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Effects of rainfall on milk yields in areas with drainage difficulties

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ABSTRACT

In this study the herd milk yield per cow of all suppliers to a major dairy processing company who supplied milk in each of the years 1977 to 1981 is analysed. Farms are classified according to the number of milking cows in 1978 and according to the dominant soil type in their area.

A relationship between the change in milk yield from year to year and soil-type was established. Milk yields declined in each of the years 1979, 1980 and 1981 compared with 1978. The decline was greatest on soils with drainage problems. It is suggested that high rainfall levels in the area in the summer months of these years had a different effect on milk yields on different types of soil.

Introduction

Background

Gardiner and Radford (1) have published a general soil map of Ireland with commentary on 44 different soil associations and a special chapter on the potential land use of different soils. Earlier Lee and Diamond (2) had published a discussion on the potential of Irish land for livestock production, including a map classifying each soil association in relation to its grazing capacity. Lee and Finch (3) prepared a grazing capacity map of the soils in county Kerry for inclusion in a Resource Survey of that county. This map was based on a reconnaissance soil survey of the county.

Fifty-one per cent of the soils of Kerry are described (3) as lowland Mineral soils, the balance being mountain and peat. Of the lowland mineral soils about 40 per cent are described as well drained with the balance of 60 per cent being poorly drained. These differences are reflected in the grazing capacity map (Fig. 1) where the free-draining soils have a grazing capacity in excess of 70 livestock units per 100 acres, while the poorly drained soils have a capacity of 50—70 units and the mountain and peat-land a capacity under 25 units per 100 acres.

Dairying is an important farm enterprise in the county with the bulk of the milk being sold to Kerry Co-op Creameries Ltd., with manufacturing facilities at Listowel. The Co-op conducts an annual census of cows milked by their suppliers. Data on milk sold by each supplier are also available so that changes in herd milk yields can be established. During the

