FERTILISER ASSOCIATION OF IRELAND

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# FERTILISER USE SURVEYS, 1972, 1974 & 1975

by

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and

# THE ECONOMICS OF FERTILISER USE

by

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# FERTILISER USE SURVEYS
## 1972, 1974 & 1975

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## FERTILIZER USE SURVEYS, 1972, 1974 and 1975

The data for these surveys of farmer practice in the use of fertilizers on different crops was collected in the course of the Farm Management Survey. Data from all the farms in the Farm Management Survey sample was made available, and where this was inadequate for a fertilizer use survey, extra data was collected for that purpose. A similar situation obtained for the 1964 and 1967 Fertilizer Use Surveys.

The data was collected in the autumn of 1971 and spring of 1972 for the 1972 Survey. This was changed to a calendar year basis in 1974 and 1975.

### NATIONAL FERTILIZER CONSUMPTION

Table 1 shows the consumption of N, P. K and Ground Limestone since 1953/54 on a national basis.

**TABLE 1 Total N, P, K and Ground Limestone use in 1,000 tons of Nutrients. 1 July–30 June**

| YEAR (1 July-30 June) | GL Tons | N Tons | P Tons | K Tons |
|---|---|---|---|---|
| 1953–54 | 690,000 | 12,000 | 23,700 | 30,500 |
| 1959–60 | 720,000 | 21,700 | 36,000 | 48,000 |
| 1964–65 | 1,126,516 | 29,100 | 48,800 | 75,100 |
| 1969–70 | 1,729,090 | 70,200 | 72,600 | 115,700 |
| 1970–71 | 1,628,812 | 84,628 | 77,810 | 122,970 |
| 1971–72 | 1,692,686 | 96,830 | 75,500 | 117,135 |
| 1972–73 | 1,990,026 | 131,600 | 90,330 | 152,937 |
| 1973–74 | 1,620,000 | 129,700 | 84,000 | 150,000 |
| 1974–75 | 1,560,000 | 133,000 | 50,000 | 93,000 |
| (to Dec '76) | | | | |
| 1975–76 | 1,836,880 | 152,700 | 58,747 | 120,206 |
| 1976–77 | 1,920,000 | 166,560 | 65,186 | 141,638 |

This (Table 1) shows the very rapid changes in consumption patterns in recent years. Nitrogen consumption did not follow the pattern of phosphorus, potassium and ground limestone. Its pre-1973 rising pattern did receive a

check, but it recovered rapidly and increased again, whereas P and K are still well below the 1972/73 figure. The rates of application of N, P and K in kg per ha are shown in Tables 2, 3 and 4 for three years

**TABLE 2 NITROGEN PER HA EACH YEAR**

| CROP | kg N per ha 1972 | 1974 | 1975 |
|---|---|---|---|
| Wheat | 46.3 | 49.2 | 52.2 |
| Oats | 17.8 | 26.5 | 26.0 |
| F Barley | 30.9 | 37.6 | 41.5 |
| M Barley | 23.4 | 26.2 | 31.5 |
| Potatoes | 70.4 | 65.1 | 75.0 |
| S Beet | 119.1 | 130.4 | 129.4 |
| Swedes | 42.1 | 46.4 | 46.0 |
| Mangels | 97.5 | 58.1 | 61.9 |
| Kale | 44.3 | 60.8 | 61.4 |
| Rape | | 52.4 | 37.2 |
| Hay (NP) | 27.9 | 24.0 | 27.9 |
| Hay (PP) | 19.8 | | |
| Silage (NP) | 97.2 | 71.9 | 101.2 |
| Silage (PP) | 70.5 | | |
| New pasture | 30.3 | 19.5 | 26.7 |
| Permanent pasture | 10.9 | | |
| Rough grazing | 0.2 | — | — |

NP = Pastures less than 5 years established
PP = Pastures more than 4 years established

The rates of N used on cereals increased from 1972 to 1975. It remained static or increased slightly on hay and silage and increased on pasture.

The amounts used on tillage crops are satisfactory. Of the grassland crops silage is well fertilized with N but hay and pasture would respond well to extra application.



