Agribusiness:

Knowledge and Innovation Priorities
Aspirations for the 21st Century

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Preface

Where to locate the dilemmas and opportunities if agribusiness wants to be a vital sector into the 21st century? And what are the knowledge and innovation challenges facing the sector? These are the central questions addressed in this report. The report presents the NRLO's views on the knowledge and innovation priorities for agribusiness in the years to come. It outlines the ambitions of those involved in agribusiness. The agro-sector is understood here not only to refer to primary agriculture, but to all related industries and services branching off with increasing diversity into other sectors and countries.

During 1996 and 1997 a large number of issues vital to the future of agribusiness were the subject of in-depth studies and workshops. The results of these studies and meetings have been integrated into five reports. Key issues include: 'a social perspective for agriculture', 'globalisation and agribusiness', 'market and consumer', 'agriculture and the environment' and 'towards healthy livestock farming'. The reports were published in February 1998.
Subsequently, some 375 interested parties (stakeholders) in a variety of fields, such as the business itself, social organisations, government agencies and scientific institutes were asked to comment on the integrated reports. The aim was to ascertain whether they shared the NRLO's views on the knowledge and innovation challenges facing the agro-sector. In response, over 200 stakeholders sent in their comments.

The current report, 'Agribusiness: knowledge and innovation priorities. Ambitions for the 21st century' outlines some of the more important issues contained in the integrated reports plus comments obtained from stakeholders. This report is succinct and selective. Ideas for the future have been limited to ten specific proposals touching on a number of basic issues in which a great step forward should be made. Presentation of the dilemmas and opportunities in agribusiness as well as the considerations underlying the proposals has been kept at a bare minimum. The interested reader will find a list attached to the report containing NRLO documents providing more detailed information.

The report marks a crucial moment in time. It intends to be a starting point for action rather than the conclusion of a job well done. The image emerging from the response made by the stakeholders is that of a widely supported ambition to ensure that agribusiness will have a great vitality in the 21st century.

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Summary

The present report presents the NRLO views on knowledge and innovation priorities for Dutch agribusiness in the years ahead as seen in an international perspective.

Knowledge and innovation priorities are highlighted against the backdrop of key challenges facing Dutch agribusiness in the years to come. Major challenges include:

- to turn from reactive to proactive policy-making based on a broad range of values. The challenge facing agribusiness is that it should assume partial responsibility for maintaining and protecting ecological, cultural, ethical and spatial values;
- to transform agro-chains into responsive, flexible networks involving other sectors besides agribusiness (such as the transport and distribution sectors, non-food industries);
- to strengthen its international market position by increasing the added value supplied to EU markets, acquiring a larger market share in emerging growth markets (such as Eastern Europe, Latin America, China) and investing in local markets all over the world;
- to develop new alliances between citizens and agribusiness by creating new partnerships between highly diverse users of rural areas and by making adjustments to production methods in agriculture that are demanded by consumers and the public at large;
- to bring about a pluralist agro-sector, characterised by manifold relations with society, regional diversity and diversity in forms of enterprise.

If Dutch agribusiness is to meet these key challenges as well as to realise their corresponding strategies it will require profound and complex innovations. In the present report they are called 'system innovations'. The thoroughness of changes to be made is attendant on a number of factors:

- system innovations involve the design and introduction of entirely new systems rather than improving existing ones, while requiring an approach that transcends inter disciplinary boundaries;
- exploration, design and implementation of system innovations demand new innovation creating networks, uniting heterogeneous parties - coming from both within and without agribusiness - in concerted action;
- bringing about system innovations requires researchers, government agencies and the business community to display different types of behaviour than those that have been traditionally familiar.

Ten proposals are presented in the report. They are intended to help agribusiness take a major step forward in accomplishing far-reaching adjustments. They have been submitted to a large number of prominent stakeholders representing the business community, social organisations, government agencies and knowledge institutes. Stakeholders' responses show that the proposals go a long way in meeting their ambitions.
Six of the ten proposals are related to the development of knowledge, technology and skills geared towards system innovations. Two pertain to a new educational programme. Two others are pertaining to initiatives to renew or at least highly improve information services. The matrix below outlines the scope of the proposals.