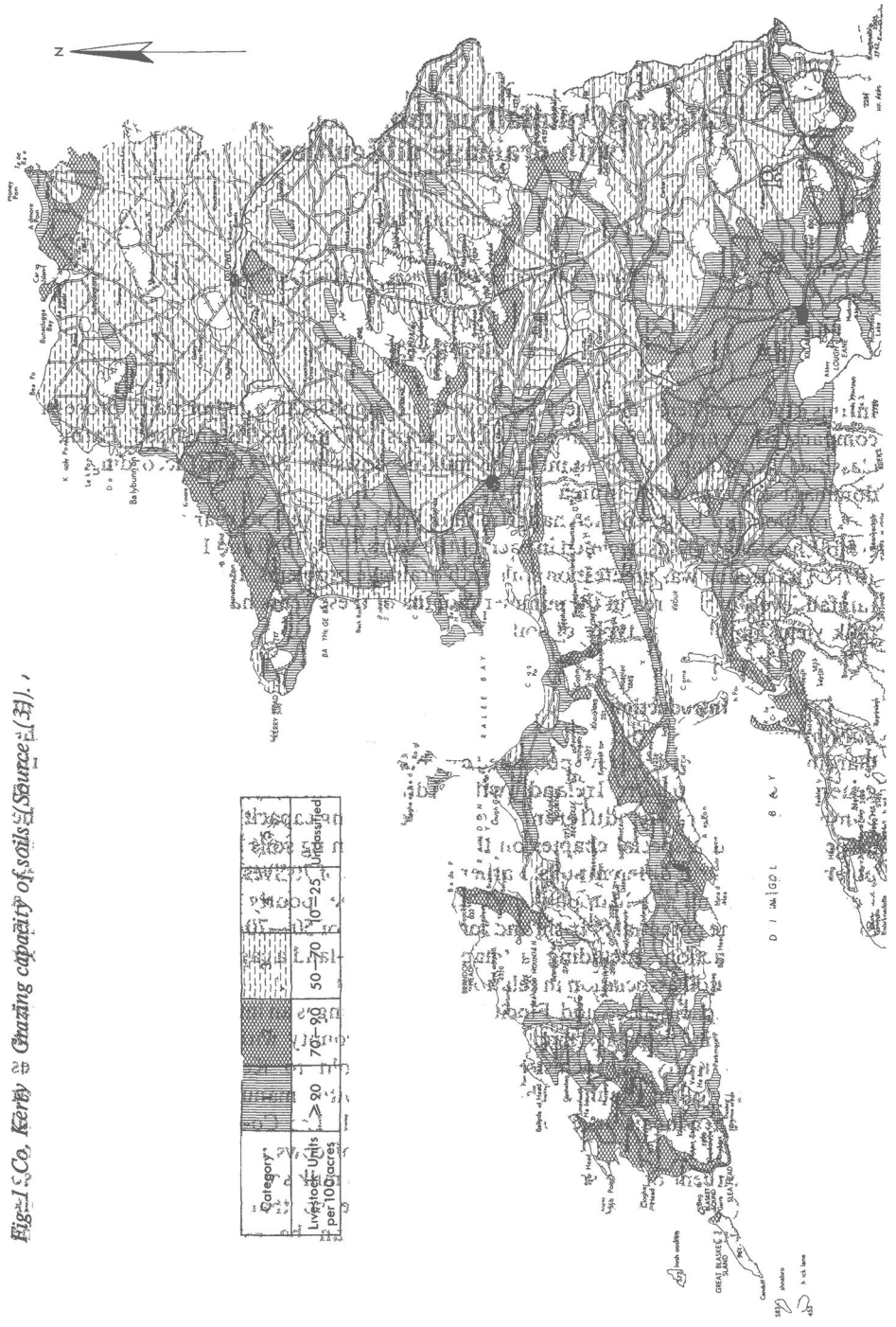

Fig. 1. Co. Kerry: Grazing capacity of soils (Source: [3]).

course of a project carried out for the Co-op the possibility that changes in yield in recent years might vary in different regions arose—and that these might be related to weather conditions and drainage.

This paper shows the steps taken to investigate these matters and the conclusions drawn.

Methodology

Classification of soiltype

The suppliers to Kerry Co-op can be categorised according to the branch creamery to which they deliver their milk (or the branch which they formerly supplied if the milk is now collected ex-farm). The categorisation of farmers by branches also has a legal significance within the Co-op in relation to election of committee and board members. In those areas where milk density is high, branch creameries are approximately four miles apart.

By plotting the location of branch creameries on a soil survey or grazing capacity map (Fig. 1) one can obtain information in relation to the soiltypes in the catchment areas of each individual branch. For the purposes of this study branch creameries were classified in relation to the dominant soiltype in their catchment area. Four classifications were used. Soiltype 1 corresponds with free-draining lowland soils with a grazing capacity in excess of 70 livestock units per 100 acres. Soiltype 3 corresponds with poorly drained mineral soils with a grazing capacity of 50—70 units and is composed almost entirely of Soil Association 22 which covers an extensive area of north and mid Kerry, west Limerick and north-west Cork. Soiltype 4 corresponds with mountain areas. Soiltype 2 is an intermediate classification. For certain branch creameries there were large areas in their catchments both of free draining and poorly draining land such that neither could be described as dominant. These branches were allocated to Soiltype 2. Soiltypes 1 to 3 can be seen as steps in a gradient of declining "drainability". Soiltype 4 has completely different characteristics. The branches allocated to each soiltype are shown in Appendix I. There is one group of bulk suppliers in the north-west of the County (Ardkreem bulk) which are geographically widely scattered and whose links with their original branches have been broken and who for management purposes are classified as a separate branch. These were allocated because of the presumed variability of soil conditions on their farms to Soiltype 2.

