Centre for Agricultural Strategy

Food production and our rural environment – The way ahead

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The Market Environment and Food Production

It has been shown by Spedding (Paper 3, Table 2) that for most major UK agricultural products, production exceeds demand in the EEC. In contrast, for many of the main areas of population in the UK the supply of the required rural environment is not meeting demand (Paper 1, Figure 1). However, whereas agricultural production in the EEC is heavily subsidised, the rural environment is not.

In considering the role of agrochemicals in relation to future developments in agriculture, I believe it is prudent to assume that subsidies for agricultural products in surplus production will diminish and prices will move closer to world market levels. On the other hand, subsidies will probably be increased to meet environmental objectives. Also, in an oversupplied agricultural market I believe demand for specified quality will become more stringent. In such a market the surviving farmers will be those who produce the largest quantity of the quality demanded at the lowest cost. High gross margins will be needed for survival to cover high fixed costs.

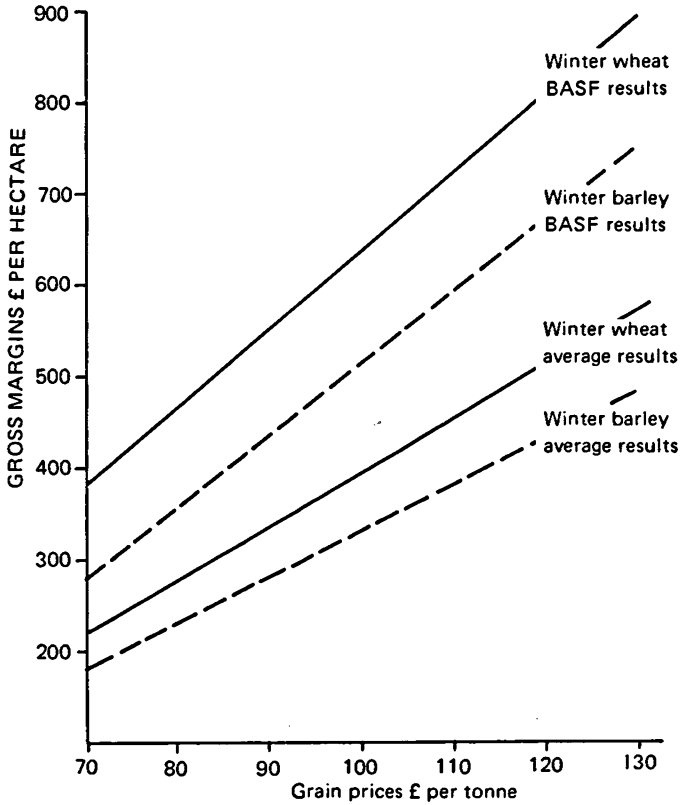
The three papers discussing alternative levels of intensity are particularly interesting from the point of view that I do not detect any significant conflict in the conclusions relating to future trends in crop production which are likely to relate to the use of agrochemicals.

The main forecasts for change with which I concur are:

1 Milk and beef output will be based on more intensive grass production concentrated on the most suitable soils. Intensive grass will have fewer plant

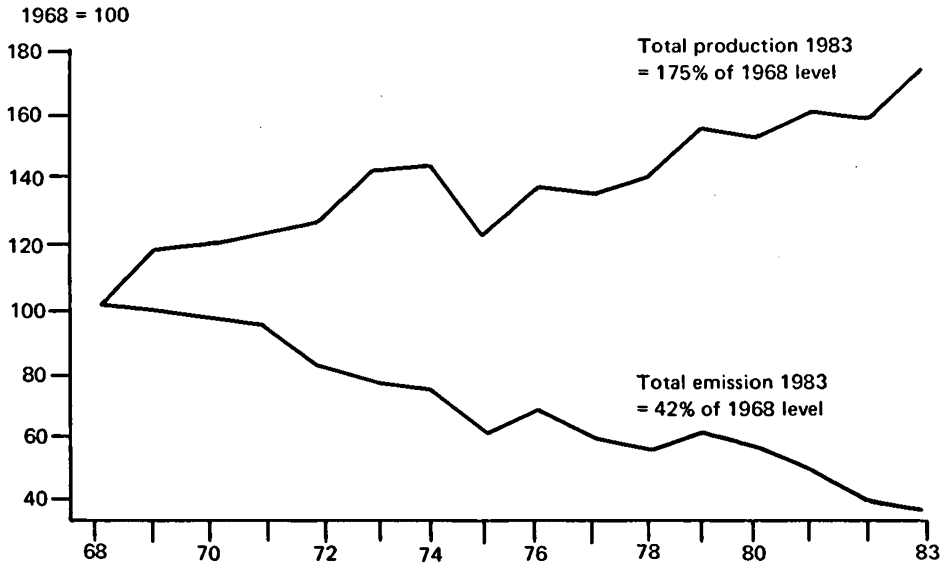
Figure 1

Profitability of feed wheat and barley using average farm production systems and BASF intensive systems at different grain prices



Data for the calculations are given (Walker, 1984)

Figure 2
Relative changes in production level and atmospheric emission from BASF AG Ludwigshafen factory complex



Note: Emission calculated from total weight of gas/dust released to the atmosphere
Production calculated from total weight of products manufactured

species and involve higher fertiliser and agrochemical inputs.