**TABLE 3 PHOSPHORUS ON DIFFERENT CROPS**

| CROP | kg per ha 1972 | 1974 | 1975 |
|---|---|---|---|
| Wheat | 33.9 | 30.5 | 29.9 |
| Oats | 27.7 | 23.6 | 23.2 |
| F Barley | 32.6 | 31.0 | 28.4 |
| M Barley | 34.0 | 30.0 | 28.6 |
| Potatoes | 73.3 | 63.5 | 67.5 |
| S Beet | 132.2 | 119.4 | 107.7 |
| Swedes | 71.1 | 81.9 | 59.6 |
| Mangels | 136.6 | 69.7 | 64.2 |
| Kale | 50.9 | 37.0 | 50.8 |
| Rape | | 16.7 | 14.8 |
| Hay (NP) | 27.8 | 16.4 | 14.6 |
| Hay (PP) | 21.6 | | |
| Silage (NP) | 27.8 | 20.9 | 18.4 |
| Silage (PP) | 34.4 | | |
| New Pasture (NP) | 22.9 | 9.5 | 8.5 |
| Permanent Pasture (PP) | 14.0 | | |
| Rough grazing | 4.0 | — | — |

NP = Pastures less than 5 years established
PP = Pastures more than 4 years established

The use of phosphorus decreased on all crops. The levels used on cereals and root crops had been generous in the past and the decline in use on these crops has not been excessive.

The grassland crops were never well treated. The silage and hay crops were getting less P in 1975 than would be expected to be removed in a high yield. The average pasture dressing was also low and could only be justified by low stocking rates especially as large areas are still low in soil P.

TABLE 4 POTASSIUM ON DIFFERENT CROPS

| CROP | Kg per ha 1972 | 1974 | 1975 |
|---|---|---|---|
| Wheat | 67.4 | 62.9 | 66.0 |
| Oats | 54.1 | 43.8 | 43.6 |
| F Barley | 63.8 | 62.3 | 57.1 |
| M Barley | 56.1 | 52.9 | 54.9 |
| Potatoes | 163.7 | 143.5 | 159.5 |
| S Beet | 278.9 | 261.0 | 237.9 |
| Swedes | 112.0 | 127.0 | 92.2 |
| Mangels | 226.3 | 155.0 | 141.3 |
| Kale | 93.3 | 62.8 | 97.3 |
| Rape | | 30.2 | 29.7 |
| Hay (NP) | 42.7 | 31.1 | 24.1 |
| Hay (PP) | 33.1 | | |
| Silage (NP) | 67.3 | 58.1 | 49.7 |
| Silage (PP) | 61.1 | | |
| New Pasture (NP) | 40.6 | 15.3 | 13.3 |
| Permanent Pasture (PP) | 17.5 | | |
| Rough Grazing | 0.4 | — | — |

Potassium dressings on tillage crops declined slightly but were still quite satisfactory in 1975. On hay and silage crops the amounts supplied were always less than the amounts removed in the crops. In 1974 and 1975 the levels were completely inadequate. Only in a situation of complete return of all organic manures to the cutting areas could a grassland farming system continue without large reductions in yields of hay and silage. Grazing animals do not retain much postassium so that low levels of application are not as serious on land continuously grazed.

Table 5 shows the levels of N, P and K (kg/ha) used on pasture in 1974 and 1975 in each county. The pastures in the southern and eastern counties received very much heavier dressings of nutrients especially N.



