

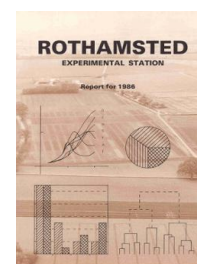
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## Rothamsted Experimental Station Report for 1986

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### Use of Fertilizers in England and Wales, 1986

**J. I. Elsmere**

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## Use of fertilizers in England and Wales, 1986

J. I. ELSMERE

This series of annual surveys continued in 1986 as a collaborative project between ADAS soil scientists, representatives of the Fertiliser Manufacturers' Association and Rothamsted. A sample of 1167 farms was surveyed by Farm Research Limited on behalf of the Fertiliser Manufacturers' Association during June, July and early August. A similar survey was again done in Scotland, with the collaboration of the Scottish Colleges, on a sample of 257 farms. The results of this survey will be reported elsewhere.

Compared with 1985, the survey estimates for England and Wales show no change in total use of N, P and K per hectare for all crops and grass (Table 1). However, continuing the general trend for the last few years, use of N in compound fertilizers continues to decrease. This is particularly noticeable in the winter cereals, where the proportion of area receiving any N in compound has decreased between 1984 and 1986 from 67% to 44% for winter wheat, and from 79% to 52% for winter barley. After an estimated increase last year, winter wheat received 186 kg ha<sup>-1</sup> total N, which was about the same as in 1984 (Table 2). Winter barley, which now accounts for 25% of the cereal area, compared to 6% in 1975, received 148 kg ha<sup>-1</sup> total N, which is about the same as in 1984 and 1985.

TABLE 1  
*Fertilizer use on tillage crops and grassland (kg ha<sup>-1</sup>), 1983-86*

	Tillage crops				Grassland				All crops and grass			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
N Straight	116	128	134	132	69	71	70	77	91	99	102	106
Compound	37	34	27	24	57	61	61	57	48	48	44	40
Total	154	162	161	156	126	132	131	135	139	147	146	146
P <sub>2</sub> O <sub>5</sub>	54	61	56	56	26	25	24	22	39	42	40	40
K <sub>2</sub> O	60	68	63	63	28	33	32	33	44	50	48	48

TABLE 2  
*Fertilizer use on winter wheat, winter barley and spring barley (kg ha<sup>-1</sup>) 1983-86*

	Winter wheat				Winter barley				Spring barley			
	1983	1984	1985	1986	1983	1984	1985	1986	1983	1984	1985	1986
N Straight	167	171	181	177	130	131	136	136	51	44	53	58
Compound	16	16	11	9	20	18	15	12	57	54	49	45
Total	182	187	192	186	150	149	150	148	107	98	102	103
P <sub>2</sub> O <sub>5</sub>	51	56	54	55	52	57	55	54	39	39	38	37
K <sub>2</sub> O	46	53	52	52	54	59	58	59	44	44	44	44

Spring barley shows very little change in the use of total N, P and K per hectare, but straight N usage increased (at the expense of compound N) from 53 kg ha<sup>-1</sup> in 1985 to 58 kg ha<sup>-1</sup> in 1986. This year, there has been an increase in use of urea from just under 1% of the total straight N used to just over 7%. This appears to have been at the expense of ammonium nitrate on winter cereals and oilseed rape. For all tillage crops, use of P and K per hectare fluctuated only slightly during the past few years, and was much the same in 1986 as in 1985.

Average N use on sugar beet is still above general recommendations: after a noticeable drop in 1985, usage was sustained at the lower level. There were corresponding changes in use of K on sugar beet.

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Average use of total N on grass increased slightly this year to  $135 \text{ kg ha}^{-1}$ . The general trend of using less N in compound was compensated by an increase of 10% in straight N usage. Use of N on grassland is very much determined by how the grass is managed, and varies from  $211 \text{ kg ha}^{-1}$  on grass cut for silage down to  $112 \text{ kg ha}^{-1}$  on grass that is grazed only.