2 Cereal production will move towards the highest levels of intensity currently practised and will be concentrated on the higher grade soils. Marginal soils for cereals will revert to grass. Reduced prices are unlikely to result in less intensive use of inputs (Figure 1) but the inputs will be better managed. The current level of intensive use of chemical inputs on progressive farms is unlikely to increase significantly.

3 Pesticide inputs will be used more efficiently by more precise management to relate treatments to the needs of individual crops, fields and seasons.

4 Pesticides will be applied more efficiently by the introduction of more precise application systems which put more active ingredients on the target, reduce drift and reduce the active ingredient required per hectare.

The Market Environment and Conservation

In contrast to the lack of conflict between the papers of Carter, Raymond and Hunter-Smith on food production, the differences between the three approaches appear more significant in relation to their effect on farm management attitudes towards conservation, and the availability of manpower and resources for such purposes.

My own industry of chemical manufacturing has of course had very extensive experience of the conflicts between industrial production and profit objectives and the pressures to conserve both the urban and rural environment in which chemical factories are based. In considering the effect of farming scale on the environment it is interesting to draw a comparison with chemical production. When the structure and scale of chemical production was at a similar evolutionary stage to that of UK farming, the large-scale producers faced severe criticism concerning environmental pollution. Today the standards of large-scale manufacture in relation to the environment have improved immensely. An example of this is shown in Figure 2. These improvements have been made partly as a result of mandatory controls and partly in recognition of the need to preserve an acceptable image to the consumer and the electorate. However, the maintenance of these high standards is extremely expensive and consequently it is only the highly profitable large-scale producer who can afford them. I believe that similar arguments will apply to farming.

To be profitable, farming needs to be on a sufficiently large scale to acquire the advantages of high cost, high efficiency machinery and equipment and high cost, high efficiency management. However, the profit objectives will be balanced by the demands for conservation which will be enforced by a combination of statutory control and incentives and by the political forces of public opinion. At present many of the criticisms of large-scale farming (and also often of

Production calculated from total weight of products manufactured

economically progressive smaller farms) are fully justified but I believe that large-scale farms will react to these pressures rather than risk curtailment of their freedom to operate. On smaller farms the pressures to maintain profitability are likely to have similar adverse effects on the environment as on larger farms, but the changes will take place over a longer time-scale which at present may give the impression that small-scale farming is less detrimental to the environment. However, the small-scale farm will suffer the disadvantage that it lacks the finance and specialist management skills needed to cope with the added complexities and cost of conservation.

In addition to the above, measures towards conservation will also increase through the control of land by conservation societies; this could well embrace the simultaneous encouragement of small-scale farming but with conservation as the main objective, and it is unlikely to contribute significantly to agricultural production.

The above arguments clearly assume that the provision of an acceptable rural environment will require extensive planning and management. I do not believe that it is simply a question of leaving nature to do its own thing. The variety of visual landscape and diversity of species which most people appreciate are the products of complex systems of land management which have developed historically. To meet the objectives of food production and environmental requirements, sophisticated planning and management will be essential in future. The primodial state is, I believe, not what most people want and is probably unattainable anyway.

Input Management Systems

The rapid increase in cereal yields during the last decade has been associated with large increases in the input of agrochemicals and fertilisers (Figure 3). Also it has become recognised that it is essential to use the nutrient and agrochemical inputs in an integrated programme (Walker, 1984). It was failure to recognise the need for associating the use of fungicides and growth regulators with high rates of nitrogen that led to the conclusion in the mid-seventies that nitrogen use had already reached an optimum level in the UK (Walker, 1984). However the explanation of yield increases with such combined inputs is not properly understood and therefore there is no clear scientific basis for reducing inputs in current intensive production systems. This point is also made by Raymond in his paper on lower input systems.

However, Raymond does note in his Table 1 that in wheat there is evidence that the scope is limited for financial improvements with even more intensive input systems than those currently used by progressive farmers. BASF results from our current trials support this view.