TABLE 5 USE OF N P K ON PASTURE KG/HA

| COUNTY | 1974 N | P | K | 1975 N | P | K |
|---|---|---|---|---|---|---|
| Carlow | 37.4 | 7.9 | 16.4 | 45.7 | 11.2 | 20.2 |
| Dublin | 27.3 | 16.4 | 33.9 | 52.9 | 22.6 | 45.9 |
| Kildare | 19.9 | 9.6 | 16.6 | 30.7 | 6.4 | 8.8 |
| Kilkenny | 31.5 | 9.0 | 15.6 | 41.6 | 9.4 | 16.1 |
| Laois | 25.1 | 12.6 | 27.8 | 35.5 | 9.7 | 14.7 |
| Longford | 6.5 | 8.5 | 7.0 | 4.8 | 6.4 | 5.4 |
| Louth | 24.5 | 13.8 | 13.9 | 33.2 | 7.5 | 13.9 |
| Meath | 25.2 | 13.0 | 22.9 | 41.4 | 9.5 | 13.0 |
| Offaly | 15.1 | 13.5 | 21.4 | 17.9 | 10.3 | 12.4 |
| Westmeath | 13.0 | 11.5 | 13.6 | 11.2 | 8.2 | 10.8 |
| Wexford | 27.6 | 14.4 | 22.4 | 43.1 | 16.6 | 21.8 |
| Wicklow | 12.3 | 9.9 | 15.4 | 16.7 | 11.3 | 20.4 |
| Clare | 7.4 | 7.5 | 8.4 | 10.1 | 6.4 | 6.0 |
| Cork | 55.8 | 17.9 | 36.1 | 70.6 | 16.2 | 33.7 |
| Kerry | 16.9 | 5.7 | 7.6 | 41.0 | 7.4 | 12.4 |
| Limerick | 26.3 | 12.0 | 19.8 | 35.7 | 16.1 | 17.1 |
| Tipperary N | 21.9 | 8.3 | 15.6 | 37.2 | 9.9 | 10.6 |
| Tipperary S | 41.8 | 22.4 | 29.7 | 40.9 | 12.9 | 17.8 |
| Waterford | 40.8 | 20.7 | 34.2 | 33.0 | 17.1 | 31.2 |
| Galway | 6.3 | 8.4 | 13,2 | 6.4 | 5.5 | 8.2 |
| Leitrim | 2.2 | 1.1 | 1.3 | 1.5 | 1.5 | 0.7 |
| Mayo | 2.2 | 2.7 | 3.6 | 5.0 | 3.9 | 5.3 |
| Roscommon | 3.8 | 6.8 | 10.2 | 4.5 | 3.8 | 7.1 |
| Sligo | 3.7 | 4.59 | 6.1 | 5.5 | 3.1 | 4.1 |
| Cavan | 16.7 | 9.0 | 8.2 | 18.4 | 4.1 | 5.5 |
| Donegal | 2.1 | 1.2 | 1.5 | 2.7 | 1.0 | 1.6 |
| Monaghan | 15.7 | 5.7 | 10.1 | 23.2 | 6.9 | 9.2 |

**TABLE 6 Kg N, P, K/ha on Pasture at Different Stocking Rates**

| Stocking Rate | | 1974 | | | 1975 | | |
|---|---|---|---|---|---|---|---|
| LU/ha | Ac/LU | N | P | K | N | P | K |
| +2.1 | .9 to 1.2 | 40 | 19 | 34 | 84 | 23 | 53 |
| 1.6 | 1.5 | 46 | 16 | 29 | 73 | 17 | 26 |
| 1.37 | 1.8 | 26 | 11 | 18 | 41 | 13 | 18 |
| 1.18 | 2.1 | 14 | 9 | 16 | 26 | 9 | 16 |
| 1.03 | 2.4 | 8 | 8 | 12 | 20 | 7 | 11 |
| 0.91 | 2.7 | 5 | 5 | 6 | 12 | 8 | 10 |
| 0.82 | 3.0 | 1.3 | 3.2 | 2.6 | 8 | 6 | 9 |

Table 6 shows the influence of stocking rate expressed as livestock units per feed hectare. A livestock unit is a cow or equivalent in terms of feed requirement. A feed hectare is a hectare of pasture or forage such as silage, hay or swedes or the produce of a hectare of cereals, etc., fed to ruminants. The stocking rates expressed above are therefore lower than the actual stocking rates on pasture plus hay or silage.

It can be seen that the farmers with high stocking rates used sufficient P and K to maintain and build up the fertility of their pasture.

In 1975 the amounts of P and K for grazing appeared to be determined by the number of livestock units on a farm rather than the area. This was a very logical decision in difficult times.

The influence of stocking rates on the use of N, P, K on silage and hay is shown in Table 7. Silage and hay are grown as independent crops. The intensity of the stocking rate on the farm does not appear to have a large effect on the fertilizer treatment given to the crops. This indicates that even farmers who are farming at a very intensive rate do not appear to be aware of the nutrient requirements of heavy crops of hay and silage.