The average amounts of fertilizer nutrients used per hectare in 1986 on individual tillage crops, and on grassland classified according to utilization, and the proportions of each crop which got different amounts of nutrients are summarized in Tables 3–8 at the end of this paper.

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TABLE 3  
Fertilizer use in England and Wales, 1986

	Fields	Hectares ('000)	Overall* (kg ha <sup>-1</sup> )			% Area receiving				Actual* (kg ha <sup>-1</sup> )		
			N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P	K	FYM	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
Spring wheat	75	29	137	41	41	99	78	73	2	139	52	56
Winter wheat	3225	1911	186	56	52	100	85	79	13	187	66	66
Spring barley	1114	523	103	37	44	97	89	89	25	106	42	50
Winter barley	1540	946	148	54	59	100	90	89	18	149	60	65
Spring oats	61	21	88	30	34	96	83	87	35	92	36	39
Winter oats	106	43	110	42	50	98	77	81	13	112	55	62
Rye	46	20	139	41	54	100	81	86	8	139	50	63
Maize	30	10	77	28	37	96	64	67	67	80	44	56
Early potatoes	79	22	187	201	225	100	100	100	42	187	201	225
Maincrop potatoes	292	98	195	203	264	100	99	99	44	196	205	266
Sugar beet	554	227	128	61	139	98	93	95	27	130	65	146
Oilseed rape	523	315	261	62	56	100	95	86	6	261	65	64
Swedes (stock)	57	19	44	75	67	90	90	89	44	49	84	75
Turnips (stock)	58	16	75	49	55	95	82	83	63	79	60	67
Kale and cow cabbage	56	11	129	49	60	90	92	92	45	143	54	65
Beans for stockfeed	139	62	4	33	26	13	52	42	9	35	64	61
Other stockfeed	75	28	64	32	50	67	69	80	35	96	46	62
Peas for human consumption	329	136	4	26	27	16	46	46	10	22	57	60
Runner and French beans	31	8	155	97	119	89	87	93	25	174	111	128
Brussels sprouts	45	9	242	86	192	100	100	100	2	242	86	192
Cabbages	56	9	160	70	122	99	88	88	1	162	80	139
Cauliflower	53	12	200	72	146	96	83	93	9	209	87	157
Onions	58	10	102	103	155	100	93	93	16	102	110	167
Small fruit	63	13	64	53	89	91	82	82	5	70	64	108
Top fruit	103	29	36	18	41	64	52	56	10	56	34	72
All tillage	9206	4650	156	56	62	94	86	82	17	165	66	76
1 year leys	39	18	155	35	40	100	64	66	26	155	55	61
2-7 year leys	2514	1481	192	31	50	94	73	75	51	203	42	66
Permanent grass	3294	2763	104	18	24	77	56	57	41	134	32	43
All crops and grass	15053	8912	146	40	48	89	74	73	30	164	54	66

\* The average application of any fertilizer component over all fields including those receiving none is termed 'overall'. The average excluding fields with none of the component is termed 'actual'.

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TABLE 4  
Percentages of crop area getting different amounts of N ( $\text{kg ha}^{-1}$ )

