3	1.4	2.2	4.2	15.5	•	9.3	4.7
PK	12.9	21.3	8.3	43.4	13.4	22.1	21.2	3.0	3.2	3.3	23.3	3.2	13.8
Very High N	5.2	2.5	•	0.2	2.3	1.9	2.2	26.8	16.8	15.7	6.7	20.4	9.7
High N	22.6	1.3	3.3	0.1	1.2	5.9	2.4	19.5	39.6	19.1	•	20.2	9.8
High P	0.1	0.5	5.3	0.1	0.6	0.6	0.8	•	•	•	•	•	0.5
High K	5.7	1.6	46.7	8.8	1.1	8.3	5.1	0.9	3.3	3.7	2.5	2.5	4.0
Low N	2.6	4.4	14.0	0.9	6.1	2.3	4.6	0.3	0.1	0.5	2.4	0.4	2.9
Low P	2.3	0.3	1.4	5.1	0.1	5.4	1.1	1.2	2.3	7.1	•	4.3	2.5
Equal NPK	6.9	0.3	7.8	•	2.8	1.9	1.3	0.9	1.4	0.7	•	0.8	1.1
Total product ('000 tonnes)	**99**	**1742**	**138**	**201**	**278**	**174**	**2630**	**782**	**92**	**981**	**3**	**1859**	**4488**

Source: British Survey of Fertiliser Practice 1997

Table EW3.2 Use of product type by crop group, England and Wales 1997

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	0.2	56.7	•	2.2	33.6	1.4	94.1	2.9	•	3.0	•	5.9	55
Urea	0.4	59.4	0.1	0.4	18.1	2.1	80.6	9.7	0.3	9.5	•	19.4	150
Ammonium Nitrate	1.8	51.8	0.4	2.4	6.6	1.9	65.0	17.2	1.4	16.3	0.1	35.0	1689
Other Straight N	2.3	62.9	0.2	3.0	17.3	2.0	87.7	8.1	0.1	4.0	0.1	12.3	184
Triple Superphosphate	0.7	59.2	2.6	1.6	8.6	9.8	82.5	5.8	0.8	10.7	0.2	17.5	40
Single Superphosphate	•	•	•	3.4	•	70.1	73.4	26.6	•	•	•	26.6	1
Other Straight P	•	2.4	•	12.1	•	1.4	16.0	83.7	•	0.4	•	84.0	8
Muriate of Potash	2.6	30.6	8.3	6.6	6.5	24.5	79.1	1.9	1.1	17.8	0.1	20.9	53
Other Straight K	2.5	7.4	2.4	72.4	2.0	11.2	97.9	1.0	•	1.1	•	2.1	29
NP	2.3	13.1	3.4	2.3	3.7	18.5	43.3	24.4	2.5	29.9	•	56.7	81
NK	0.9	7.2	0.6	2.7	0.4	6.0	17.8	8.2	1.8	72.2	•	82.2	211
PK	2.1	60.1	1.8	14.1	6.0	6.2	90.4	3.8	0.5	5.2	0.1	9.6	618
Very High N	1.2	9.8	•	0.1	1.4	0.7	13.3	47.9	3.5	35.2	0.1	86.7	437
High N	5.1	5.0	1.0	0.1	0.8	2.3	14.3	34.7	8.3	42.7	•	85.7	439
High P	0.6	46.8	35.9	0.9	8.6	5.4	98.3	0.1	•	1.6	•	1.7	20
High K	3.2	15.8	35.8	9.8	1.6	8.0	74.3	4.0	1.7	20.0	•	25.7	179
Low N	2.0	59.6	14.8	1.4	13.0	3.1	93.9	1.9	0.1	4.0	0.1	6.1	129
Low P	2.1	5.2	1.8	9.3	0.3	8.4	27.1	8.4	1.9	62.6	•	72.9	111
Equal NPK	13.8	11.5	21.5	0.0	15.6	6.7	69.1	14.9	2.5	13.5	•	30.9	50
All fertilisers	**2.2**	**38.8**	**3.1**	**4.5**	**6.2**	**3.9**	**58.6**	**17.4**	**2.0**	**21.9**	**0.1**	**41.4**	**4488**

Source: British Survey of Fertiliser Practice 1997

Table EW3.3 Product use by month of application, England and Wales 1997

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total product ('000 tonnes)
Calcium Ammonium Nitrate	•	12.6	53.0	26.9	1.8	0.2	4.3	•	•	1.2	•	•	55
Urea	•	10.8	40.2	33.3	6.3	6.8	1.6	0.4	0.1	0.3	0.1	•	150
Ammonium Nitrate	0.2	4.5	32.1	38.8	11.5	4.9	3.5	3.1	0.8	0.4	•	•	1689
Other Straight N	2.2	5.0	44.4	37.8	6.1	0.8	2.5	1.0	•	•	0.2	•	184
Triple Superphosphate	3.5	0.9	13.2	8.0	10.6	0.7	3.8	4.4	26.2	22.1	4.4	2.2	40
Single Superphosphate	•	•	70.1	•	•	•	•	•	•	29.9	•	•	1
Other Straight P	•	29.7	25.4	•	•	•	•	0.4	2.4	18.4	13.5	10.1	8
Muriate of Potash	7.4	13.2	16.0	18.9	4.9	2.1	0.9	4.8	10.9	9.7	3.4	7.7	53
Other Straight K	11.8	11.1	17.4	4.0	0.2	0.1	•	•	3.0	10.2	16.0	26.2	29
NP	0.5	10.1	41.6	25.2	9.1	2.9	1.5	1.2	5.2	1.5	0.7	0.5	81
NK	•	3.0	11.2	5.5	23.9	34.7	16.9	3.8	0.8	0.2	•	•	211
PK	5.2	5.3	11.3	2.6	1.0	0.4	0.7	3.8	19.6	36.2	9.0	4.8	618
Very High N	•	1.2	34.0	28.5	12.4	10.6	6.9	5.2	0.7	0.4	•	•	437
High N	•	1.0	38.0	28.1	16.5	4.9	6.0	4.9	0.4	0.4	0.2	0.4	439
High P	•	19.4	43.2	16.3	•	•	•	•	14.3	6.9	•	•	20
High K	1.1	10.7	51.6	22.8	1.3	0.5	1.1	1.5	5.8	0.9	1.6	1.1	179
Low N	0.6	9.2	17.6	11.4	0.6	0.3	1.2	7.2	25.0	22.9	4.0	0.2	129
Low P	0.2	1.1	28.3	11.7	26.3	16.3	13.0	1.9	1.2	0.0	•	•	111
Equal NPK	•	8.5	37.9	26.0	6.0	0.6	2.6	5.1	6.5	4.9	1.6	•	50
All fertilisers	**1.2**	**4.9**	**30.1**	**26.4**	**10.0**	**5.8**	**4.2**	**3.3**	**4.8**	**6.5**	**1.7**	**1.1**	**4488**

