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Towards an Integrated Agriculture

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Summary of the Preliminary Study V44

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## FOREWORD

This publication contains the summary of the study "Towards an integrated agriculture", which has been carried out for the 25th report to the government "A Policy-oriented survey of the future", towards a broader perspective (published summer 1983).

In this report the Council gave considerable attention to agriculture. Two perspectives were elaborated: separation of functions and integration of functions. The constitutive ideas for this last perspective were obtained from this preliminary study.

## TOWARDS AN INTEGRATED AGRICULTURE

### SUMMARY

#### 1. INTRODUCTION

There has been a great deal of discussion in recent years about agriculture in the Netherlands and in the EC as a whole. Besides increased recognition of the economic function of agriculture there has also been criticism from an economic point of view (the cost of over-production), a social point of view (the drop in employment), and a physical point of view (effects on the environment and animal welfare).

Alternative strategies have also been put forward in the last few years which take more account of the employment factor and the environment factor respectively, but they too are open to immediate criticism on the grounds of costs, feasibility and/or side effects.

Another view of agriculture has been developed, however, which has not featured in mainstream discussions; its aim is to integrate economic, social and environmental objectives and it is known as "integrated agriculture" or "agriculture with a broader objective". To date this idea has not been elaborated and evaluated in terms of costs and benefits. This has been attempted in the present report, which deals with the following topics:

1. developments in agriculture in the Netherlands since 1950 and the underlying causes;
2. the advantages and disadvantages of these developments;
3. expected developments;
4. three views developed to date on the future of agriculture;

5. integrated agriculture: definition, objectives and strategy;
6. intended shifts of emphasis;
7. possible policy instruments;
8. an initial attempt to quantify and assess such a scheme.

## 2. DEVELOPMENTS SINCE 1950

Since 1950 agriculture in the Netherlands has undergone a number of far-reaching changes; among the most striking are an increase in the volume of production (particularly in animal husbandry, despite a reduction in the labour force and the amount of land used), a drastic intensification, mechanisation and "chemicalisation", an increase in exports (a greater share in the market for dairy produce, meat and potatoes) and radical changes in the production structure (increased use of energy, artificial fertilizers and concentrates, increased size of farms, fields and plots, increased domination of family farms and a move towards more animal husbandry). The Netherlands now occupies fourth place in the table of net exporters of agricultural products.

These changes can largely be explained by the following four factors:

1. Technological developments: more efficient breeds, machines, stalling systems, "auxiliary substances" (growth substances, pharmaceuticals and pesticides), etcetera.
2. Price changes: particularly the large rise in wage levels, the relative decrease in the price of energy (up to 1974), artificial fertilizers, concentrates and "auxiliary substances" and the gradual fall in the prices paid to farmers.
3. Government policy: it has not so much been the national government's policy on agriculture which has been the most significant factor but the accession to the EC with its expanding markets and increased competition. Of particular importance to the Netherlands has been the emphasis in EC market and prices policies on support for

dairy produce and the exemption of some raw materials for concentrates from high import duties. As regards national policy the most significant factors have been a good agricultural extension service and strong support (both financially and procedurally) for land reallocation and reconstruction.

4. Changes in the pattern of consumption: more meat and more processed products (fruit yoghurt, potato-chips etc.).

Due to these various factors the Netherlands has been able to profit from its geographical position between sea ports (concentrates) and large markets in the hinterland (Ruhr, Paris).

### 3. ADVANTAGES AND DISADVANTAGES

It must be admitted that these developments have benefited society in the Netherlands considerably in a number of ways. Consumers have profited from a structural drop in the price of agricultural products; farmers have seen their level of income, social status and their working conditions improve and the whole community has benefited from the large contribution made by the agricultural sector to the balance of payments. The EC has become self-sufficient in an increasing number of agricultural products. There have even been a few advantages for the environment and wildlife. For example, the agricultural sector managed to find a good use for the increasing amounts of organic waste being produced by industry (350,000 tonnes per year) by turning it into animal feed. The intensification of farming was favourable to certain birds, such as geese and a few species of aquatic birds and waders.