	Fields	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+
Spring wheat	75	1	2	1	3	10	19	22	35	7	0	0	0
Winter wheat	3225	0	0	0	2	3	3	10	38	38	5	0	0
Spring barley	1114	3	1	7	18	19	22	22	7	0	1	0	0
Winter barley	1540	0	0	0	3	7	14	29	39	6	1	1	0
Spring oats	61	4	6	19	14	14	13	22	8	0	0	0	0
Winter oats	106	2	0	3	20	13	27	13	22	0	0	0	0
Rye	46	0	1	4	3	10	15	32	24	8	2	0	0
Maize	30	4	10	5	27	31	21	0	3	0	0	0	0
Early potatoes	79	0	0	0	0	2	3	28	35	18	14	1	0
Maincrop potatoes	292	0	0	2	1	2	5	10	36	28	12	3	0
Sugar beet	554	2	0	3	6	9	18	42	15	3	1	0	0
Oilseed rape	523	0	0	1	0	1	1	1	5	28	40	23	1
Swedes (stock)	57	10	16	40	24	11	0	0	0	0	0	0	0
Turnips (stock)	58	5	0	17	41	18	3	15	2	0	0	0	0
Kale and cow cabbage	56	10	0	13	4	3	28	16	13	0	1	13	0
Beans for stockfeed	139	87	10	0	0	1	2	0	0	0	0	0	0
Other stockfeed	75	33	13	8	5	13	13	2	6	7	0	0	0
Runner and French beans	31	11	0	7	1	1	0	29	22	5	23	0	0
Brussels sprouts	45	0	0	0	1	0	1	11	21	21	18	26	0
Cabbages	56	1	0	3	7	4	23	17	22	11	4	7	0
Cauliflower	53	4	0	5	0	10	1	7	5	38	25	6	0
Onions	58	0	2	32	16	5	12	9	19	2	0	3	0
Small fruit	63	9	17	33	14	4	2	0	21	0	0	0	0
Top fruit	103	36	13	21	14	8	6	2	0	0	0	0	0
All tillage	9206	6	1	2	5	6	9	16	28	20	5	2	0
1 year leys	39	0	0	4	21	7	4	27	13	10	3	11	0
2-7 year leys	2514	6	1	8	7	8	6	8	13	11	11	15	7
Permanent grass	3294	23	3	14	12	10	6	7	9	6	4	6	1
All crops and grass	15053	11	2	7	7	7	7	12	20	14	6	5	1

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TABLE 5  
Percentages of crop area getting different amounts of  $P_2O_5$  ( $kg\ ha^{-1}$ )

	Fields	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+
Spring wheat	75	22	9	28	30	5	6	0	0	0	0	0	0
Winter wheat	3225	15	2	16	49	13	3	1	1	0	0	0	0
Spring barley	1114	11	19	46	20	2	1	0	0	0	0	0	0
Winter barley	1540	10	4	22	51	12	1	0	0	0	0	0	0
Spring oats	61	17	30	39	14	0	0	0	0	0	0	0	0
Winter oats	106	23	1	29	45	2	0	0	0	0	0	0	0
Rye	46	19	6	36	35	4	0	0	0	0	0	0	0
Maize	30	36	13	30	22	0	0	0	0	0	0	0	0
Early potatoes	79	0	0	0	3	7	0	5	34	30	15	5	0
Maincrop potatoes	292	1	0	1	4	2	3	7	34	25	15	8	0
Sugar beet	554	7	2	39	29	12	6	3	2	1	0	0	0
Oilseed rape	523	5	2	13	62	13	3	0	2	0	0	0	0
Swedes (stock)	57	10	9	21	22	12	10	8	4	5	0	0	0
Turnips (stock)	58	18	16	31	12	12	5	7	0	0	0	0	0
Kale and cow cabbage	56	8	15	28	46	2	0	2	0	0	0	0	0
Beans for stockfeed	139	48	1	16	28	2	3	0	2	0	0	0	0
Other stockfeed	75	31	15	28	20	5	0	1	0	0	0	0	0
Peas for human consumption	329	54	2	15	24	2	1	1	1	0	0	0	0
Runner and French beans	31	13	0	6	32	4	12	10	23	0	0	0	0
Brussels sprouts	45	0	0	9	36	29	22	3	0	2	0	0	0
Cabbages	56	12	4	27	12	15	20	6	4	0	0	0	0
Cauliflower	53	17	0	10	26	29	1	13	3	1	0	0	0
Onions	58	7	0	7	30	16	4	19	8	9	0	0	0
Small fruit	63	18	12	16	28	25	0	1	0	0	0	0	0
Top fruit	103	48	21	22	4	4	0	0	0	0	0	0	0
All tillage	9206	14	5	22	42	10	3	1	2	1	0	0	0
1 year leys	39	36	2	34	22	2	3	1	0	0	1	0	0
2-7 year leys	2514	27	24	29	14	3	2	1	0	0	0	0	0
Permanent grass	3294	44	33	16	4	1	1	0	0	0	0	0	0
All crops and grass	15053	26	17	21	25	6	2	1	1	0	0	0	0