**TABLE 7 N, P, K on Hay and Silage at Different Stocking Rates in 1975 (kg/ha)**

| | | Silage | | | Hay | | |
|---|---|---|---|---|---|---|---|
| LU/ha | Ac/LU | N | P | K | N | P | K |
| +2.1 | .9 to 1.2 | 98 | 16 | 38 | 22 | 8 | 17 |
| 1.6 | 1.5 | 113 | 20 | 48 | 43 | 16 | 34 |
| 1.37 | 1.8 | 105 | 20 | 57 | 40 | 17 | 34 |
| 1.18 | 2.1 | 99 | 16 | 58 | 26 | 16 | 29 |
| 1.03 | 2.4 | 86 | 16 | 39 | 26 | 17 | 29 |
| 0.91 | 2.7 | 74 | 25 | 32 | 21 | 13 | 20 |
| 0.82 | 3.0 | 76 | 13 | 66 | 22 | 15 | 22 |

Table 8 shows the influence of type of farming on the use of fertilizers. Enterprises involved in the production of milk had the highest fertilizer usage. Where there were mixtures of enterprises there was a tendency to use more fertilizer on pasture.

**TABLE 8 kg N, P, K/ha on Pasture in Different Farming Systems**

| | 1974 | | | 1975 | | |
|---|---|---|---|---|---|---|
| Farming System | N | P | K | N | P | K |
| Mainly Creamery Milk | 27 | 12 | 18 | 40 | 12 | 16 |
| Creamery Milk + Tillage | 57 | 17 | 29 | 68 | 16 | 30 |
| Creamery Milk + Pigs | 45 | 18 | 29 | 52 | 15 | 25 |
| Liquid Milk | 37 | 13 | 23 | 62 | 13 | 23 |
| Mainly Dry Stock | 7.2 | 7.5 | 11 | 8 | 6 | 7 |
| Dry Stock + Tillage | 25 | 14 | 25 | 26 | 9 | 16 |
| Hill Sheep + Cattle | 1.3 | 1.4 | 1.8 | 0.6 | 1 | 1 |
| Others | 2.1 | 1.2 | 1.2 | 11 | 2 | 4 |

Tables 9, 10 and 11 show the relative importance in 1975 of different compounds and single nutrient fertilizers in supplying nutrients to the different crops. Sugar beet is not included as over 95 per cent of the fertiliser used on sugar beet is from the sugar beet compound. Potatoes received 42% of their P and 47% of their K from 7 : 6 : 17.

**TABLE 9** **Per Cent of the Total Nitrogen used on Different Crops from Different Sources**

| Source | Wheat | Oats | F Barley | M Barley | Potatoes | Hay | Silage | Pasture |
|---|---|---|---|---|---|---|---|---|
| 5:5:10 | 0 | 6 | 1 | 1 | 21 | 4 | 0 | 1 |
| 10:10:20 | 36 | 42 | 40 | 33 | 16 | 15 | 2 | 5 |
| 14:7:14 | 7 | 2 | 14 | 26 | 1 | 2 | 0 | 1 |
| 18:6:12 | 15 | 28 | 28 | 24 | 2 | 8 | 6 | 5 |
| CAN | 38 | 7 | 10 | 1 | 6 | 54 | 58 | 68 |
| Urea | 1 | 0 | 0 | 0 | 1 | 1 | 11 | 4 |
| Others | 3 | 15 | 7 | 15 | 53 | 16 | 23 | 16 |

**TABLE 10** **Per Cent of the Total Phosphorus used on different Crops from Different Sources**

| Source | Wheat | Oats | F Barley | M Barley | Potatoes | Hay | Silage | Pasture |
|---|---|---|---|---|---|---|---|---|
| 0:7:30 | 8 | 1 | 1 | 0 | 1 | 6 | 16 | 6 |
| 0:10:20 | 10 | 5 | 1 | 1 | 3 | 18 | 25 | 21 |
| 5:5:10 | 0 | 6 | 2 | 2 | 23 | 8 | 1 | 2 |
| 10:10:20 | 63 | 47 | 60 | 41 | 18 | 28 | 13 | 16 |
| 14:7:14 | 6 | 1 | 11 | 16 | 1 | 2 | 1 | 2 |
| 18:6:12 | 9 | 11 | 14 | 10 | 1 | 5 | 12 | 5 |
| 8% P | 0 | 10 | 1 | 0 | 3 | 17 | 11 | 33 |
| Super 16% | 0 | 0 | 0 | 0 | 1 | 4 | 3 | 4 |
| Others | 4 | 19 | 10 | 30 | 49 | 12 | 18 | 11 |