Source: British Survey of Fertiliser Practice 1997

Table EW4.1 Average fertiliser practice on tillage and grassland by MAFF region, England and Wales 1997

		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	96	84	80	34	146	64	88	140	54	70	469
	All grass	86	53	55	39	176	37	62	150	20	34	293
	All crops & grass	90	67	66	37	162	52	76	146	35	50	762
Anglia	All tillage	92	69	65	9	164	72	83	151	49	61	1571
	All grass	67	37	40	15	156	42	52	104	15	21	130
	All crops & grass	90	66	63	10	163	70	91	147	46	57	1701
Northern	All tillage	95	80	82	24	162	65	81	154	52	66	245
	All grass	86	77	78	56	132	32	44	113	25	34	571
	All crops & grass	88	78	79	49	139	40	53	123	31	42	816
North East	All tillage	97	78	83	19	171	70	92	165	55	77	603
	All grass	86	71	73	47	158	37	57	136	26	41	233
	All crops & grass	92	74	78	33	165	55	77	151	41	60	836
North Mercia	All tillage	94	81	87	31	129	61	87	122	50	76	204
	All grass	78	51	52	61	183	35	68	143	18	36	229
	All crops & grass	83	60	63	52	165	46	76	137	27	47	433
South Mercia	All tillage	93	89	83	27	154	68	93	143	61	77	478
	All grass	91	65	62	29	145	39	53	133	26	33	260
	All crops & grass	92	79	74	28	151	58	79	139	46	58	738
East Midlands	All tillage	92	75	72	9	167	65	78	154	48	56	865
	All grass	71	48	48	18	151	32	46	108	15	22	247
	All crops & grass	86	66	65	12	163	58	71	140	38	46	1112
South East	All tillage	91	83	82	12	169	65	77	154	54	63	515
	All grass	84	27	31	19	126	46	74	106	13	23	189
	All crops & grass	89	63	64	15	154	63	76	137	40	49	704
South West	All tillage	90	88	86	45	126	76	79	113	66	68	205
	All grass	94	83	83	62	159	41	61	149	34	51	249
	All crops & grass	93	84	84	58	151	50	66	141	42	55	454
Wales	All tillage	93	84	85	14	188	72	89	175	60	75	524
	All grass	87	78	78	37	114	32	42	98	25	33	817
	All crops & grass	88	80	80	31	134	42	55	118	34	43	1341

Source: British Survey of Fertiliser Practice 1997

Table SC3.1 Product type as percentage of all product used by crop group, Scotland 1997

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	1.9	1.9	•	•	1.3	7.1	2.2	•	•	•	•	•	1.1
Urea	0.1	2.0	0.4	•	2.7	0.4	1.2	0.1	0.2	1.0	•	0.5	0.8
Ammonium Nitrate	14.1	47.0	5.7	•	43.4	6.3	29.9	22.1	22.2	16.1	30.7	19.6	24.3
Other Straight N	2.7	3.9	•	•	3.7	4.5	3.3	0.3	•	1.6	1.1	0.9	2.0
Triple Superphosphate	0.8	0.5	•	•	•	0.8	0.6	•	0.8	0.3	•	0.2	0.4
Single Superphosphate	0.7	0.5	•	•	•	0.1	0.5	0.2	•	0.2	•	0.2	0.3
Other Straight P	•	•	•	•	•	1.1	0.1	0.8	0.6	1.3	•	1.0	0.6
Muriate of Potash	0.8	0.3	1.8	•	•	•	0.5	0.3	•	0.2	•	0.2	0.4
Other Straight K	•	0.7	•	•	•	•	0.3	•	•	•	•	•	0.1
NP	1.0	0.4	3.3	•	•	0.9	0.8	7.0	6.9	3.5	•	5.2	3.2
NK	3.4	1.8	•	•	0.5	•	2.0	1.6	•	6.7	•	3.8	3.0
PK	2.8	11.1	3.6	•	•	2.0	6.2	1.0	0.1	2.4	•	1.6	3.7
Very High N	3.0	2.0	•	•	•	2.6	2.1	38.6	23.7	28.5	0.2	32.1	18.4
High N	23.9	2.3	•	•	7.7	11.6	11.0	26.0	41.8	25.0	4.1	26.1	19.2
High P	1.6	1.3	2.6	•	•	5.4	1.6	•	•	0.1	•	0.1	0.8
High K	12.5	0.3	72.0	•	2.0	14.9	9.5	•	•	3.2	0.5	1.5	5.1
Low N	6.1	22.7	6.2	•	5.8	30.8	15.2	0.3	0.2	•	•	0.2	7.0
Low P	0.3	0.6	2.6	•	•	•	0.5	0.6	1.0	9.3	63.0	6.1	3.5
Equal NPK	24.3	0.4	1.7	•	32.8	11.4	12.5	1.1	2.5	0.7	0.4	1.0	6.3
Total product ('000 tonnes)	**112**	**138**	**16**	**0**	**27**	**23**	**316**	**169**	**26**	**169**	**9**	**373**	**688**

Source: British Survey of Fertiliser Practice 1997

Table SC3.2 Use of product type by crop group, Scotland 1997

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	Total Product ('000 tonnes)
Calcium Ammonium Nitrate	31.5	39.1	0.1	•	5.1	24.3	100.0	•	•	•	•	•	7
Urea	2.6	48.1	1.0	•	12.7	1.7	66.1	2.9	1.1	29.9	•	33.9	6
Ammonium Nitrate	9.4	38.7	0.5	•	6.9	0.9	56.4	22.3	3.4	16.3	1.7	43.6	168
Other Straight N	21.7	39.5	•	•	7.2	7.6	76.0	3.3	•	19.9	0.7	24.0	14
Triple Superphosphate	36.7	30.0	•	•	•	8.0	74.6	•	8.1	17.3	•	25.4	3
Single Superphosphate	37.5	33.9	•	•	•	0.8	72.3	13.6	•	14.1	•	27.7	2
Other Straight P	•	•	•	•	•	6.4	6.4	33.6	3.7	56.4	•	93.6	4
Muriate of Potash	35.6	19.1	11.6	•	•	0.2	66.6	21.8	•	11.5	•	33.4	3
Other Straight K	•	99.4	•	•	0.6	•	100.0	•	•	•	•	•	1
NP	5.0	2.5	2.4	•	•	1.0	10.9	54.1	8.0	27.0	•	89.1	22
NK	18.4	12.0	•	•	0.7	•	31.2	13.6	•	55.3	•	89.1	22
PK	12.2	60.7	2.3	•	•	1.8	77.0	6.6	0.1	16.3	•	23.0	25
Very High N	2.7	2.2	•	•	•	0.5	5.3	51.6	4.8	38.3	•	94.7	126
High N	20.2	2.4	•	•	1.6	2.1	26.2	33.2	8.1	32.2	0.3	73.8	132
High P	32.4	32.7	7.7	•	•	23.6	96.4	•	•	3.6	•	3.6	5
High K	39.4	1.2	32.7	•	1.5	9.8	84.7	•	•	15.2	0.1	15.3	35
Low N	13.9	64.8	2.1	•	3.2	14.9	98.8	1.0	0.1	•	•	1.2	48
Low P	1.2	3.5	1.8	•	•	•	6.5	4.1	1.1	64.8	23.5	93.5	24
Equal NPK	62.9	1.4	0.6	•	20.3	6.2	91.4	4.4	1.5	2.6	0.1	8.6	43
All fertilisers	**16**	**20**	**2**	**0**	**4**	**3**	**46**	**25**	**4**	**25**	**1**	**54**	**688**