However, there are also negative aspects. From the economic point of view one disadvantage is the enormous increase in over-production and the concomitant financial burden for the EC (now about 40 billion guilders yearly). This over-production has created a new form of dependence, because the cost of marketing the surpluses is heavily

dependent on world market prices and on the United States' agricultural policy. The Netherlands has become increasingly vulnerable to measures taken by its EC partners (e.g. closing their frontiers).

The Netherlands has also become vulnerable on the supply side because of the country's increased dependence on energy and raw materials for concentrates from the world market. Regarding the Third World, the effect of EC policy (import duties, export refunds) has been to increasingly distort competition.

On the social front the major disadvantages include the decline in employment in the agricultural sector, the inability of farmers' incomes to keep up with the trend and an increasingly skewed distribution of incomes. Farmers also have to work many hours and have very little occupational mobility. Their say in matters concerning cooperatives, management and the environment has also been reduced. In addition, polarisation between farmers and the general public has increased, particularly because of land reallocation and reclamation, intensive animal husbandry and the use of pesticides.

On the physical front, the great increase in the use of energy and raw materials is a major disadvantage, having been one of the factors affecting soil fertility in some regions (as a result of the excessive input of manure and minerals). In some regions there is a lack of moisture and organic matter in the soil and an increased incidence of soil diseases. In some regions crop yields (potatoes) are even declining. The "external" environment too is saddled with increased pollution from commercial fertilizers, manure and pesticides, and this has contributed to a considerable impoverishment of the flora, and to a lesser extent the fauna. The countryside has become more or less standardised. Finally, the conditions in which animals are kept are being more and more criticized (injustified in the case of dairy farming, but justified where intensive animal husbandry is concerned).

It is important to remember here that these disadvantages not only affect the community at large, but also the agricultural sector itself. Everyone passes the burden on: consumers on to the farmers, the farmers on to the animals and the environment, the EC on to the Third World, the Netherlands on to its EC partners and the present generation on to future generations.

#### 4. PROSPECTS

To what extent will these developments continue in the future? This is to a great extent dependent upon the behaviour of the various factors described above which determine agricultural developments.

With regard to technology, considerable advances are to be expected in micro-electronics and biotechnology (breed improvement, embryo transplantation etc.). The resulting cost-price reductions will mainly benefit the consumer, though such developments may have either a positive or a negative effect as regards employment and the environment.

With regard to prices, it is difficult to make any forecast on the price of capital, land or energy, though it is expected that labour costs will fall (because of unemployment), which in turn will mean relatively more input of labour. On the other hand, however, the prices paid to farmers are likely to drop still further, as a result of technological developments and increasing over-production and competition, and this will in fact decrease employment at an even more rapid rate. The raw materials for concentrates may also become cheaper, but this is dependent on the EC's import policy.

With regard to government policy it is likely that price subsidies for surplus dairy products, meat and sugar will be limited. It is possible, however, that subsidies for products from Mediterranean countries, such as olives and grapes, may be increased, a shift which is unfavourable to the Netherlands.

As far as the pattern of consumption is concerned, it is possible that the reduction in spending power might lead to a fall in meat consumption. This too is disadvantageous to agriculture in the Netherlands.

Generally speaking, it is likely that many of the present problems facing agriculture will continue if not worsen; these refer to over-production, vulnerability, employment, incomes (and their distribution), the Third World, use of manure, and the impoverishment of the natural environment. High unemployment will almost certainly mean that the number of people working in the agricultural sector while retaining unemployment benefits (legally or otherwise) will increase.

#### 5. THREE SUGGESTED SCHEMES

Various schemes have been suggested to avoid these sombre prospects. The three most important of these are discussed below; they place the emphasis on capital, labour and the environment respectively.