**TABLE 11** **Per Cent of the Total Potassium used on Different Crops from Different Sources**

| Source | Wheat | Oats | F Barley | M Barley | Potatoes | Hay | Silage | Pasture |
|---|---|---|---|---|---|---|---|---|
| 0:7:30 | 15 | 2 | 1 | 0 | 1 | 13 | 26 | 15 |
| 0:10:20 | 9 | 5 | 1 | 1 | 2 | 19 | 19 | 25 |
| 5:5:10 | 0 | 7 | 2 | 2 | 19 | 9 | 1 | 3 |
| 10:10:20 | 57 | 49 | 59 | 43 | 15 | 30 | 10 | 20 |
| 14:7:14 | 5 | 1 | 10 | 17 | 1 | 3 | 1 | 3 |
| 18:6:12 | 8 | 11 | 14 | 10 | 1 | 5 | 9 | 6 |
| 50% K | 0 | 6 | 2 | 0 | 5 | 8 | 19 | 13 |
| Others | 6 | 19 | 11 | 23 | 56 | 13 | 15 | 15 |

# THE ECONOMICS OF FERTILISER USE

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# THE ECONOMICS OF FERTILISER USE

The appropriate level of fertiliser use has always been a pertinent question even in times of relatively minor rates of change in factor and product prices and price relationships. However there were times in the fifties and for much of the sixties when the level of fertiliser use was so low and the response to additional inputs so large that the economising principle was rarely called into operation in the decision-making process. If it was worthwhile to apply some fertiliser then it was generally better to apply 'more' rather than 'less'. Accordingly the pattern of fertiliser use up to the early seventies was one of a general increase at an *increasing* rate for N and at a more or less *constant* rate for P and K (Appendix). This differential rate of growth reflected the generally characteristic response of production to the nutrients in question.

Additionally even on the more intensive farms it is doubtful if, in many cases, the use of fertiliser was ever pushed to the point where the cost of an additional unit of input was ever equal to or greater than the value of the extra product derived therefrom. In general much of the increase in consumption was due to an extension of the area fertilised rather than on areas previously receiving fertiliser.

The atmosphere in regard to fertiliser consumption changed in 1974 from those heady days of the late sixties and early seventies, due to a remarkable coincidence of rapidly escalating fertiliser costs and falling cattle prices. The effect of a decline in cattle prices alone, even with relatively stable fertiliser prices has been noted from 1966, because despite the generally greater use of fertiliser on dairy than on drystock farms it must be remembered that the amount of land devoted to cattle is about twice that used for milk production. When, however, falling cattle prices are associated with rapidly escalating costs the effect is considerably accentuated.

In the following brief contribution I will attempt to set down the use of fertiliser in a current economic context while at the same time relating it to an historical perspective. The aspects emphasised are the importance of fertiliser in total farm costs, changing product/fertiliser price relationships and the pattern of returns and costs in an intensification programme.

**Fertiliser as a Farm Material**

Expenditure on any particular factor employed in agriculture is a function of unit cost and volume. To some extent these would be expected to move in contrary directions. However the demand for fertiliser is essentially *'derived'* – in the sense that its use is a function of the returns it generates

rather than as a reflection of its own price. Be that as it may for the moment, it is interesting to examine the trend in the expenditure on fertiliser in relation to total costs and output and this is indicated in Table 1.

As a proportion of total costs expenditure on fertiliser is significantly greater than in the mid-sixties but in recent years it has not increased greatly, averaging about 18% in the past three years and expected to be less in 1977. That the share of fertiliser in total costs has not increased as dramatically as popular belief would have it, is due to the fact that other costs in farming have

**TABLE 1 Expenditure on Fertiliser in Relation to Output and Costs**

| | 1965 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
|---|---|---|---|---|---|---|---|---|---|
| Output (£M) | 252 | 344 | 388 | 478 | 624 | 638 | 855 | 997 | 1,256 |
| Total Costs (£M) | 112 | 166 | 191 | 211 | 271 | 332 | 385 | 476 | 569 |
| Fert. & Lime £m/(A) | 12 | 23 | 28 | 31 | 42 | 55 | 69 | 89 | 102 |
| (A) as % of Costs | 11 | 14 | 15 | 15 | 15 | 17 | 18 | 19 | 18 |
| (A) as % of Output | 5 | 7 | 7 | 7 | 7 | 9 | 8 | 9 | 8 |