Figure 3

Winter Wheat – Output, variable costs and gross margin 1970/71–1981/82 adjusted to 1981/82 values

Year	Yield t/ha	Price £/tonne	Gross Output £	Seed Cost £/ha	Fert. Cost £/ha	Spray Cost £/ha	Total Variable Costs £/ha	Gross Margin £/ha
70/71	4.11	136.3	560.2	36.2	45.9	15.4	98.4	461.8
71/72	4.66	124.9	582.5	34.4	45.6	17.6	99.7	482.8
72/73	4.50	134.9	607.2	33.9	52.6	23.6	112.8	494.5
73/74	4.31	174.1	749.8	29.1	47.3	26.8	105.3	644.5
74/75	5.26	134.0	704.9	33.7	41.7	29.8	107.5	597.4
75/76	4.46	134.9	601.6	36.8	54.0	37.4	130.8	470.8
76/77	3.92	140.6	550.9	32.5	46.0	40.3	122.6	428.3
77/78	5.22	114.1	593.5	37.1	47.8	45.2	133.5	460.0
78/79	5.56	129.3	731.0	36.4	56.3	61.6	160.8	570.2
79/80	5.46	122.5	669.1	37.1	61.6	69.1	176.0	493.1
80/81	6.42	117.4	753.2	33.0	64.1	71.9	175.8	577.4
81/82	6.29	112.4	706.7	33.5	69.9	73.7	183.5	523.2

NB: All items are valued at 1981/82 input price

Source: University of Cambridge, Agricultural Economics Unit 1981/82

It is therefore concluded that in order to progress towards more profitable production it is necessary to devise input management systems which more closely relate the inputs to the needs of individual crops in individual fields. Official and commercial organisations are developing such management aids. MAFF, in particular, is developing decision-making and forecasting systems for cost-effective and environmentally acceptable pest control (Department of the Environment, 1983).

Also, my own company has developed a computerised advisory service known as CASP (Walker, 1984) which relates the level of nutrient and agrochemical inputs to the status of the field and the crop cultivar to be grown. The first stages of the computer program calculate a potential yield for the crop based on such factors as soil type, structure, depth, drainage, nutrient analysis, organic matter, crop rotation, crop history, cultivation, time of drilling and variety. Input levels are then related to the yield target and projected value of the crop; they are also related to a pest, disease and weed risk analysis based on the characteristics and history of the field and crop for which records are maintained in the computer. A specific program is then calculated and printed for each crop in each field with

a detailed plan for all nutrient and chemical inputs together with the target yield and notes on timing and compatibility of treatments. A full gross margin analysis is also provided. The plan is produced at the time of drilling and there are facilities for it to be updated and amended as the season progresses.

I believe that this approach represents a positive step towards the future requirements of profitable crop production in an environment where it is necessary to control the cost of inputs in relation to potential financial returns. It will also assist in meeting the environmental objective of using the minimum amount of chemical input needed for profitable food production.

Application Systems

Raymond notes in this Conference that it has been calculated that 80% of pesticides miss the target. It is also reported (Walker, 1980) that standards of practical spray application and maintenance of equipment are extremely poor. Improvements in the standards of manufacture and control systems for conventional sprayers coupled with improved training of spray operators should improve spraying accuracy. There are also novel technical developments based on controlled droplet size systems and electrostatic spraying which have the potential for more accurate application. The net result of these developments should be less drift and more product on the target (Department of the Environment, 1983). If this is achieved there should logically follow the opportunity to use lower rates of active ingredient per unit area.

Conservation through Profitable Farming

As an illustration of the development of greater concern and positive action by farming and the chemical industry in relation to the environment, BASF and Velcourt have recently initiated a joint project with Hill Samuel Agricultural Property Unit Trust, the owners of the land. The project involves positive action to improve the rural environment by a variety of schemes to restore wildlife habitats and improve visual amenity on a 683 ha Bedfordshire farm managed by Velcourt. The objective of the project is to create practical improvements to the environment and to show by example the potential for managing such schemes in conjunction with large-scale modern farming. It must be emphasised that the plans for the project have been under the management of the Farming and Wildlife Advisory Group which has been actively involved and has co-ordinated the interests of a range of UK organisations concerned with the environment. It is an important theme of the project that it is made possible only by profitable farming.

I am firmly of the opinion that the satisfaction of man's aesthetic requirements is equally important to meeting his bodily needs by food production. To satisfy the aesthetic requirements, changes in attitude and the introduction of incentives and controls will be demanded by the consumer to redress some of the destruction of the existing environment which is taking place. I do not think that in broad terms it will be difficult to identify what people require, but in detail there are clearly going to be differences. However, activities other than agriculture will increasingly conflict with environmental objectives in future. A balanced approach taking account of all these activities is needed: it would be illogical and unproductive to require silent water pumps while at the same time permitting such activities as motor racing.

It has been argued in this paper that the objectives of food production and protection of the rural environment can be achieved through profitable farming which, for economic reasons, will have to be on a reasonably large scale. I realise that there are alternative approaches based on much stronger controls similar to those applied to most other businesses within the town planning laws. However, in practice these costly and complicated laws are recognised to have been remarkably unsuccessful in improving our urban environment. Having said this I believe there is an important role for public ownership and control of parcels of land through conservation societies and considerable progress has already been made by such organisations.

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