Source: British Survey of Fertiliser Practice 1997

Table SC3.3 Product use by month of application, Scotland 1997

row %	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Product ('000 tonnes)
Calcium Ammonium Nitrate	•	6.8	34.3	33.9	24.3	0.6	•	•	•	•	•	•	7
Urea	0.5	7.1	23.2	31.1	26.2	•	11.8	•	•	•	•	•	6
Ammonium Nitrate	1.9	1.8	28.5	39.7	10.8	6.0	5.0	4.8	0.9	0.2	•	0.5	168
Other Straight N	•	3.4	41.7	38.5	14.4	1.1	0.9	•	•	•	•	•	14
Triple Superphosphate	•	10.4	5.3	58.5	25.9	•	•	•	•	•	•	•	3
Single Superphosphate	•	•	27.2	11.1	8.5	19.2	•	•	33.9	•	•	•	2
Other Straight P	•	7.3	•	86.3	•	•	6.4	•	•	•	•	•	4
Muriate of Potash	11.6	5.3	37.2	30.5	10.2	3.2	•	2.0	•	•	•	•	3
Other Straight K	•	0.6	99.4	•	•	•	•	•	•	•	•	•	1
NP	•	7.9	46.0	26.8	7.8	4.5	4.4	•	2.5	•	•	•	22
NK	•	•	7.4	28.7	16.8	43.1	4.0	•	•	•	•	•	21
PK	2.4	8.1	15.7	4.7	•	4.5	1.4	•	19.4	18.2	9.4	16.2	25
Very High N	•	2.2	15.4	48.0	12.2	10.8	7.8	3.0	0.7	•	•	•	126
High N	•	0.5	22.0	51.8	8.5	8.0	5.4	1.8	2.0	•	•	•	132
High P	•	•	18.0	30.5	18.7	•	•	•	28.4	4.3	•	•	5
High K	0.8	•	46.7	47.4	4.6	0.2	•	•	•	0.2	•	•	35
Low N	•	0.3	15.9	8.5	9.1	0.3	•	2.9	32.9	28.2	0.4	1.4	48
Low P	•	1.8	12.9	9.0	14.8	39.5	14.6	7.5	•	•	•	•	24
Equal NPK	•	•	39.3	38.3	4.4	3.5	1.5	10.7	1.7	0.1	•	•	43
All fertilisers	**1**	**2**	**25**	**39**	**10**	**8**	**5**	**3**	**4**	**3**	**0**	**1**	**688**

Source: British Survey of Fertiliser Practice 1997

Table SC4.1 Average fertiliser practice, North East Scotland 1997

	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	.	.	.	.	.	.	.	.	.	.	6
Spring barley	92	100	100	28	70	64	67	64	64	67	39
Winter barley	.	.	.	.	.	.	.	.	.	.	7
Oats	.	.	.	.	.	.	.	.	.	.	0
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	0
Seed potatoes	.	.	.	.	.	.	.	.	.	.	4
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	3
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	5
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	0
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	47	69	119	114	69	119	114	13
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	2
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	0
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	0
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	1
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	3
Soft fruit	.	.	.	.	.	.	.	.	.	.	0
Top fruit	.	.	.	.	.	.	.	.	.	.	0
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	93	99	97	24	65	76	76	61	75	74	84
Grass under 5 years	80	80	80	54	118	37	53	94	30	42	37
Grass 5 years and over	51	51	51	34	87	26	25	45	13	13	20
All grass	69	69	69	46	109	34	45	75	23	31	57
All crops & grass	81	84	83	35	83	59	64	67	50	53	141

Source: British Survey of Fertiliser Practice 1997

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 1997

	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	62	88	90	21	37	83	85	23	73	77	45
Spring barley	97	100	100	33	70	58	64	68	58	64	83
Winter barley	78	85	85	36	33	84	81	26	72	69	42
Oats	87	98	98	23	53	61	70	46	60	69	12
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	0
Seed potatoes	.	.	.	.	.	.	.	.	.	.	5
Early potatoes	.	.	.	.	.	.	.	.	.	.	2
2nd Early/Maincrop potatoes	89	89	89	54	138	154	213	122	137	189	13
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	100	100	100	12	64	56	62	64	56	62	12
Winter oilseed rape	89	89	89	41	56	58	58	50	51	52	27
Linseed	.	.	.	.	.	.	.	.	.	.	0
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	43	79	116	116	79	116	116	18
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	5
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	4
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	0
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	1
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	5
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	4
Soft fruit	.	.	.	.	.	.	.	.	.	.	1
Top fruit	.	.	.	.	.	.	.	.	.	.	1
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	82	91	91	31	61	73	78	50	66	72	282
Grass under 5 years	94	97	92	38	90	39	61	85	38	56	71
Grass 5 years and over	61	62	61	35	80	28	25	49	17	15	57
All grass	77	79	76	36	86	35	46	66	27	35	128
All crops & grass	80	86	85	33	71	58	67	57	50	57	410

Source: British Survey of Fertiliser Practice 1997

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 1997

	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	49	100	100	39	42	77	81	21	77	81	13
Spring barley	95	99	99	54	65	51	53	62	51	52	46
Winter barley	42	97	97	70	53	76	81	23	74	78	15
Oats	.	.	.	.	.	.	.	.	.	.	4
Rye/Triticale	.	.	.	.	.	.	.	.	.	.	3
Seed potatoes	.	.	.	.	.	.	.	.	.	.	0
Early potatoes	.	.	.	.	.	.	.	.	.	.	0
2nd Early/Maincrop potatoes	.	.	.	.	.	.	.	.	.	.	1
Sugar Beet	.	.	.	.	.	.	.	.	.	.	0
Spring oilseed rape	.	.	.	.	.	.	.	.	.	.	3
Winter oilseed rape	.	.	.	.	.	.	.	.	.	.	1
Linseed	.	.	.	.	.	.	.	.	.	.	1
Forage maize	.	.	.	.	.	.	.	.	.	.	0
Rootcrops for stockfeed	100	100	100	56	72	91	89	72	91	89	13
Leafy forage crops	.	.	.	.	.	.	.	.	.	.	7
Arable silage/other fodder crops	.	.	.	.	.	.	.	.	.	.	6
Peas - human consumption	.	.	.	.	.	.	.	.	.	.	0
Peas - animal consumption	.	.	.	.	.	.	.	.	.	.	1
Beans - animal consumption	.	.	.	.	.	.	.	.	.	.	0
Vegetables (brassicae)	.	.	.	.	.	.	.	.	.	.	0
Vegetables (other)	.	.	.	.	.	.	.	.	.	.	1
Soft fruit	.	.	.	.	.	.	.	.	.	.	0
Top fruit	.	.	.	.	.	.	.	.	.	.	0
Other tillage	.	.	.	.	.	.	.	.	.	.	0
All tillage	81	99	99	.	63	60	62	51	59	62	115
Grass under 5 years	91	90	83	54	129	35	53	117	31	44	98
Grass 5 years and over	84	84	83	60	117	37	41	98	31	34	195
All grass	86	86	83	57	121	36	44	103	31	37	293
All crops & grass	85	88	85	56	112	40	47	96	35	40	408