*Source:* 1965–75, C.S.O; 1976, 1977 estimated.

been by no means static. Feed and machinery prices for instance have increased by 156% and 166% respectively from 1970 to 1976; fertiliser prices have risen by somewhat over 200% over the same period while farm fuel prices have increased by about 250%.

In relation to output, fertiliser costs have absorbed about 8.5% in recent years. This particular relationship can however be somewhat misleading, as independently of the behaviour of fertiliser volume and price, the relationship is also dependent on the volume and prices of the component make-up of output. While commodity in relation to fertiliser prices have remained quite competitive as is indicated in Table 2, in some years the volume of farm out-

**TABLE 2 Fertiliser and Agricultural Price Indices (1967 = 100)**

| | 1967 | 1969 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 |
|---|---|---|---|---|---|---|---|---|
| Agr. Price | 100 | 113 | 127 | 154 | 201 | 204 | 262 | 339 |
| Fert. Price | 100 | 111 | 121 | 134 | 146 | 232 | 245 | 356 |

*Source:* C.S.O., 1976 Agr. Price Index estimated.



put has been rather disappointing. While a notable increase in the volume of output took place in most recent years nevertheless in 1974 and 1976 the reverse was the case so that in any particular year the relativity of costs to output (depends on the volume of output) in that particular year.

**Individual Products**

In general the prices of the major grassland products have tended to increase faster than farm prices in general. Again using 1967 as base (i.e. the last ten years period) fat cattle prices have increased by 270%, creamery milk by 200% while feed barley prices have increased by 212% (Table 3). These price rises have not been on a gradual basis, of course, and consequently whether fertiliser prices have increased faster or slower than the major

**TABLE 3 Trend in Certain Product and Fertiliser Prices**

| | Cattle | | Milk | | Feed Barley | | Fertiliser (1) | |
|---|---|---|---|---|---|---|---|---|
| | £ /cwt | Index | P/gall. | Index | £/tonne | Index | £/tonne | Index |
| 1967 | 7.33 | 76 | 11.7 | 95 | 21.6 | 91 | 30.25 | 94 |
| 1968 | 8.53 | 89 | 11.8 | 96 | 22.0 | 92 | 32.58 | 102 |
| 1969 | 8.90 | 93 | 11.7 | 95 | 23.4 | 98 | 32.66 | 102 |
| 1970 | 9.61 | 100 | 12.3 | 100 | 23.8 | 100 | 32.05 | 100 |
| 1971 | 10.61 | 110 | 13.3 | 108 | 26.0 | 109 | 34.84 | 109 |
| 1972 | 13.60 | 142 | 16.2 | 132 | 27.0 | 113 | 38.45 | 120 |
| 1973 | 17.22 | 179 | 20.0 | 163 | 42.7 | 179 | 40.79 | 127 |
| 1974 | 15.72 | 164 | 23.7 | 193 | 47.3 | 199 | 67.17 | 209 |
| 1975 | 21.21 | 221 | 30.5 | 248 | 56.4 | 237 | 96.92 | 302 |
| 1976 | 27.16 | 283 | 34.8 | 283 | 67.5 | 284 | 99.16 | 309 |
| 1977 | 35.00 | 364 | 47.0 | 382 | 88.0 | 370 | 100.00 | 312 |

*Source:* Mainly C.S.O. (1) 10-10-20.

products is to some extent dependent on the choice of base year. Furthermore it will not go unnoticed by members of the Fertiliser Association that the prices quoted for that well known fertiliser, 10-10-20, would seem to be relatively high! It is probable that only relatively small amounts of fertiliser were sold at the price levels indicated. However if current and recent price quotations are a guideline for 1977 then unquestionably the level of product prices anticipated in the current year will, in relation to their previous level, have well outstripped the rise in fertiliser prices recorded in recent years.