Herd milk yield per cow

Milk yields are affected by many factors, the most important of which is probably the quality of management on the farm. This factor is usually significantly related to the size of herd with the best management in the largest herds. Valid comparisons between different groups of farms would have to take size of herd into account. The data available relates to deliveries to the creamery and understates true yield by the amount of milk retained on farms for household use or for feeding to animals. As a proportion of the total this would be greatest in smaller, less specialised herds and thus the figures available would tend to exaggerate the real yield differences to some degree. Another factor affecting the yield calculation is the estimate of cow numbers. This is made near the peak of the production season, when farmers are asked the numbers of cows in milk. Cows which calved subsequent to that date and contributed to

the volume delivered would therefore be excluded leading to an error in milk yield estimation. (The percentage of cows calving in June, July and August nationally is of the order of six per cent).

In this study the herd milk yield per cow (i.e. total milk yield per farm divided by the number of milking cows on the farm) of all suppliers to Kerry Co-op who supplied milk in each year 1977 to 1981 is analysed. Farms are classified according to the number of milking cows in 1978, and according to the dominant soiltype of their branch. Where calculated herd milk yield is lower than 150 gallons or greater than 1,250 gallons in any year the farm is omitted because it is felt that there may have been an error in the data.

Rainfall

The climate of Kerry is described in (3). Figure 2 from that publication shows average annual rainfall. Three zones are shown corresponding with different rainfall levels. The average annual rainfall in some parts of the zone with highest rainfall is the highest recorded in Ireland. Even in the areas of lowest rainfall in the county annual levels are higher than in most other specialist dairying areas, as rainfall declines in Ireland as one moves east.

Annual weather reports are published by the Meteorological Service of the Department of Communications. These show that in each of the years 1979, 1980 and 1981 there were periods in mid-summer when rainfall was very much in excess of normal. Rainfall data is gathered for the Meteorological Service by many government departments, semi-state bodies, garda stations, voluntary and paid observers scattered through the country. The Meteorological Service publishes for each station a monthly index of rainfall as a percentage of normal. It is therefore possible to derive a rainfall index as a percentage of normal for each county for any period by summing and averaging the indices for the individual recording stations within that county. Table 1 shows rainfall as a percentage of normal in nine "dairying" counties for each month in the grazing season, March to October, in the years 1977 to 1981. In compiling these indices mountain stations were omitted, since they might introduce a bias because of their number and concentration in certain regions and their relative irrelevance to milk production.

It will be noted that in May 1979, June 1980 and May 1981 rainfall was above average in all dairying counties but was particularly high in Kerry in each period. As stated earlier the normal level of rainfall in Kerry is higher than in most other counties so that the differences observed in the indices imply a considerable volume difference. In 1977 and 1978 there was no such period of high rainfall in the periods of maximum grass growth and milk production.

To summarise, Kerry has a high average rainfall. In three recent years this average was greatly exceeded at the peak of the grass and milk production season. Up to 60 per cent of its lowland area is poorly drained with "liability of poaching and rush infestation" (1). The hypothesis to be tested is whether the heavy rainfall on poor draining soils in 1979, 1980 and 1981 was reflected in proportionately lower milk yields than on free draining soils.

Initially it is necessary to establish a base level of milk yield for comparison. Herd milk yields per cow for 1977 and 1978 were calculated for each of the four soiltypes and for each of five size categories.

TABLE 1: Rainfall as % of average 1941–70 by county

Month	Carlow	Clare	Cork	Kilkenny	Kerry	Limerick	Tipperary	Waterford	Wexford
March 1977	154	130	144	146	174	154	150	129	143
April 77	140	139	72	105	105	117	129	76	102
May 1977	42	35	48	40	40	47	36	43	37
June 1977	116	94	59	95	78	84	103	64	99
July 1977	30	74	44	52	70	62	68	47	40
August 1977	127	110	111	113	71	102	104	116	112
September 1977	66	86	67	60	63	58	68	68	61
October 1977	196	136	203	201	185	148	161	215	238
March 1978	92	195	142	100	197	184	150	95	91
April 1978	95	116	105	106	90	105	105	121	94
May 1978	28	29	29	35	33	39	26	29	38
June 1978	88	86	87	66	128	98	82	78	70
July 1978	102	87	98	86	89	87	85	118	116
August 1978	113	87	107	105	114	90	91	126	119
September 1978	32	63	27	26	41	43	43	21	16
October 1978	46	47	41	46	44	53	57	43	51
March 1979	144	157	122	126	159	161	147	109	130
April 1979	112	114	71	102	111	121	110	100	92
May 1979	147	177	132	142	178	194	166	130	135
June 1979	77	85	101	93	88	97	84	96	63
July 1979	17	42	23	18	45	38	27	17	25
August 1979	138	145	124	130	148	154	135	143	129
September 1979	44	70	44	43	64	56	48	42	50
October 1979	195	109	129	188	116	144	134	156	197