Source: British Survey of Fertiliser Practice 1997

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

British Survey Of Fertiliser Practice 1997

Report On The Supplementary Question On Farm Record Keeping For Fertiliser Application

Summary

The principal purpose of the BSFP is to estimate crop-specific application rates of manufactured fertiliser throughout a particular harvest year. This is achieved by carrying out face-to-face interviews with a sample of managers of farms during the months of May to August, towards the end of the harvest year. Where possible, the retrospective enquiry of fertiliser practice makes use of records kept by the farmer. This Report, based upon additional questions asked in interviews during the 1997 Survey, contains information about the extent and character of record keeping on the farms visited. In large part, it confirms what was first uncovered by similar questions during the 1995 Survey.

As might have been anticipated, record-keeping is much more established in farms with larger farmed area; for example, over 95% of farms over 200 ha. mainly concerned with cropping, report keeping records. However, overall, the 1997 Survey confirms the 1995 Survey finding that, weighted for farm area, approximately a third (33%) did not keep records of manufactured fertiliser use.

This is important for two broad reasons. First, it provides evidence that might motivate improvements in the methodology and hence accuracy of the Survey. Specifically, it means that the interviewers in the Survey were not able to draw upon contemporary accounts of fertiliser usage in one third of the farms surveyed. This highlights the potential of errors of recall from the retrospective questioning in the Survey, which could be considerable, and underlines the importance of investigating the possible use of a dedicated diary, or similar, in the Survey, in order to provide contemporary records.

Second, it provides evidence that the application of fertiliser is not recorded systematically throughout British agriculture. In itself, this underlines the importance of continuing the Survey, as there is no administrative alternative. However, it might also be motivation for seeking to improve the upkeep of fertiliser record-keeping. The figures generally reported here should not be used without reflection, as they are a product of the sampling design used in the Survey*. Farms were not selected, and are therefore not represented, with equal probability but with variable probability determined by the farmed area according to the stratification by farm type and size. The aggregate statistics generally reported are as though weighted by farmed area, which corresponds to the wish to comment upon the extent to which fertiliser applications are recorded.

Re-weighting the results for ‘all farms’, irrespective of size, would show that little more than half (58%) of farmers in mainland Britain who use manufactured fertiliser keep some kind of record of that use. But this largely reflects behaviour of the very many small farms.

* The sampling of farmers for the Survey is designed to maximise the precision of estimating crop-specific application rates of manufactured fertiliser. Accordingly, farmers are sampled according to the extent of farmed area, such that larger 'farms', having more farmed area, are much more likely to be included in the Survey.

Contents:

Section 1: Introduction

The British Survey of Fertiliser Practice (BSFP) obtains information through personal interviews during the months of May to August with the owners or managers of farms located throughout mainland Great Britain. The principal purpose of the survey is to collect information on field and crop-specific application rates of manufactured fertiliser. However, in 1997, in addition to detailed information on the area, type, quantity, and timing of fertiliser applications, farmers were also questioned about their habits of record keeping for fertiliser usage on the farm[1]. This followed a similar investigation in 1995. This report examines the results from the 1997 survey and allows comparison with those from the previous study.

The 1997 Survey had a stratified sample of 1474 farms distributed throughout mainland Great Britain. Stratification helps achieve a much more representative survey sample than might otherwise be achieved through the use of a simple random sampling strategy. The stratification for the survey used information from the annual June Agricultural Census on farm type, farm size and location.

This information also allows the farms to be divided into four size groups:

20 - 50 hectares
50 - 100 hectares
100 - 200 hectares
200 hectares or more

and four farm types:

Cropping & horticulture
Dairy
Cattle and sheep
Mixed/other

Nearly all (1162 or 98%) of the 1187 farms surveyed used manufactured fertiliser. Of the remaining 25 that did not, 13 made use only of organic manure and 12 (largely those farms categorised as 'cattle and sheep') made no use of either manufactured fertiliser organic fertiliser.

Overall, three quarters (867 or 73%) of the 1187 farms applied some form of organic manure. As might have been expected, nearly all (98%) dairy farms and the majority (81%) of mixed/other farms used both manufactured fertiliser and organic manure. All of these figures were very similar to the usage levels reported in the 1995 survey.

Section 2 of this report analyses and comments upon record keeping for manufactured fertiliser; section 3 does so for organic manure record keeping.

Aggregate results were weighted by farm area

[1]The survey questionnaire is appended to this report

Section 2: Record Keeping For Manufactured Fertiliser

2.1 General practice in record keeping for manufactured fertiliser at GB level

Table 1 Record keeping among users of manufactured fertiliser, by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	67	84	88	95	**88**	85	458
Dairy	42	54	61	68	**55**	54	218
Cattle & Sheep	36	39	46	62	**43**	44	343
Mixed/other	42	66	82	86	**73**	74	143
All 1997	**44**	**59**	**71**	**87**	**67**		
All 1995	52	57	70	89		67	
Sample size	222	296	359	285			1162

Overall, two thirds (882 or 67%) of farmers kept some kind of record of their use of manufactured fertiliser. The extent of record keeping varied with both farm type and farm size. The most frequent and consistent record keeping of fertiliser practice took place on cropping and horticultural farms, with 88% keeping records of fertiliser usage. By contrast, less than half (43%) of the cattle and sheep farms kept such records. Similarly, dairy farmers had a relatively low incidence of record keeping. It was also evident that the larger the farm, the more likely it was to keep fertiliser records. For instance, 87% of the largest farms (200+ ha) kept records of manufactured fertiliser applications, compared to less than half of the smallest farm category. Apart from a marginal drop in the proportion of small farms keeping records there was little evidence of change in record keeping levels since 1995.

2.2 Forms of record keeping for manufactured fertiliser

The survey 'Farm Questionnaire' (attached as appendix) also asked those farmers keeping records how they recorded fertiliser applications to their land. The questionnaire listed four common modes of recording. The farmers were asked which, if any, of these methods were used to record both fertiliser and manure applications. There was also provision in the questionnaire for noting any other alternative forms of paper record.