Although the index of fertiliser prices has shown an increase of about 250% since 1967, the pattern and rate of increase has varied with the individual nutrient. Table 4 illustrates that N prices have risen by a factor of

**TABLE 4 Trend in Nutrient Prices**

| | N | | P | | K | |
|---|---|---|---|---|---|---|
| | £/tonne | Index | £/tonne | Index | £/tonne | Index |
| 1967 | 85.2 | 93 | 112.3 | 89 | 32.3 | 88 |
| 1968 | 91.5 | 99 | 123.8 | 98 | 37.7 | 103 |
| 1969 | 92.3 | 100 | 126.8 | 100 | 36.5 | 99 |
| 1970 | 92.0 | 100 | 126.8 | 100 | 36.7 | 100 |
| 1971 | 104.0 | 113 | 138.3 | 109 | 41.3 | 113 |
| 1972 | 110.9 | 121 | 161.3 | 127 | 45.8 | 125 |
| 1973 | 119.2 | 130 | 176.6 | 139 | 50.9 | 139 |
| 1974 | 177.1 | 193 | 352.3 | 278 | 79.1 | 216 |
| 1975 | 239.8 | 261 | 546.5 | 431 | 119.9 | 327 |
| 1976 | 240.4 | 261 | 569.4 | 449 | 126.2 | 344 |

*Source:* Author's estimates.

2½, K prices by 3½ and P prices by 4½ since 1970. This has some important implications with regard to the process of intensification because to the extent that P and K are 'capital' fertiliser inputs, economic logic would suggest that the costs attributed to these inputs per unit of output (e.g. milk or beef) will decline as output is expanded.

The differential trends in nutrient prices has also altered the proportions of total fertiliser costs accounted for by these nutrients. For instance in 1970, out of a total expenditure of somewhat over £20m. on fertiliser, the proportions spent on N, P, and K were 32,46 and 21% respectively. The corresponding proportions in 1976 out of a total expenditure of approximately £85m. were 43, 39 and 18% respectively. That the changing proportions do not reflect the differential price trends shown in Table 4 arises because the consumption of N has shown a less erratic pattern than either of the other major nutrients.



**TABLE 5 Proportions of Fertiliser Expenditure on Individual Nutrients**

| | N | | P | | K | | Total | |
|---|---|---|---|---|---|---|---|---|
| | £m | % | £m | % | £m | % | £m | % |
| 1970 | 6.56 | 32.4 | 9.35 | 46.2 | 4.32 | 21.4 | 20.23 | 100 |
| 1976 | 36.71 | 43.0 | 33.45 | 39.2 | 15.17 | 17.8 | 85.33 | 100 |

*Source:* Author's estimates.

With respect to fertiliser consumption in the current year it is expected that N will increase by 7 to 9% and P and K by 6 to 8%. This means that the consumption of N, P and K will be +25, −30 and −16% of their 1973 level, or expressed in weighted terms the use of fertiliser in the current year will be some 6% less than in 1973.

**Intensification and Substitution**

The relationship between fertiliser use and returns has been amply demonstrated over the years from survey and experimental sources, generally indicating that success in farming is closely linked to fertiliser use. Where aberrations exist they have been mainly attributed to the failure of stocking intensity to keep pace with the level of fertiliser used. A more recent pointer is available from the Institute's Farm Management Survey in relation to

**TABLE 6 Relationships between Gross Margin/Ac (£) and Other Factors**

| | Gross Margin (£/Ac) | | | | | |
|---|---|---|---|---|---|---|
| | 30 | 30–55 | 55–80 | 80–105 | 105–130 | 130+ |
| No. of Herds | 74 | 177 | 184 | 143 | 61 | 60 |
| Forage Acs./cow | 3.52 | 2.38 | 1.94 | 1.65 | 1.36 | 1.18 |
| Feed Acs./cow | 3.71 | 2.59 | 2.12 | 1.86 | 1.58 | 1.40 |
| N/Ac. (lb.) | 8 | 19 | 30 | 50 | 75 | 110 |

*Source:* Farm Management Survey

creamery milk production for 1975. While some of the difference in gross margin per acre in Table 6 is attributable to variation in milk yields it is nevertheless true that fertiliser use had a considerable bearing on stocking rate and

in consequence on the gross margin realised. It seems that for the majority of producers in the sample, inefficiency in cow productivity was surpassed by inefficiency in grassland management.