Outline of proposals
Type of programme
System innovation
Training
Information service

1. International training centre for agribusiness top management
2. Innovation programme on chains & logistics
3. Information and knowledge network on new markets
4. Innovation programme on environment-oriented system innovation
5. Social sciences network for environmental issues in agriculture
6. The agriculture and environment information network
7. Innovation programme on landscape quality improvement through spatial integration of agricultural and external developments
8. Animal health strategies innovation programme
9. Training programme for policy-defining epidemiologists and veterinary quality managers
10. Integrated animal farming systems innovation programme

Message

If agribusiness aims to be a vital sector in the 21st century, then how should it go about achieving this aim and what are its assets?
The answer to this question involves a large number of specific issues which shall be addressed in the following chapters. Still, one major theme can be heard in all these issues, pointing towards the key task for agribusiness in the years to come: to create and invest in new networks generating knowledge and innovation.

Invest in new networks generating knowledge and innovation

1. Tasks and strategies for the future

1.1 Towards a policy based on a broad range of values?

Agriculture has long been perceived as an economic activity. Its primary responsibility was seen to be an efficient provision of high-quality and low-price food and ornamental plant products. One of the main concerns for those involved in the agro-sector was the constant struggle to maintain, and if possible improve, international competitiveness. International competitiveness is and will remain a key concern for agribusiness.

International competitiveness

In the past few decades it has become increasingly clear that economic values are no longer the be-all and end-all in the development of the agro-sector. Particularly, ecological values have been holding the brighter spotlights and tensions between economy and environment in recent years have become a much-debated issue in business and political circles as well as the media. Essentially, however, the spectrum of value areas is much wider. There is a wide variety of value areas which require simultaneous attention: economic values, ecological values, social values, cultural values and ethics, and spatial values.

Attention for wide variety of value areas

The position of agribusiness with regard to these value areas is an important issue for the future. The agro-sector is faced with the need to change its perception of responsibilities and their distribution. Traditionally, the agro-sector has been specifically accustomed to feeling responsible for the economic value area. Other values, such as ecological, cultural, ethical and spatial values were at best perceived as limiting conditions of business management. Responsibility for such values was perceived as resting with government and social organisations. The change of course which the agro-sector is now facing implies that it will also have to assume responsibility for maintaining and protecting those ecological, cultural, ethical and spatial values. It implies a turn from reactive to proactive policy-making, thinking and action with respect to sustainability.

Need to change

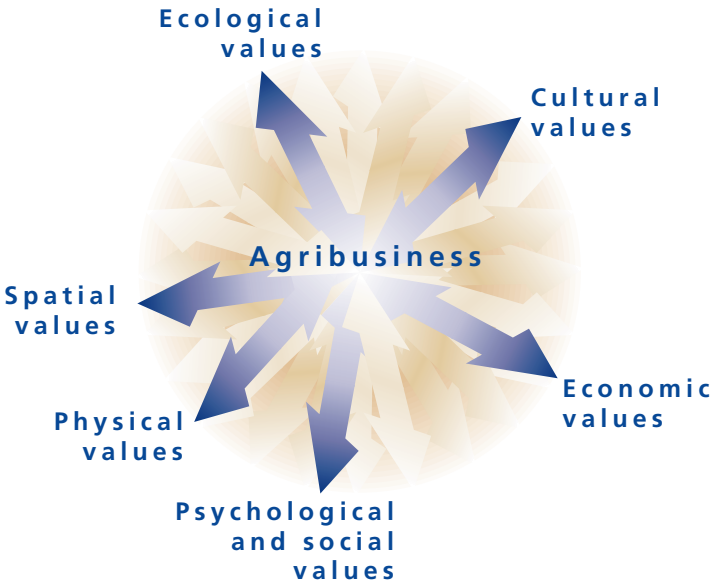
Turn from reactive to proactive policy-making

The above can also be phrased as follows.
The future is uncertain. However, it is highly conceivable that 'contributing to the quality of social life' will be the frame of reference within which the agro-sector will be called to account in the 21st century. The agro-sector will then have the opportunity to enter the third stage of its development. The first stage was that the sector thought and acted in terms of producing, processing and

marketing of foods and ornamental plant products. The second stage - and the sector is in the middle of that right now - is one of thinking and acting in terms of added value. Still, this added value is often limited to the production and valorisation of foods and ornamental plant products. The third stage of development could be one in which the sector switches to 'value thinking'. This requires an analysis of the nature, content and dynamics of various values in society. An analysis of how agribusiness may contribute to realising all those values in the decades to come.