The first, which corresponds largely to current government policy, can be described as export growth. The assumption here is that it would be most profitable for the Netherlands to continue to make every effort to reduce cost prices and at the same time improve quality wherever possible. EC agricultural policy would have to become more market oriented. This would improve the competitive position and the balance of payments of the Netherlands and reduce the fall of employment levels. Dairy products are an exception, as the social consequences of a free market policy in this sector would be too harmful; a temporary quota system is therefore desirable. Possible disadvantages of this scheme are the harm that may be done to the environment and wildlife. This, however, could be restricted by taking measures to prevent the excessive use of manure and by establishing nature reserves and concluding management agreements respectively.



One objection to this scheme is that if the ultimate choice is a free market policy, this amounts to saying that surplus productivity can only be eliminated at the cost of drastic reductions in income and employment. Furthermore, nature reserves and management agreements provide insufficient compensation for the harm done to the natural environment by intensive farming and infrastructure projects.

The second scheme, described by young farmers' associations as the medium-sized farms policy, opts for eliminating surpluses without loss of employment. This is only possible if the market is regulated still further by the introduction of quotas for individual farms, not only in the dairy sector but also in others, while at the same time raising the prices paid to farmers. It is also felt that land policy and subsidies policy should be geared more to smaller farms, so that they can develop into viable undertakings. If the farmers' burden is thus lightened they will be less inclined to increase intensification and the pressure on nature and the environment will therefore be reduced. This last supposition is in fact the weakest aspect of the scheme.

The third scheme, described by environmental organizations as environmentally sound agriculture, is concerned much more specifically with ensuring the quality of nature, environment and food. It envisages not only quota systems, but also nature reserves, management agreements and markets for products from "organic" farms. The aims are the elimination of intensive animal husbandry, the extensification of glass-house market gardening and dairy farming and the introduction of a much more varied cropping plan in arable farming. Patterns of consumption would also be required to change considerably.

The objection to this plan is that it is unrealistic; such drastic changes are not feasible socially and would either cost too much or take place at the expense of a great many jobs.

In conclusion it can be said that all of these schemes involve one or more unsurmountable problems.

## 6. INTEGRATED AGRICULTURE

Integrated agriculture attempts to avoid the pitfalls described above and to integrate widely divergent objectives in such a way that the burden is not merely passed on. In very general terms, the aim is to integrate the interests of capital, labour and the environment; in more practical terms, to integrate the following objectives:

- a. reasonable prices and quality for the consumer;
- b. reasonable incomes and working conditions for farmers;
- c. maintenance of net levels of employment in agriculture;
- d. more balance and self-sufficiency on the EC market;
- e. less distortion of competition for the Third World;
- f. more economical use of energy and raw materials;
- g. improved quality of the environment (production environment, working environment, external environment);
- h. promotion of varied wildlife and a varied and attractive countryside;
- i. improvement of animal welfare.

Integrated agriculture also assumes the continuance of the EC market, no substantial increases in government subsidies to agriculture, no drastic changes in patterns of consumption and on balance (!) no stricter regulations than are in force at present. Emphasis is on creating new opportunities rather than imposing limitations. Besides food production, agriculture is deemed to have four subsidiary functions: the creation of attractive landscapes, the encouragement of wildlife and vegetation, re-use of organic industrial and domestic waste and the supply of energy. These subsidiary functions should be paid for as far as possible, too.

In land reconstruction and management projects, conflicts of interests are not a priori assumed; cooperation among those concerned is regarded as a realistic option.

Integrated agriculture has nothing to do with alternative agriculture or old fashioned agriculture; it is an efficient and dynamic agriculture, though with a broader range of objectives. Nor does it constitute a ready-to-use cultivation system or a blueprint for the future. All that is predetermined are the objectives (deliberately formulated in relative terms) - the means are left open as far as possible. To this end a less technocratic and more "sociocratic" system of decision-making is required, particularly where land reconstruction is concerned.