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TABLE 6  
Percentages of crop area getting different amounts of  $K_2O$  ( $kg\ ha^{-1}$ )

	Fields	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+
Spring wheat	75	27	4	30	26	10	3	0	1	0	0	0	0
Winter wheat	3225	21	2	15	44	14	2	1	0	0	0	0	0
Spring barley	1114	11	8	42	31	5	2	0	0	0	0	0	0
Winter barley	1540	11	3	15	51	15	4	1	0	0	0	0	0
Spring oats	61	13	26	36	25	0	0	0	0	0	0	0	0
Winter oats	106	19	1	12	59	6	0	2	0	0	0	0	0
Rye	46	14	0	26	43	13	4	0	0	0	0	0	0
Maize	30	33	8	15	32	11	0	0	0	0	0	0	0
Early potatoes	79	0	0	0	0	6	0	18	12	32	18	14	0
Maincrop potatoes	292	1	0	1	3	1	3	1	8	25	25	31	1
Sugar beet	554	5	0	4	10	15	13	11	18	20	3	1	0
Oilseed rape	523	14	1	14	55	12	4	0	1	0	0	0	0
Sweeds (stock)	57	11	9	16	25	21	9	1	7	0	0	0	0
Turnips (stock)	58	17	13	23	21	7	12	7	0	0	0	0	0
Kale and cow cabbage	56	8	12	26	22	10	15	5	2	0	0	0	0
Beans for stockfeed	139	58	0	12	24	5	1	0	0	0	0	0	0
Other stockfeed	75	20	8	27	28	6	8	1	1	1	0	0	0
Peas for human consumption	329	54	0	15	26	2	1	1	1	0	0	0	0
Runner and French beans	31	7	0	1	25	10	13	10	29	4	3	0	0
Brussels sprouts	45	0	0	0	0	0	4	32	14	36	11	2	0
Cabbages	56	12	1	11	8	9	10	19	12	10	8	0	0
Cauliflower	53	7	0	2	3	3	27	21	11	27	10	0	0
Onions	58	7	0	1	6	17	3	13	16	27	10	0	0
Small fruit	63	18	0	5	8	18	47	0	2	2	0	0	0
Top fruit	103	44	8	20	9	11	0	3	0	4	0	0	0
All tillage	9206	18	3	17	39	12	4	2	2	2	1	1	0
1 year leys	39	34	5	19	35	2	2	1	0	3	0	0	0
2-7 year leys	2514	25	15	20	17	7	6	6	3	1	0	0	0
Permanent grass	3294	43	27	15	7	3	2	1	1	0	0	0	0
All crops and grass	15053	27	12	17	26	8	4	2	2	1	1	0	0

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TABLE 7  
Fertilizer use on grassland classified by utilization†