Table 2 Forms of record keeping among record keepers (shown as count and %)

	Farm count	% 1997	% 1995
Farm diary	402	52	48
Field record sheet	263	34	33
Farm notebook/pocket book	263	34	27
Computer	172	22	18
Other	52	7	6

The left hand column of Table 2 records the form of record keeping among the 773 farmers that kept some kind of record of manufactured fertiliser usage in 1997. The other two columns express the count as a percentage of farmers that kept records of manufactured fertiliser for 1997 and 1995 respectively. The column percentages sum to more than 100%, because up to one third of farmers kept more than one kind of record. As in 1995, around half of the 'recording farmers' used a farm diary, whilst a third used either field sheets or notebooks. The use of computers for keeping records for manufactured fertilisers had increased to 22% up from 18% in 1995.

Table 2(a) Use of a farm diary for record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	43	56	46	40	**45**	44	403
Dairy	55	63	65	46	**61**	58	119
Cattle & Sheep	68	54	60	46	**58**	53	147
Mixed/other	64	70	64	50	**60**	47	105
All 1997	**58**	**59**	**54**	**43**	**52**		
All 1995	54	51	49	41		48	
Sample size	97	174	255	247			773

Approximately half of all the record keeping farms noted down fertiliser details in a farm diary. This was fairly uniform across the various farm type/size groups, although a little less popular on the largest cropping/horticulture holdings. Use of the farm diary on all but these largest enterprises may have increased marginally since 1995.

Table 2(b) Use of a field record sheet for record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	43	40	53	48	**48**	43	403
Dairy	5	9	23	31	**16**	18	119
Cattle & Sheep	8	13	12	11	**11**	12	147
Mixed/other	18	21	36	42	**34**	36	105
All 1997	**19**	**24**	**39**	**42**	**34**		
All 1995	16	21	32	51		33	
Sample size	97	174	255	247			773

A third of record keepers used a formal field sheet to record their use of manufactured fertiliser. Field record sheets are used more extensively on farms growing crops. For instance, half (48%) of the cropping/horticulture category used this form of recording. There was little evidence of change in the use of field sheets between 1995 and 1997.

Table 2(c) Use of farm notebook/pocket book for record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	36	44	28	35	**34**	23	403
Dairy	45	35	30	31	**34**	21	119
Cattle & Sheep	32	33	29	32	**31**	38	147
Mixed/other	27	26	33	50	**38**	34	105
All 1997	**35**	**37**	**29**	**36**	**34**		
All 1995	29	31	30	22		27	
Sample size	97	174	255	247			773

In 1997, a third (34%) of record keepers noted down fertiliser applications in pocket notebooks; with little variation in usage levels across farm size/type classifications. A higher proportion of farmers used notebooks in 1997 than in 1995.

Table 2(d) Use of computer for record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	7	26	26	46	**33**	25	403
Dairy	0	7	9	8	**7**	6	119
Cattle & Sheep	3	3	7	21	**7**	6	147
Mixed/other	0	11	14	34	**19**	18	105
All 1997	**3**	**14**	**18**	**39**	**22**		
All 1995	5	8	16	33		18	
Sample size	97	174	255	247			773

The proportion of farms using computers to record manufactured fertiliser applications had increased to 22% in 1997. Uptake was more prevalent on larger farms and tended to be those involved with growing crops. Only in the 'cropping/horticulture' category was there significant use across all size groups. It is likely that in most instances this would have confirmed details initially recorded on paper, with 71% of computer users reporting at least one other form of record keeping

Other forms of record keeping.

Some 7% of farmers, largely the managers of small and medium sized farms, reported alternative forms of record keeping. Around a third of these were variants of the other listed types of record keeping e.g. 'filing system', 'record book' etc. A further third of this group cited invoices as

records of fertiliser use. Others kept records in a structured format such as those prescribed by various advisory or marketing organisations (ADAS Fertiplan, Scottish Quality Cereals Scheme etc.). A few farmers kept recpords in a more individual form, for instance by making notes on maps or calendars.

2.3 The level of detail in fertiliser records.

Respondents who maintained records were then questioned as to the level of detail provided by their records.

Table 3 Detail of record keeping among record keepers (shown as count and %)

	Farm count	% 1997	% 1995
Application rate	739	96	94
Application date	698	90	93
Area of farm/field	688	89	85
Analysis	640	83	82
Product/brand Name	511	66	71

The format of Table 3 is the same as Table 2: The percentages in the right hand columns of the table express the counts recorded as a percentage of the number of record keeping farmers.

Farmers who kept records of manufactured fertiliser use tended to keep comprehensive details of applications. Table 3 illustrates that, in 1997, as in 1995, all of the details listed received high priority amongst record keeping farmers, with slightly less importance attached to the brand name of the fertiliser applied. Although the proportion of dairy and cattle and sheep farmers that kept records was comparatively low (54% and 44% respectively), the tables below show that when they did keep records, they were only marginally less rigorous in the level of detail recorded.

Table 3(a) Record of application rate (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	89	97	100	99	**98**	98	403
Dairy	75	93	98	100	**92**	92	119
Cattle & Sheep	89	87	86	100	**90**	87	147
Mixed/other	82	100	97	97	**96**	94	105
All 1997	**86**	**94**	**97**	**99**	**95**		
All 1995	89	92	94	99		94	
Sample size	97	174	255	247			773

Nearly all the farms surveyed (95%), especially the larger farms, considered the rate of fertiliser application to be an important detail to record. The figures for 1997 are very similar to those reported in 1995.

Table 3(b) Record of application date (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	89	90	96	96	**95**	91	403
Dairy	90	88	91	85	**89**	95	119
Cattle & Sheep	82	85	76	93	**83**	91	147
Mixed/other	73	89	83	89	**86**	89	105
All 1997	**85**	**89**	**90**	**94**	**90**		
All 1995	91	92	91	96		93	
Sample size	97	174	255	247			773

Most record keepers (90%) recorded the date of fertiliser application. This part of the record appeared to have been most important to cropping/horticultural farms. The marginal decrease in the overall figure was attributed to a reduction in the proportion of smaller cattle & sheep and mixed/other farms recording this detail in 1997.

Table 3(c) Record of area over which dressing was applied, (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	82	90	96	93	**93**	90	403
Dairy	90	79	84	85	**83**	81	119
Cattle & Sheep	76	85	81	93	**83**	74	147
Mixed/other	82	95	86	92	**89**	85	105
All 1997	**81**	**87**	**90**	**93**	**89**		
All 1995	73	82	84	78		85	
Sample size	97	174	255	247			773

The majority (89%), of record keepers also recorded the area over which the dressing of fertiliser was applied. This aspect of record keeping had improved since 1995.

Table 3(d) Record of fertiliser analysis (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	82	88	90	91	**90**	89	403
Dairy	60	70	70	77	**69**	71	119
Cattle & Sheep	58	67	81	96	**74**	68	147
Mixed/other	91	79	81	89	**85**	87	105
All 1997	**69**	**78**	**84**	**91**	**83**		
All 1995	70	77	85	90		82	
Sample size	97	174	255	247			773

Fewer, although still a high proportion of record keepers (83%), took note of the nutrient analysis of the fertiliser that they had applied, although this was less common among smaller cattle & sheep and dairy farms. There was no change in this aspect of record keeping since the 1995 enquiry.