TABLE 1: Rainfall as % of average 1941–70 by county *(Condt.)*

Month	Carlow	Clare	Cork	Kilkenny	Kerry	Limerick	Tipperary	Waterford	Wexford
March 1980	152	128	121	138	140	146	145	113	130
April 1980	33	42	40	55	26	56	75	66	31
May 1980	41	42	45	43	36	39	43	47	48
June 1980	145	114	91	87	164	131	113	89	106
July 1980	105	131	174	121	149	156	133	182	140
August 1980	119	102	138	124	118	115	106	134	147
September 1980	134	140	127	137	137	121	130	137	108
October 1980	140	126	150	143	133	153	145	164	151
March 1981	211	168	192	197	198	193	185	192	242
April 1981	68	32	32	51	27	24	32	46	59
May 1981	201	215	240	229	241	275	219	228	191
June 1981	90	105	117	87	119	90	91	116	117
July 1981	61	65	47	49	61	54	64	37	38
August 1981	22	31	27	32	32	35	30	29	19
September 1981	156	159	151	146	154	144	130	155	150
October 1981	96	104	86	83	120	107	102	79	87

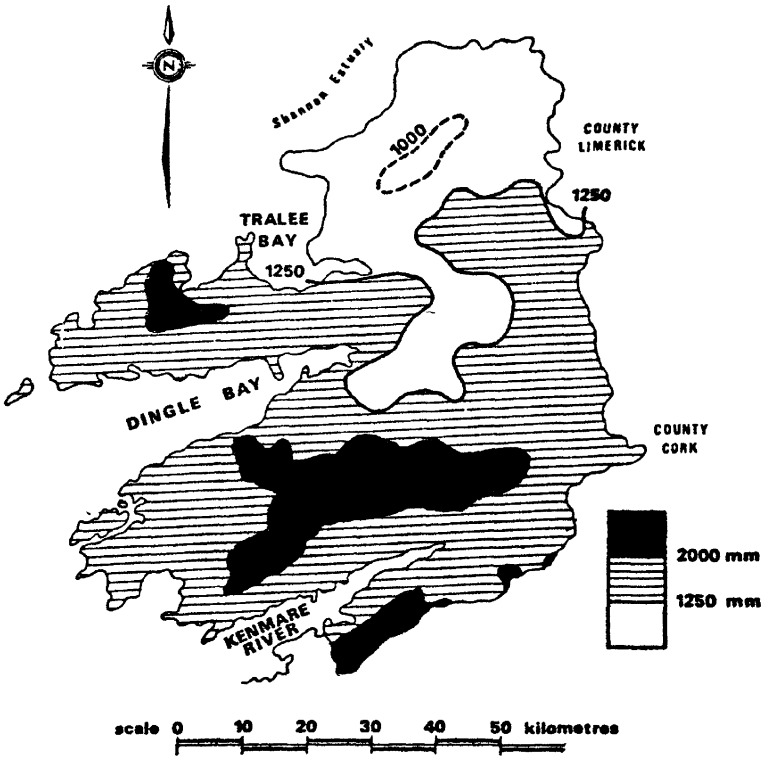

Fig. 2: Average annual rainfall in County Kerry, 1931–1960. (Source: (3)).