Fields	% Grassland area	Overall* (kg ha <sup>-1</sup> )			% Area receiving					Actual* (kg ha <sup>-1</sup> )		
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N	P	K	FYM	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	
Paddock grazed												
Not mown	3	218	28	33	90	65	65	27	243	43	51	
Mown	3	171	34	50	97	75	74	69	177	45	67	
All paddock grazed	6	197	31	41	93	70	69	46	212	44	59	
Strip grazed												
Not mown	1	230	36	34	100	76	77	48	230	47	44	
Mown	2	225	31	64	99	82	90	81	227	37	72	
All strip grazed	3	227	33	50	100	80	84	66	228	42	60	
Set stocked												
Not mown	13	167	20	23	85	57	57	40	198	36	41	
Mown	12	182	28	52	93	70	74	58	196	40	71	
All set stocked	25	174	24	37	88	63	65	48	197	38	57	
Other grazings												
Not mown	37	79	16	16	73	52	52	28	108	30	32	
Mown	24	150	27	49	91	75	76	64	164	36	64	
All other grazings	61	107	20	29	80	61	61	42	133	33	48	
All grazings	95	134	22	32	84	63	63	44	160	35	51	
Cut for seed												
All cut for seed	0	171	61	68	95	93	82	0	180	65	83	
Cut for silage												
Not grazed	2	223	34	61	98	70	77	61	228	49	78	
Grazed extensively	13	204	34	70	97	84	87	71	210	41	81	
Grazed intensively	10	225	31	64	98	79	83	71	231	39	77	
All cut for silage	25	214	33	67	97	81	85	71	220	41	79	
Cut for hay												
Not grazed	1	80	10	15	59	26	28	19	135	37	53	
Grazed extensively	10	83	17	22	84	62	62	54	98	28	35	
Grazed intensively	6	109	26	35	87	63	63	49	125	41	55	
All cut for hay	17	92	20	26	84	60	60	50	110	33	43	
All mowings	43	165	28	50	92	72	75	62	179	38	67	
Not stated/not used	2	83	19	21	72	53	52	22	115	36	40	
All grass	100	134	22	33	84	62	63	44	160	36	52	

\*The average application of any fertilizer component over all fields including those receiving none is termed 'overall'. The average excluding fields with none of the component is termed 'actual'.

†Note that fields which are both grazed and mown will appear in both grazing and mowing sections of the table.



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**TABLE 8**  
Percentages of crop area getting different amounts of N ( $\text{kg ha}^{-1}$ )

	Fields	0	<25	25-	50-	75-	100-	125-	150-	200-	250-	300-	400+
Paddock grazed													
Not mown	201	10	0	3	5	11	6	15	15	8	11	14	
Mown	157	3	0	11	3	17	8	24	10	10	4	6	
All paddock grazed	358	7	0	7	4	14	7	19	13	9	8	10	
Strip grazed													
Not mown	80	0	0	12	9	8	7	3	9	16	32	4	
Mown	97	1	0	3	4	13	1	29	13	9	16	10	
All strip grazed	177	0	0	7	6	11	4	17	11	12	24	7	
Set stocked													
Not mown	701	15	1	8	9	7	5	10	6	12	15	4	
Mown	653	7	1	11	5	6	4	9	11	12	16	4	
All set stocked	1354	12	1	9	7	6	5	7	12	12	16	4	
Other grazings													
Not mown	2087	27	5	20	11	11	4	6	7	4	2	1	
Mown	1599	9	1	9	12	10	8	10	13	10	7	2	
All other grazings	3686	20	3	16	12	11	6	7	9	6	4	2	
All grazings	5575	16	2	13	10	9	6	7	11	8	6	3	
Cut for seed													
All cut for seed	21	5	0	0	4	0	0	25	36	20	5	0	
Cut for silage													
Not grazed	129	2	0	1	7	5	11	4	21	7	10	5	
Grazed extensively	908	3	0	4	4	7	7	10	17	15	11	5	
Grazed intensively	604	2	0	4	3	3	4	9	19	15	16	6	
All cut for silage	1641	3	0	4	4	5	6	9	18	14	13	5	
Cut for hay													
Not grazed	85	41	0	4	4	13	2	16	8	7	4	0	
Grazed extensively	629	16	2	15	23	14	9	10	7	3	1	0	
Grazed intensively	355	13	2	18	11	10	13	8	13	5	2	2	
All cut for hay	1069	16	2	15	17	12	10	10	9	4	2	1	
All mowings	2734	8	1	8	9	8	8	9	14	10	8	3	
Not stated/not used	98	28	7	10	14	2	14	13	4	1	2	0	
All grass	5901	16	2	12	10	9	6	7	11	7	6	3	