## 7. INSTRUMENTS

What sort of policy might be able to unite such potentially conflicting objectives and bring them closer to achievement? Government policy instruments might be the first thing to come to mind, but in integrated agriculture these are secondary. The most important instruments are those of the various groups of people concerned. The function of government is more one of creating conditions and frameworks. Options include:

- a. increasing the possibility of solving problems by less usual methods; for example, advice and subsidies should not only be provided for making land suitable for machines, but also the other way round;
- b. increasing the opportunities for pluriform, non-commercial private extension services, to deal with such things as crop protection;
- c. increasing the opportunities for the farmers and nature conservationists concerned to participate in decisions on land allocation, crop protection and nature management in agricultural areas. At present authority is too much in the hands of public service departments and only two land development companies. Groups concerned could, for example, be allowed to have their own plans elaborated by experts chosen by themselves. Such changes are less revolutionary than they might appear: they are already taking place locally where urban renewal is concerned.

In this way it might be possible to increase the freedom of choice available to the various groups concerned and thereby improve the chances of an integrated approach.

With regard to government measures, such instruments as levies and subsidies are the first to consider here, not only because of the crucial role played by prices but also because such forms of control, though shifting the scope for the parties concerned, do not reduce it. Measures described below might be appropriate.

With regard to EC market and prices policy a combination of two measures is considered in the first place: higher import levies on the raw materials for concentrates and lower export refunds for agricultural products. This could have several effects: savings (grain, dairy produce, meat) and extra income (levies) for the EC exchequer, increased self-sufficiency, limitation of (indirect) energy consumption, encouragement of the re-use of organic waste and reduction of the regional burden on the environment by overmanuring. The budgetary savings would create the possibility of compensating the farmers for loss of income in the form of somewhat higher prices. These are only acceptable, however, if the volume of production is controlled at the same time.

These measures would be relatively unfavourable to the Netherlands' competitive position, but the plausible alternative, a levy on intensive production imposed by the EC, might well be considerably more disadvantageous.

With regard to national prices and incomes policy, it would appear to be of vital importance to keep labour costs down if levels of employment (not only in agriculture) are to be raised or indeed maintained. This need not mean a loss of purchasing power if a reduction of the charges on labour is opted for. The necessary budgetary compensation could be found by raising charges on other means of production, such as energy, raw materials and "auxiliary substances". The use of the latter would then be

reduced while the use of labour would be encouraged. Things will not go so far as to see machines being replaced by the people they once replaced, but expert work, including accurate observation, planning, planting, harvesting, caring for crops and livestock and so on, will be essential (annex 2). Such labour can pay for itself more easily if the burdens on producers are shifted, as net yields will be higher and savings can be made on animal feed, commercial fertilizers and "auxiliary substances". Subsidies on investment in for example modified machinery to suit the idea of broader objectives may also have an encouraging influence.

However, no matter how powerful the price mechanism may be, it alone cannot satisfactorily solve the problems of over-production, decreasing employment and the threat to the environment. Support policies are also necessary, and one important element is a quota system. The change of course in this direction in EC policy must be continued and expanded to other sectors including the meat sector (also of significance in view of manure surpluses). Policy with regard to land and tenancies could also be directed more towards employment. Control of land prices, directly if necessary, seems essential if the tenancy system is to survive. An additional possibility might be a certain deregulation through the Agricultural Tenancies Act, but only where nature reserves are concerned, since there the "protection" of the tenant in fact works to the latter's disadvantage. Polderisation of the Markerwaard could also reduce land prices, but there has not been nearly sufficient research into alternatives and agricultural side effects of such a move for a decision to be taken on this.

Policy as regards land reconstruction lends itself particularly well to a more sociocratic decision-making procedure. This would demand:

- a. increasing the choice available to those concerned by to some extent separating land improvement from land reallocation. Mainly the introduction of administrative

land reallocation (which in any case is more suited to quota systems) and the reintroduction of grants for the re-location of farms other than under a land reconstruction system;

- b. increasing the actual authority of those concerned by decentralising the decision-making process and transferring powers to appoint those who prepare and implement plans from the public authorities to the parties directly concerned;
- c. privatising certain responsibilities which are at present carried out by public authorities, in order to encourage pluriformity.