It is not suggested that either 1977 or 1978 were in any sense "normal" years. The variability in weather is such that in no growing season is one unlikely to find conditions where rainfall in some months does not vary from the historical average by more than 50 per cent. It is difficult therefore to classify any year as "normal". The two years 1977 and 1978 were, as stated, different types of years at least in the sense that they did not have excess rainfall in mid-summer. Comparisons between those years and the later ones in which excess rainfall was experienced may indicate a casual relationship between excess rainfall and lower yields and this relationship may vary by soil type. However one should also be aware of the possible impact of other weather variables and of rainfall in other parts of the season.

Results

The results are shown in Table 2 for four different size groups. Data for the size group "5 or under" were also compiled, but there appeared to be an error in the herd-count in this category in 1978 and comparisons were therefore only made with 1977.

A slightly disturbing aspect of the yields revealed in Table 2 is that the expected gradual decline in yield within a particular

TABLE 2: Herd milk yields per cow (gallons) by herdsize (1978) and soiltype (No. of herds in brackets)

		Herdsize							
Soiltype	Year	6–10		11–20		21–40		> 40 cows	
Soiltype 1	1977	517.0	(336)	590.6	(659)	664.8	(369)	740.5	(75)
	1978	585.9		655.4		740.2		823.4	
Soiltype 2	1977	546.7	(200)	609.8	(451)	682.3	(446)	756.1	(134)
	1978	616.2		674.5		757.7		815.2	
Soiltype 3	1977	535.9	(320)	576 0	(680)	644.7	(670)	691.7	(196)
	1978	583.0		627.6		699.9		761.6	
Soiltype 4	1977	425.4	(328)	464.8	(248)	521.0	(35)	648.4	(8)
	1978	451.6		511.5		600.7		682.8	

size group as one moves from Soiltype 1 to 4 does not occur. In all but one example yields in Soiltype 2 in both years are ahead of those in Soiltype 1 though these differences are not always statistically significant. In some cases yields on Soiltype 3 are ahead of those on Soiltype 1. It may be that there are regional differences within the county in management ability, e.g. on stocking rates, or there may be some other as yet unquantified factor depressing yields on some farms on Soiltype 1, or raising them in some farms on Soiltype 2. This aspect of the data is being further investigated.

Table 3 shows the percentage change in herd milk yields per cow, that occurred in 1979, 1980 and 1981 compared in each case with 1978, classified according to herdsize and soiltype. In each year the general trend is for a reduction in milk yield compared with 1978. This is consistent with the less favourable grass growing conditions.

However what is of particular interest here is the variation that occurred in the yield changes, between herds of similar size but on different soiltypes. The general picture is that herd yields held up best on mountain soil (Soiltype 4). Indeed there was no significant decline in yields in any of the following years. One of the groups (herds between 21 and 40) actually showed a significant increase on 1978 levels in one year (1980). Yields on mountain soils in general therefore were not adversely affected by the weather conditions of 1979, 1980 and 1981.

Yields on all lowland soils declined in each year in each size group (except 6—10 cows) compared with 1978. In most cases, these decreases were statistically significant. What is more, there is a general pattern whereby the decline in yield tended to increase as one moved from Soiltype 1 to Soiltypes 2 and 3. The difference in the change in milk yield between all soiltypes and size-groups for each year was tested for statistical significance by means of t-tests. There are six pairwise comparisons and the number of these where the percentage yield change was significantly different is shown at the bottom of Table 3 for each size group. (More details are given in Appendix 2).