Table 3(e) Record of fertiliser product or brand name (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	54	71	67	75	**70**	74	403
Dairy	55	67	60	62	**62**	66	119
Cattle & Sheep	55	56	55	61	**56**	66	147
Mixed/other	73	68	61	74	**68**	69	105
All 1997	**57**	**67**	**63**	**72**	**66**		
All 1995	64	62	72	80		71	
Sample size	97	174	255	247			773

Two thirds of record keepers recorded the product or brand name of the fertiliser applied. This was more evident amongst farms growing crops. The 1997 figures suggested that farm managers, particularly those managing larger farms did not find the brand name of a fertiliser as important a record keeping detail as they had in 1995.

2.4 The organisation of field records

Question 9 in the Farm Questionnaire asked if farmers kept fertiliser records for every field on the farm

Table 4 Records kept for each field on farm (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	71	78	91	94	**89**	88	403
Dairy	70	65	86	85	**76**	65	119
Cattle & Sheep	55	79	76	86	**73**	55	147
Mixed/other	55	84	81	87	**81**	85	105
All 1997	**63**	**76**	**86**	**91**	**83**		
All 1995	64	70	81	90		78	
Sample size	97	174	255	247			773

Nine out of ten of the larger farms kept fertiliser records for each field on the farm, especially if they were involved with growing crops. However, only just over half of the smallest cattle & sheep and mixed/other farms kept fertiliser records for each field. The 1997 results show a general improvement in this aspect of completeness of record keeping; notably in the cattle & sheep and dairy sectors.

2.5 The selection of fields for record keeping

Farmers that did not keep fertiliser records for each field on the farm were then asked how they chose which fields (or groups of fields) on which to keep records for manufactured fertilisers. Despite an improved survey questionnaire design in 1997, response to this question was not as high as might have been expected, totalling 168 entries from 117 of the 548 farms that had reported that they did not keep records for each field on the farm.

Table 4a The basis for choosing selected fields

	Farm count 1997	% of responding farms in **1997**	% of responding farms in **1995**
Type of cropping	95	81	70
Past cropping history	42	36	19
Location of field	24	21	21
Requirement of scheme/grant (e.g. NSAs)	2	2	5
Other	5	4	7

Table 4a shows the farm counts expressed as a proportion (%) of the number of farms that responded to the question. These are contrasted with those reported for 1995. Note that the 1995 results were calculated as proportions of a small sample of only 43 responding farms and so any comparisons should be made with some caution. The percentages in the right hand columns sum to more than 100% because some farmers took more than one of the factors listed into consideration when selecting fields for record keeping. Most farms selected fields for fertiliser record keeping on the type of cropping (81%), others on account of their past cropping history, or because of their location on the farm. As in 1995, only 2 farms kept records on fertiliser applications through obligation to an agri-environment scheme (e.g. Nitrate Sensitive Areas, ESAs etc.).

Section 3: Record Keeping for Organic Fertiliser

Nearly three quarters (i.e. 867 or 73%) of the 1187 farmers surveyed in 1997 had applied organic fertiliser. There appeared to be less significance attached to documenting manure applications, with only a third (304 or 35%) of users keeping any form of record.

3.1 Incidence of Record keeping for organic fertiliser (manure)

Table 5 Record keeping among users of organic fertiliser, by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	11	45	56	66	**55**	51	242
Dairy	24	27	30	17	**26**	27	212
Cattle & Sheep	28	14	17	32	**26**	19	296
Mixed/other	26	39	47	54	**44**	47	117
All 1997	**25**	**27**	**36**	**53**	**35**		
All 1995	26	24	38	54		34	
Sample size	171	235	264	197			867

Overall, a little more than a third (35%) of the farmers that used organic fertiliser in 1997 kept records of their manure applications. The extent of this type of record keeping varied with both farm type and farm size. Around half of the farms involved with crop production (cropping /horticulture and mixed/other), especially the larger categories kept records for their manure spreading. In contrast, only a quarter (26%) of the dairy and cattle & sheep farms kept similar records. Although there is some evidence here of a marginal increase in manure recording levels over those seen on 1995, overall results were very similar.

3.2 Forms of record keeping for organic manure

Table 6 Forms of record keeping among record keepers (shown as count and %)

	Farm count 1997	% of OM record keeping farms in **1997**	% of OM record keeping farms in **1995**
Farm diary	180	59	54
Farm notebook/pocket book	108	36	22
Field record sheet	91	30	29
Computer	49	16	9
Other	13	4	4

The third column of Table 6 shows the counts expressed as percentages of the 304 farms that kept some kind of record of organic manure usage in 1997. It should be remembered that, as with manufactured fertiliser, many farmers made use of more than one system of recording. Farm diaries were the most common form of record keeping for organic manure, with an increased proportion (59%) of farmers favouring their use, compared to 54% in 1995. Increases were also reported in the proportion of farmers that had made use of notebooks and field record sheets, which were both equally popular. The use of computers to record organic fertiliser applications increased substantially from 9% to 16%, up to near the level of usage for manufactured fertiliser. The 'other' responses included reference to bespoke recording systems (e.g. fertiplan) and other alternatives, such as maps and invoices. One farmer made reference to 'a record from sludge supplier'.

Table 6(a) Use of a farmers diary for organic manure record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	**20-50**	**-100**	**-200**	**200+**	**All 1997**	**All 1995**	Sample size
Cropping/horticulture	43	50	42	40	**42**	47	158
Dairy	57	59	41	67	**52**	66	61
Cattle & Sheep	68	71	71	79	**71**	65	70
Mixed/other	60	80	63	35	**54**	46	57
All 1997	**61**	**62**	**50**	**44**	**52**		
All 1995	62	68	57	35		54	
Sample size	51	68	110	117			346

In 1997, 304 farms reported that they had used organic manure and had kept records of their applications. A further 42 farms reported that they also kept records for organic applications even though they had not reported their use during that growing season. As in 1995, a half of these 'record keeping' farms used a diary. These included seven out of ten cattle and sheep

farms along with over half of the dairy and cattle & sheep categories. The figures for aggregated farm size from both surveys suggest that farm diaries were less likely to be used as the size of the farm increased.

Table 6(b) Use of a field record sheet for organic manure record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	57	18	42	40	**39**	38	158
Dairy	7	5	23	33	**13**	16	61
Cattle & Sheep	8	0	6	7	**6**	13	70
Mixed/other	20	40	21	35	**30**	36	57
All 1997	**16**	**13**	**29**	**35**	**26**		
All 1995	15	18	21	51		29	
Sample size	51	68	110	117			346

Field record sheets were used more frequently on cropping, horticulture and mixed/other farms. They also became more prevalent as farm size increased. A third of the largest size category of dairy and mixed farms employed field sheets, but cattle & sheep farms were much less likely to produce individual field records.