A policy of this kind would save money, but the land reconstruction authorities are to acquire new responsibilities - such as energy-saving infrastructure projects (e.g. cogeneration) and so that the overall budget for land allocation should not be allowed to fall further.

Nature policy will have to be used to create conditions which will put an end to the present fights over priority rights on plots of land and ensure that farmers and conservationists can work together. This should apply not only to nature reserves and management areas. Functional natural elements in particular should be given renewed attention. Every effort should be made not to limit, but to expand the range of possibilities open to the parties concerned. Options include:

- a. more support for voluntary management of nature reserves and the countryside. This should not, however, degenerate into distortion of competition, i.e. functional nature management must remain central. This is perfectly possible in the case of many hedgerows, for example;
- b. the encouragement of management agreements as a policy instrument; small sums of money could then have a considerable effect on the countryside. Such agreements should also be made possible outside centrally designated areas;
- c. relaxing municipal regulations for cutting trees so as to permit the re-location of hedgerows;

- d. relaxing the regulations on management agreements as a policy instrument, so that they can be concluded outside centrally designated areas and invite more participation of farmers and conservationists concerned;
- e. very important: the introduction of grants to encourage integrated investments, such as tools and machinery for wet soils and grassland which is only accessible by boat, and for re-locating hedgerows. This would release agricultural nature management from an atmosphere of standstill and restriction.

If such a policy were adopted nature reserves would no longer be of central importance, but would become a supplementary instrument, for use as a last resort to ensure the survival of certain plant and animal species and to experiment with forms of integrated management. Farmers would retain management wherever possible.

With regard to the financing of nature policy, the costs would have to be borne to a greater extent by those causing the problems (e.g. farmers whose activities impoverish the natural environment) and by the "users" (those enjoying the recreational qualities of the landscape). Possible instruments might include modest levies on concentrates and the tourist tax.

Environmental policies should be concerned with more vigorous control of pollution, not only that caused by agriculture, but also that which harms agriculture. Increased attention should be paid to the working environment of farmers and to the production environment. Particular priority should be given to acid rain caused by power stations, industry and motor vehicles, to heavy metals (from commercial fertilizers, concentrates, water purification sludge, copper in pig feed) and to manure (intensive animal husbandry). However, besides the restricting measures which have already been proposed (stricter standards for contaminants and additives in animal feed, commercial fertilizers and purification plant sludge, and the introduction of standards on the maximum amount of manure to be used per hectare) relaxing measures are also needed. For example, grants could be provided for expanding

storage facilities for manure and for re-locating intensive stock-breeding farms in arable farming areas. The IJsselmeer polders might be opened up to such ventures.

Even if such measures were taken it seems that in the long run it would be impossible to continue the extraction of drinking water from higher-lying land without purification.

With regard to policy regarding product quality, the Netherlands, as an exporting country within the EC, will have to be constantly one step ahead. Residue standards will have to be tightened up and a number of highly dangerous "auxiliary substances" could gradually be prohibited. This would encourage industry to develop alternatives. It might also be possible to introduce new approval stamps, not for products which have been grown by alternative methods, but for products which are relatively pure. This might encourage conventional farmers to take extra care with regard to quality.

Energy policy is of considerable importance to integrated agriculture. It will have to be geared much more to non-exhaustible energy generated on a decentralised basis. This could perhaps be encouraged by paying higher prices for electricity supplied to the grid. It might also be possible to subsidise farms which are not connected to the gas mains if they invest in wind turbines, for example. This would give agriculture, particularly in coastal regions, an important, paid subsidiary function.