In general four of the six possible pairwise comparisons in each size group

TABLE 3: Average % change in herd milk yields compared with 1978 by herdsize and soiltype

Soiltype	Year	Herdsize 6–10	11–20	21–40	> 40
	1979	−0.1	+4.5	+3.2	−1.4
Soiltype 4	1980	+1.2	+4.0	+9.8	−0.7
	1981	+5.9	+4.7	+4.0	−0.3
	1979	−0.6	−2.0	−1.1	0.0
Soiltype 1	1980	+0.6	−1.8	−1.0	−0.9
	1981	+0.7	−3.1	−1.6	−3.2
	1979	−5.5	−3.3	−4.2	−3.7
Soiltype 2	1980	−3.8	−3.5	−5.4	−2.8
	1981	−2.0	−4.3	−6.7	−3.3
	1979	−5.6	−6.5	−5.9	−2.8
Soiltype 3	1980	−8.6	−7.7	−6.2	−2.8
	1981	−5.8	−5.1	−5.6	−2.8
No. of significant	1979	4	5	4	–
differences (at 5%	1980	5	5	5	–
level)[a]	1981	5	3	4	–

[a]Soiltype 1 compared to 2, 1 to 3, 2 to 3, 1 to 4, and 3 to 4 for each year and herd size. Full details are given in Appendix.

show significant differences in yield changes in the three smallest size categories. Except for the 11—20 cow group in 1981 the difference between Soiltype 1 and 3 was always significant. The value for Soiltype 2 always lay between that of Soiltype 1 and 3 and with the same exception was always significantly different from at least one of these.

Differences in the largest size group are not significant. This may be due to either or both of two factors. Firstly the number of farms involved (see Table 2) is smaller so that the standard deviations are higher. Secondly the brucellosis eradication scheme may have had a complicating effect in these herds (the incidence of brucellosis is considerably higher in larger herds). Table 4 shows a similar comparison but with 1977 as a base.

Yields in each of the years on each soiltype are higher than in 1977 but by different percentages which in many cases are statistically significant between one soiltype and another. The fact that yields in those "bad-weather" years are higher than in 1977 (a "good-weather" year) may be explained by the acknowledged trend towards improved milk yields.

The differences in yield change between Soiltypes 1, 2 and 3 are again consistent in all size groups under 40 cows with best relative performance on Soiltype 1 and worst on Soiltype 3. The difference in performance between Soiltypes 1 and 3 is statistically significant in each year in each of these four size groups. The relative

TABLE 4: Average % change in herd milk yields compared with 1977 by herdsize and soiltype

Soiltype	Year	Herdsize				
		⩽ 5	6–10	11–20	21–40	> 40
Soiltype 4	1979	7.2	5.0	15.3	18.1	3.4
	1980	8.3	8.0	14.7	24.9	4.5
	1981	12.7	12.4	15.8	18.7	5.4
Soiltype 1	1979	12.6	13.4	9.7	11.2	12.1
	1980	23.5	14.5	10.0	11.4	11.0
	1981	16.1	15.3	8.6	10.6	8.3
Soiltype 2	1979	12.2	7.4	8.0	7.8	4.1
	1980	6.1	10.6	7.8	6.7	4.9
	1981	7.9	10.7	7.0	4.9	4.6
Soiltype 3	1979	3.3	3.7	2.5	2.7	6.8
	1980	2.0	0.8	1.2	2.3	6.4
	1981	5.5	4.2	4.0	2.8	6.2
No. of significant pair differences (at 5% level)	1979	2	3	5	4	1
	1980	3	5	5	6	–
	1981	2	3	5	4	–

See note to Table 3.

performance on Soiltype 4 is not as consistent as in the previous comparisons. As in 1978 it outperforms other soiltypes between 11 and 40 cows, but has an intermediate position under 10 cows. As in the previous comparison no statistical differences is shown in the over 40 cow categories for the reasons noted.

Discussion

The data reveal significant differences in yield changes between herds of similar size in different soiltypes in the years concerned. Mountain soils exhibited no reduction in milk yields compared with 1978. Free draining lowland soils showed a significant reduction in yields and this reduction was smaller than that experienced on soils with drainage problems. A similar pattern was noted by reference to 1977. The hypothesis that the heavy rainfall had a differential effect on milk yields is therefore tenable.