Table 6(c) Use of a farm notebook for organic manure record keeping (among organic manure record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	29	32	25	31	**29**	19	158
Dairy	50	41	45	0	**43**	19	61
Cattle & Sheep	24	36	24	7	**23**	23	70
Mixed/other	40	10	37	43	**35**	29	57
All 1997	**33**	**32**	**31**	**30**	**31**		
All 1995	21	21	25	20		22	
Sample size	51	68	110	117			346

Nearly a third (31%) of the farmers used a pocket notebook to account for their organic manure practices, more than had done so in 1995. Increased reporting in use of notebooks was particularly noticeable in the dairy sector. However, overall figures showed little variation between the farm size categories.

Table 6(d) Use of computers for organic manure record keeping (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	25	18	21	30	**25**	15	158
Dairy	0	9	9	0	**7**	5	61
Cattle & Sheep	0	0	0	14	**3**	2	70
Mixed/other	0	10	0	9	**5**	9	57
All 1997	**4**	**10**	**12**	**23**	**14**		
All 1995	2	3	7	19		9	
Sample size	51	68	110	117			346

In 1997, the proportion of farms using computers to record their organic manure usage increased in all but the cattle & sheep farm type category, and was particularly apparent in the cropping/horticulture sector. Only 14% of the operators of large cattle and sheep farms opted to use computers for this purpose.

Table 6(e) Farmers using 'other' types of paper record to record organic manure applications (among record keepers), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	0	0	2	4	**3**	4	158
Dairy	7	5	9	0	**7**	5	61
Cattle & Sheep	4	0	12	0	**4**	2	70
Mixed/other	0	0	0	9	**4**	4	57
All 1997	**4**	**1**	**5**	**4**	**4**		
All 1995	9	3	3	3		4	
Sample size	51	68	110	117			346

As in 1995 few farmers listed alternative forms of record keeping. However, there was mention of maps, informal notes and one invoice from a 'supplier'.

3.3 The level of detail in organic manure records.

Respondents that maintained records for organic manure applications were then questioned as to the level of detail provided by their records.

Table 7 Detail of record keeping among organic manure record keepers (shown as count and %)

	Farm count 1997	% of OM record keeping farms in **1997**	% of OM record keeping farms in **1995**
Area over which applied	300	87	68
Application date	272	79	17
Application rate	161	47	46
Type	120	35	39
Analysis	35	10	21

Most farmers (87%) recorded the area over which manure was applied. More than three-quarters recorded the date; a dramatic increase in this detail when compared to the 1995 figure. Half of the farms recording organic fertiliser applications recorded the rate of application, and a third the type of manure spread. Only one in ten farmers reported having an analysis (or nutrient content) of the manure that they had spread.

Table 7(a) Record of area of farm/fields (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	**20-50**	**-100**	**-200**	**200+**	**All 1997**	**All 1995**	Sample size
Cropping/horticulture	86	73	85	88	**85**	74	158
Dairy	93	82	86	100	**87**	69	61
Cattle & Sheep	72	93	100	93	**87**	63	70
Mixed/other	100	90	89	91	**91**	61	57
All 1997	**82**	**82**	**88**	**90**	**87**		
All 1995	53	65	68	78		68	
Sample size	51	68	110	117			346

The area of application was well documented amongst record keeping farms, with much less variation between farm size and type classifications in 1997 than was observed in 1995. There was a suggestion in the 1995 report that some of the variation shown could have been attributed to misinterpreting the questionnaire as referring to the geographical location on the farm as opposed to the physical area over which manure had been spread.

Table 7(b) Record of application rate (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	71	27	52	58	**53**	54	158
Dairy	43	45	50	67	**48**	45	61
Cattle & Sheep	20	36	24	57	**31**	31	70
Mixed/other	60	40	42	52	**47**	46	57
All 1997	**37**	**37**	**45**	**57**	**47**		
All 1995	45	38	44	56		46	
Sample size	51	68	110	117			346

Around half of the farmers recorded the rate at which organic manure had been applied. This was more likely to have happened on larger farms. The level of recording for this detail was very similar to that reported in 1995.

Table 7(c) Record of type of manure (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	57	50	38	47	**45**	47	158
Dairy	21	32	32	33	**30**	33	61
Cattle & Sheep	16	14	24	29	**20**	27	70
Mixed/other	60	30	16	35	**30**	39	57
All 1997	**27**	**34**	**31**	**42**	**35**		
All 1995	28	32	37	52		39	
Sample size	51	68	110	117			346

Overall the type of manure applied was recorded by 35% of the farmers in question; a reduced proportion when compared to that reported in 1995. As might have been expected, this detail was least likely to have been recorded on smaller farms, and in particular cattle & sheep farms.

Table 7(d) Record of the analysis of manure (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	29	5	4	21	**13**	29	158
Dairy	14	5	27	0	**15**	16	61
Cattle & Sheep	0	0	0	7	**1**	11	70
Mixed/other	20	10	5	4	**7**	19	57
All 1997	**10**	**4**	**8**	**15**	**10**		
All 1995	13	15	20	29		21	
Sample size	51	68	110	117			346

The overall incidence of recording of organic manure analysis was low in 1995 and had dropped even lower in 1997, with only one in ten farmers recording such detail. Distribution of the results was irregular but, again as might be expected, extremely low in the cattle/sheep category.

Table 7(e) Record of application date (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	86	64	85	74	**77**	13	158
Dairy	86	82	77	100	**82**	24	61
Cattle & Sheep	84	86	71	86	**81**	11	70
Mixed/other	60	100	68	78	**77**	23	57
All 1997	**82**	**79**	**78**	**77**	**79**		
All 1995	17	19	16	16		17	
Sample size	51	68	110	117			346

In direct contrast to results obtained from the same question in 1995, eight out of ten farmers that documented their manure spreading, recorded the date of application. There appeared to be uniform acceptance that this was an important detail with little variation in the results across the size/type farm classifications.

3.4 The organisation of field records

Farmers were then asked if they kept records for organic fertiliser for each field on the farm.

Table 8 Record keeping for each field on farm (among record keepers for organic manure), by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All 1997	All 1995	Sample size
Cropping/horticulture	71	86	79	86	**83**	14	158
Dairy	50	64	73	100	**66**	31	61
Cattle & Sheep	52	71	94	71	**70**	42	70
Mixed/other	80	70	84	96	**86**	28	57
All 1997	**57**	**74**	**81**	**86**	**78**		
All 1995	36	32	23	18		25	
Sample size	51	68	110	117			346

Three quarters (78%) of farms keeping records on organic manure in 1997 did so for each field, or group of fields, on the farm. Larger farms that grew crops showed the highest incidence of record keeping for the whole farm. Dairy, cattle & sheep and small farms were less likely to do so. Overall the proportional levels reported in 1995 were very different from those shown by the 1995 Survey.