With regard to research policy, more attention should be given to factors such as labour and the environment (including soil fertility). However, the objective should no longer be labour-saving but the opposite - the deployment of highly qualified labour which can pay for itself. This presents a completely new challenge to those involved in agricultural research. On the environmental side thought might be given to:

- a. the introduction of national monitoring networks for soil quality, flora and fauna, and the expansion of the existing networks for food quality and ground water;



- b. a survey of sources and flows of contamination;
- c. new arable crops (of particular importance in reclaimed moorland);
- d. integrated pest and weed control, flora and fauna management, land improvement and water management. Functional natural elements in particular require more attention, e.g. extensive grassland for heifers and dry cows;
- c. the effects of prices and quota systems on incomes, employment and energy consumption.

Other policy measures could include:

- 1. measures to prevent the establishment of mammoth-size farms;
- 2. changes to the law on inheritance so as to facilitate the transfer of farms and to make less intensive farming possible;
- 3. measures to prevent the formation of cartels in the fertilizer industry, stock breeding, the dairy industry and among land improvement companies;
- 4. better international agreements on sugar, cereals, dairy produce and fertilizers so as to improve the position of agriculture in the Third World.

Thus in some areas regulations need to be tightened up and in others they need to be relaxed in order to bring a system of integrated agriculture a little closer.

#### 8. PROVISIONAL ATTEMPT TO QUANTIFY AND ASSESS SUCH A SYSTEM

So far the effects of the measures proposed have only been assessed in qualitative terms. It is now time to consider whether these effects will actually occur, and if so, to what extent.

For this purpose a number of tests were carried out (chapter 11) using a linear programming model of agriculture in the Netherlands by Th. Bakker from the Agricultural Economics Institute (annex 3).

The first test dealt with the effects of measures to restrict over-fertilization with phosphates. The primary response was found to be a reduction in the amount of concentrates imported and drastic cuts in pig and poultry breeding. On the positive side this would not only bring about the desired elimination of over-fertilization with phosphates, but it would also mean a reduction in energy consumption and an improvement in the quality of surface water. This would be countered, however, by a 6% loss of employment and a loss of income of fl. 1,300 per working year. Such a result is not very satisfactory from the point of view of integrated agriculture.

A second test calculated the effects of increasing the cost of energy through the introduction of an energy levy on the means of production equivalent to doubling the price of energy. It was found that such a measure would have spectacular consequences. The agricultural sector would make drastic economies on concentrates, attempting to replace them wherever possible with fodder crops. This would reduce the livestock population and the amount of grassland and double the acreage under arable crops. The reduction in the livestock population would be greater in the case of pigs (-35%) and poultry (-70%) than in the case of dairy herds (-20%).

These changes have a number of advantages: energy consumption would be halved, over-fertilization with phosphates would virtually cease, that with copper would be halved and there would be much less over-production in the dairy industry, which would mean that a billion guilders could be saved on the EC budget, quite apart from the yield to the Dutch treasury of fl. 880 million from the energy levy. On the other hand, however, there would be a number of considerable disadvantages: employment would drop by 8% and in the supply and processing industries by as much as 20%. Income would also fall by fl. 6,600 per working year. Thus this is not a satisfactory result from the point of view of integrated agriculture either.

In both of these tests the screws were turned tighter on the agricultural sector without any form of compensation being allowed for. It was therefore obvious in advance that the result would not really constitute integrated agriculture. In a third test, however, compensation was provided, by using the revenue from the energy levy to lighten the burden in respect of the labour factor, i.e. a shift of the burden from labour to energy. This test did indeed produce better results, income increasing by fl. 5,300 per year compared with the previous run. Employment did not increase, however. The explanation is probably that the model did not include modified technical means of production which, though not competitive at present prices, would be so if prices were modified. Such aspects will be allowed for in a later study.

Although it is not yet possible to quantify the effects of integrated agriculture in full, the results are encouraging enough to continue on the same road. A follow-up study has already been started and discussions on a more integrated agriculture may start.