However there is one caveat. A comparison of the yield changes on different soiltypes in the two base years used, 1977 and 1978, themselves show some significant differences. Specifically in the size groups, 5—10 cows and 20—40 cows the increase in yield between the two years on Soiltype 3 (11.3% and 9.7% respectively) was significantly lower than that achieved on Soiltypes 1 and 2 (15.7% approx. and 13% approx.). (The number of significantly different pairs for these two years was only six compared to 12, the lowest figure for comparisons with other years, see Appendix 3). This might indicate either that there was a small differential trend in yield improvements

between different soiltypes irrespective of weather condition or that there were also other peculiar weather factors in these two years which reduced yields on Soiltype 3.

The average declines in herd milk yields compared with 1978 is set out in Table 5 below.

TABLE 5: Decline in milk yield by soil type in 1979, 1980 and 1981 compared to 1978 (%)

Soiltype	1979	1980	1981
1	1.7	0.7	1.8
2	3.9	4.2	4.6
3	5.9	6.8	9.9

Herds in soiltypes 2 and 3 were responsible respectively for 27.4 per cent and 41.7 per cent of milk delivered in 1978 (a total of 74 million gallons from the farms included in this analysis). If the decline in yield could have been kept at the level of farms on Soiltype 1 an estimated further 1.74 million gallons of milk in 1979, 2.59 million gallons in 1980 and 1.52 million gallons in 1981 could have been produced.

There is also some evidence that over the period milking cow numbers tended to fall on farms on Soiltypes 2 and 3 while no fall was apparent on Soiltype 1. The fall is also progressive. The change in cow numbers between 1978 and 1981 on the different soiltypes is shown in Table 6. It is not possible to show that these differences are statistically significant by reference to any base period.

The relatively good performance on soil class 4 requires some comment. It may be that on these "mountain" soils stocking *rates* were initially very low and the soils were not put under any exceptional pressure in the periods of excess rainfall. Pressure from heavy stocking in relation to the system of management and drainage capacity may have contributed to the lower yields in other areas. The reaction of farmers in cutting back cow numbers (Table 6) is part evidence for this..

Conclusions

The paper has shown the probable effect of the high levels of rainfall in 1979, 1980 and 1981, on milk yields and in particular their differential effect on different types of soil—particularly where these are classified according to their "drainability". It is probable that the effects of the excess rainfall on grass growth expressed here in milk yields were also experienced on beef herds in terms of slower growth in animal weights. The evidence of the losses could be used in the future in a cost/benefit evaluation of providing adequate drainage on these soils, although the provision of drainage alone will not convert a low production soil into one of high production.

TABLE 6: Percentage change in cow numbers by soiltype and herdsize, 1978–81

	6 – 10 cows	10–20	20–40	> 40
Soiltype 1	+2.0	+1.3	+3.5	+0.2
Soiltype 2	–4.5	–1.0	+0.5	–2.8
Soiltype 3	–7.9	–7.1	–4.4	–3.5
Soiltype 4	–2.2	–2.8	+4.4	–8.2

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References

1. M. J. Gardiner and T. Radford, *Soil associations of Ireland and their land use potential.* Soil Survey Bulletin No. 36, An Foras Taluntais, Dublin, 1980.
2. J. Lee and S. Diamond, *The potential of Irish land for livestock production,* Soil Survey Bulletin No. 26, An Foras Taluntais, Dublin, 1972.
3. J. Lee and T. Finch, "Co. Kerry—grazing capacity of soils" in *Co. Kerry Agriculture Resource Survey* compiled by Kerry County Committee of Agriculture, 1972.

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APPENDIX 1

Soiltype 1: Ardfert, Ballinascreena, Kilcummin, Clahane, Killorglin, Listry, Ballyhar, Beaufort, Kilgobnet, Dingle, Ventry, Dunquin, Ballyferriter, Feoghanagh, Cloghane, Stradbally, Camp, Annascaul, Lispole.

Soiltype 2: Ardkreem bulk, Abbeydorney, Ballinclemessig, Kilflynn, Rattoo, Ballyheigue, Dicksgrove, Scartaglin, Tobermaing, Gortatlea, Ballymacelligott, Cordal, Ballydaly, Bealnadeega, Millstreet.