3.5 The basis for selecting fields for record keeping of organic fertiliser

If farmers did not keep records for organic manure for each field on the farm, they were then asked how they chose fields, or groups of fields on which to keep records. When a similar question was asked in 1995 the response rate was low (141 entries from 318 record keeping farms). The 1997 questionnaire had been redesigned to improve on this, but again the response rate was lower than it should have been (91 entries for the 918 farms that did not keep manure records for each field).

Table 9 The basis for selecting fields for organic manure record keeping (shown as count and %)

	Farm count 1997	% of OM record keeping farms in **1997**	% of OM record keeping farms in **1995**
Type of cropping	39	4	7
Past cropping history	27	3	1
Location of field	18	2	3
Other	7	1	2
Requirement of scheme/grant (e.g. NSAs)	0	0	0

Table 9 illustrates the distribution of the 91 entries that were registered for this section of the survey and contrasts them with the 13 entries from 1995. Results from both surveys indicate that criteria that influence whether a farmer keeps records for organic fertiliser are similar in terms of

priority to those that would motivate them to keep records for manufactured fertiliser. However, again the sample was too limited for any firm conclusions to be drawn. In 1997, as in 1995, the most common reason for keeping records of organic fertiliser applications was the type of crop that was due to be grown on a particular field. Past cropping history and the location of a field were also significant factors. In either survey, none of the farms surveyed reported requirement to maintain manure records as part of any agri/environment management scheme (e.g. Nitrate Sensitive Areas Scheme etc).

Section 4: Use of computers on farms

For the final question on record keeping in the questionnaire, farmers were asked if they used a computer for any farm business other than fertiliser application record keeping.
412 farms reported that they used a computer. Of these 167 used a computer for records of manufactured fertiliser and other farm business. The remaining 245 farms used a computer for farm business, but not for manufactured fertiliser records. Only 47 or 4% of farmers used a computer for farm business including keeping records for manufactured as well as organic fertiliser.

Table 10 Use of a computer for other farm business, by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All	Sample size
Cropping/horticulture	23	35	46	65	49	460
Dairy	18	28	43	47	33	144
Cattle & Sheep	12	17	18	27	17	221
Mixed/other	22	24	41	50	37	362
All	16	26	37	55	35	
Sample size	231	305	366	285		1187

Table 12 shows that over a third (35%) of the sample population used a computer for farm business other than fertiliser record keeping. Incidence of computer use correlated with increased farm size, but overall even 16% of the smallest farm size class used a computer for business in 1997. Half of the cropping/horticulture enterprises (two thirds of the largest of that type of holding) and at least a third of the mixed other and dairy categories used computers. Cattle and sheep farmers were the least likely to have used a computer for their business, amounting to just one in four (27%) of the largest farms but considerably less on smaller units.

Table 10a Use of a computer for business but not for records of manufactured fertiliser applications, by farm type and farm size (shown as %)

Farm size (ha)	20-50	-100	-200	200+	All	Sample size
Cropping/horticulture	19	15	24	23	21	460
Dairy	18	25	38	42	29	144
Cattle & Sheep	11	16	15	16	14	221
Mixed/other	22	17	30	20	23	362
All	15	18	25	22	21	
Sample size	231	305	366	285		1187

One in five (21%) of the farms surveyed used a computer but not for fertiliser record keeping. Distribution of these farms was comparatively even across the range and reflected the figures shown in Table 10 for computer uptake. Dairy farms were the most likely farm type to use a computer but not for fertiliser records.

Section 5: Discussion

The results on record keeping collected by the 1997 supplementary question to the survey of fertiliser practice correspond well with the results to similar questions posed by the 1995 survey. This implies that many of the comments made then, particularly regarding differentiating between questionnaire categories of farm size and type are still largely relevant to the later results. This is a good indication that information provided by either survey is well founded.

There was a close correlation between the size of farming enterprise concerned and the sophistication of the record keeping; this appeared more marked in the 1997 survey. Large cropping/horticulture farms were the most likely to keep good records. In contrast, smaller dairy, and cattle and sheep holdings often did not keep any fertiliser records.

The type of farm involved had a profound effect on fertiliser recording practice. For instance farms with livestock are more likely to use organic manure as a fertiliser. Conversely, large cropping or horticultural farms are more likely to apply larger quantities of manufactured fertiliser. Average farm size has increased, often to take advantage of economies of scale in production. In line with these efficiency improvements and an increased awareness of marginal production costs, there comes an increased need for good documentation of all farm inputs. Fertiliser record keeping is therefore likely to improve as long as this is the case. At the same time there is also increased awareness that considerable savings can be made through monitoring soil nutrient status and adjusting inputs accordingly.

It is perhaps surprising that the two surveys have had so little feedback from farmers keeping fertiliser records as part of their commitment to an agri-environmental scheme. Areas managed by such schemes have increased in recent years and it would be of interest to follow their impact in terms of fertiliser practice and record keeping in time to come. It would also not be surprising

to find that more recent concerns over food quality and traceability would manifest in a further improvement in fertiliser records if a similar investigation was carried out today.
On farm handling and spreading of fertiliser have also changed in recent years. Again increased farm size demands that fertiliser is supplied in bulk. Modern management practices discourage the keeping of stocks and buyers have access to the same fertiliser products from a more accessible range of sources. This may explain, to some extent, a reduced interest in brand names of fertiliser applied, with more emphasis instead on the chemical analysis of a fertiliser. Increase use of customised fertiliser blends, especially in liquid fertilisers will also have a bearing on this.

Record keeping for manufactured fertiliser tended to be more detailed. Less than half of farmers that claimed to keep records for organic fertiliser actually recorded a date, rate and area for each application. However some farms appeared to keep comprehensive detailed records for all field inputs. Most farmers kept records for each field on the farm. Those that selected fields for record keeping usually did so on account of the type of crop that they intended to grow.

Many farmers used a least one type of paper record. Initial records were often noted in diaries and notebooks for subsequent transcription to more formal and organised records such as field record sheets and computer files. There was evidence that the use of computers for record keeping had increased significantly over the two-year period between the surveys. However, there are many farmers that use computers for farm business, but not for their fertiliser records.

Cattle and sheep farmers, although not necessarily heavy users of fertiliser, appeared to be conscientious in their level of record keeping, if they did keep records. By contrast, dairy farms, already noted for their comparatively high level of usage for both manufactured fertiliser and manure, reported low levels of record keeping. The dairy farming sector has also achieved significant efficiency gains, owed, in part to their adoption of computer systems that monitor food intakes and milk outputs etc. It would seem logical that, by quantifying and recording their fertiliser applications, further gains could be still be made through the management of inputs to maximise response. The 1997 survey results suggest that many dairy farms already have computer facilities available and could be encouraged to apply them to this purpose. Dairy farmers are not alone in this respect; survey estimates suggest that one in five farms use computers for farm business, but not for fertiliser record keeping.

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Edinburgh University Data Library, (Printed June 1998)