With respect to the present relationship between intensification and returns in dairying, Table 7 illustrates the pay off step-wise on an expansion path from 3 acres to 0.9 acres per cow on relatively good land. It will be

**TABLE 7 Relationship between Intensification and Returns in the Dairy Enterprise [1]**

| Acres/Cow | Fert. Costs (£/AC) | Other Costs (£/AC) | Revenue (£/AC) | Margin (£/AC) | Cost/AC Released (£) |
|---|---|---|---|---|---|
| 3.0 | – | 53 | 101 | 48 | – |
| 1.5 | 12 | 105 | 202 | 85 | 12 |
| 1.2 | 20 | 132 | 252 | 100 | 17 |
| 0.9 | 40 | 176 | 337 | 121 | 43 |

[1] Based on data supplied by W.E. Murphy

observed that fertiliser costs increase at an *increasing* rate with the progression through the various stages involved and assuming a linear relationship between milk yield per acre, other costs and stocking rate, it would intuitively follow that a stage of diminishing returns and falling margins will ultimately be reached. However, with the standards and assumptions used in the exercise this stage was not encountered although lower yields, lower milk prices or higher unit capital costs with increasing scale would singly or in combination bring that stage about in the exercise.

Again at the varying levels of intensity indicated it is extremely doubtful if the taking of conacre would be a serious alternative to intensification. Table 7 has shown that in a strictly economic resource sense, fertiliser is a substitute for land and to that extent the cost required to release an acre of land from its existing use would certainly be less than the prevailing levels of rental for conacre. The individual farm operator, then, has the choice of confining his existing stock numbers on fewer acres, thereby releasing resources for other purposes, or intensifying his existing enterprise. On many farms neither option is exercised. An indication of the tendency to take conacre even in the circumstances of relatively low stocking intensity is provided by Kelleher and



O'Hara who point out that many farmers in their study would rent an extra field at an inflated rent rather than fertilise their own grassland.

Perhaps a similar logic applies to the high prices being paid for land even when owned land resources are inadequately used. Presently one acre and perhaps £30 worth of fertiliser can produce as much milk as two acres on many farms in the country, but despite this the demand for land with the ensuing escalating prices strongly suggests that factors other than current returns strongly influence prices. To the extent therefore that fertiliser is a

**TABLE 8 Fertiliser (10-10-20) and Land Prices, 1967 and 1976**

| Fertiliser | 1967 | 1971 | 1976 |
|---|---|---|---|
| £/tonne | 30 | 35 | 99 |
| Index | 100 | 117 | 330 |
| **Land** | | | |
| £/AC | 175 | 300 | 1200 |
| Index | 100 | 171 | 686 |

*Source:* Derived from guidelines from the Irish Land Commission

substitute for land, then Table 8 indicates that fertiliser is now a relatively less expensive resource than a decade ago and its rate of increase has been only about half that of land. But apparently this is not widely recognised. Only about 13 per cent of the land of Ireland is stocked at 1¼ acres per livestock unit or better while fully 45% has a stocking rate of 2 acres or worse.

**Concluding Remarks**

The revival in the use of P and K fertilisers since the slump in 1975 in particular will almost certainly be maintained for the remainder of the decade. It is extremely unlikely that we will have a recurrence of that combination of circumstances which precipitated the downturn in consumption in 1975 and furthermore a progressive increase in grazing livestock numbers is anticipated in the years ahead. In 1976 for instance there were just under 6 million grazing livestock units in the country at a stocking rate of approximately 1.8 acres/L.U. By 1980 if the growth rate projected for the cattle sector in particular is realised there would be about 7 million livestock units in the country with a corresponding stocking rate of just over 1.5 acres per livestock

unit. Estimates made in conjunction with Willie Murphy and Jim Brogan suggest that this increase in stocking rate would require an increase in N, P and K of 55–60%, 35% and 50% respectively above their 1976 level. Implicit in this estimate is a better balance between fertiliser use and livestock numbers than was characteristic of the sixties. Finally the fertiliser industry has a vital role to play in the realisation of the latent potential of Irish agriculture. It can assist that development by encouraging sustained growth through a gradual rather than an erratic price policy.



APPENDIX

Trend in Fertiliser Use