Soiltype 3: Lixnaw, Dromclough, Scartlea, Listowel, Ballylongford, Athea, Cratloe, Tarbert, Kilcoleman, Lisselton, Coolaclarig, Duagh, Kilmorna, Doon, Coolbeha, Brosna, Currans, Rathmore, Gullane, Lacka, Annablaha, Knockeenahone, Castlemaine, Firies, Ballyfinane.

Soiltype 4: Lyre, Kenmare, Cahersiveen, Ballinskelligs, Portmagee, Waterville, Dromid, Foilmore, Keel, Glenbeigh, Cromane.

APPENDIX 2

Calculation of significant differences

In the main text are shown for each size group and soiltype the percentage change in herd milk yield in the years 1979, 1980 and 1981 *vis-a-vis* 1978 (Table 3) and 1977 (Table 4). What is of interest is whether the average percentage changes shown for different soiltypes in the same size group are statistically significantly different from each other.

This can be established by comparing the difference between the two means with the standard error of this difference and deriving a t value, which is then assessed for significance using standard tables. The standard error of the difference between the two means is derived from the formula

$$\text{S.E.}\ (x_1 - x_2) = \sqrt{\sigma^2(\frac{1}{N_1} + \frac{1}{N_2})}$$

Where σ^2 is the variance of the total dis-

TABLE 2.1: Significance of yield change difference vis-a-vis 1978

Herdsize	Year	4 v 1	4 v 2	4 v 3	1 v 2	1 v 3	2 v 3
6–10	1977	xx	xx	n.s.	n.s.	xx	xx
	1979	n.s.	xx	xx	xx	xx	n.s.
	1980	n.s.	xx	xx	xx	xx	xx
	1981	xx	xx	xx	n.s.	xx	xx
11–20	1977	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	1979	xx	xx	xx	n.s.	xx	xx
	1980	xx	xx	xx	n.s.	xx	xx
	1981	xx	xx	xx	n.s.	n.s.	n.s.
21–40	1977	n.s.	n.s.	n.s.	n.s.	xx	xx
	1979	n.s.	xx	xx	xx	xx	n.s.
	1980	xx	xx	xx	xx	xx	n.s.
	1981	n.s.	xx	xx	xx	xx	n.s.
> 40	1977	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	1979	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	1980	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	1981	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

tribution, and N_1 and N_2 are respectively the numbers of observations in the categories whose means are x_1 and x_2.

In each herdsize category in Tables 3 and 4 in each year there are six pair differences to be compared for significance. Appendix Table 2.1 shows which pair differences are statistically significant when yields are compared with 1978. 1977 has also been included as there are references in the text to the differences in yields between 1977 and 1978. In Appendix Table 2.2 the corresponding data when yields are compared with 1977 are shown.

TABLE 2.2: Significance of yield change difference vis-a-vis 1977

Herdsize	Year	4 v 1	4 v 2	4 v 3	1 v 2	1 v 3	2 v 3
⩽ 5	1979	n.s.	n.s.	n.s.	n.s.	xx	xx
	1980	xx	n.s.	n.s.	xx	xx	n.s.
	1981	n.s.	n.s.	n.s.	xx	xx	n.s.
6–10	1979	xx	n.s.	n.s.	xx	xx	n.s.
	1980	xx	n.s.	xx	xx	xx	xx
	1981	n.s.	n.s	xx	n.s.	xx	xx
11–20	1979	xx	xx	xx	n.s.	xx	xx
	1980	xx	xx	xx	n.s.	xx	xx
	1981	xx	xx	xx	n.s.	xx	xx
21–40	1979	n.s.	xx	xx	n.s.	xx	xx
	1980	xx	xx	xx	xx	xx	xx
	1981	n.s.	xx	xx	xx	xx	n.s.
> 40	1979	n.s.	n.s.	n.s.	xx	n.s.	n.s.
	1980	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	1981	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.