Contribution to the quality of society requires a perspective on the interrelatedness of values

The ambition of the agro-sector in the 21st century might be: to make an active contribution to a variety of value areas. They are all dimensions which require specific attention and care, but there is more: the paramount concern would be to grasp the interrelatedness of value areas. One need not practice holism to realise that the problems facing agribusiness can never be solved by looking at just one dimension. Each case will display a multiplicity of interrelations between various dimensions.
Obviously, the ambition to develop active policy-making based on a broad range of values is couched in uncertainties, risks and dilemmas. Trying to find the right way out will take the agro-sector on unparalleled explorations. But the crucial challenge for the agro-sector is to show that it is not indifferent to its contribution to the quality of social life or its legacy to future generations.



1.2 Agro-chains develop into networks

During the last decade, the agro-sector has made significant progress in its transition from a supply-driven orientation to a demand-driven focus. Thoughts

and actions in the sector are increasingly directed towards 'chain reversal', i.e. tailoring products and qualities to the wishes of markets and consumers. In addition, a concerted effort is being made to strengthen and diversify cooperation throughout the chain. 'Agro-chains' have become a household concept.

Agro-chain

However, thinking in terms of 'agro-chains' will not suffice to meet future needs. The sector finds itself faced with a double challenge.
The first of them is that the consumer market has come to display high levels of differentiation, uncertainty and volatility. Mass individualisation and instant consumerism are the key words here. Consumers have become individualised and behave in a volatile, unpredictable and momentary fashion. They vary in quality levels required and they demand products and services tailored to their individual needs, to be delivered at the right place at the right time.
Consequently, the agro-sector is currently faced with the need to cater to an environment characterised by complexity, continual change and speed - which is expected to continue into the 21st century. As a result, the agro-sector is forced to develop new forms of organisation: responsive and flexible innovative networks instead of tightly organised chains.

Double challenge

The second challenge facing the agro-sector is to strengthen interaction and cooperation with other sectors. Besides creating the 'vertical' networks referred to above, the second key challenge for agribusiness in the 21st century is to create new horizontal networks.
Such horizontal networks will include new coalitions between the agro-sector, industrial sectors and the service sector. The key players on a highly dynamic market not only include consumers, but also buyers of intermediate products and semi-finished goods. This leads to a situation in which various links in the agro-chain do business with links in entirely different chains. An example in the non-food sector is the use of renewable raw materials, obtained from agrification crops.
New and innovative networks are also required as links between agribusiness and the transport and distribution sectors. They are not only desired in order to maintain and extend the important distributive role played by the Netherlands - in the field of agro-products as in others - but also to work out solutions for problems such as the congestion of transport channels, lack of space and the quality of our environment.
Rural areas are another example where the cooperation between agribusiness and other sectors is becoming more and more important.
Under those conditions the future is not for (vertical) chains but for a conglomerate of responsive and flexible organisations continually entering into new alliances, be they of a vertical, horizontal or, indeed, diagonal nature.

Responsive, flexible innovative networks as new organisational forms

New horizontal and diagonal networks

1.3 International perspective

Dutch agribusiness has long been a major exporter of food and ornamental products. However, a portfolio analysis of the position of Dutch agribusiness in various markets around the globe gives rise to concern. Dutch agribusiness enjoys a strong position in both largely saturated and slowly growing markets (especially in the EU). Conversely, the Dutch position is generally weak in rapidly growing markets such as those in Eastern Europe, Latin America, the Pacific Rim, China or India.

Three strategies for strengthening international market position

Apart from strengthening the distribution function discussed in the previous section, the challenges for Dutch agribusiness in an international perspective appear to be found in three directions:

- ◇ increasing added value supplied to EU markets;
- ◇ acquiring a larger market share in emerging markets;
- ◇ effectively settling into local markets all over the world.

Added value on Western home market

Comparatively speaking, the Western home market shows the clearest signs of the globalisation trend that is expected to continue into the 21st century. Particularly evident are European unification, on the one hand, and clear signs of an interweaving of European and American economies, on the other. This is also referred to as 'double regionalisation'.
Today the Western block can best be characterised as an 'elbowing market', with competition concentrating on a mix of price and quality. Here, added value can principally be achieved by taking responsive action to enhance product qualities and services that represent added values to the consumer. Interesting opportunities present themselves in the fields of health products, environmentally and animal-friendly products and the growing market of out-of-home food consumption.

Greater market share in emerging growth markets

Beyond the Western home market, a number of emerging growth markets can be discerned, which also show a broad and highly variegated range of consumer demands. Lying further afield, these markets are as yet little known. Thus, there is a pressing need to survey these markets and their cultures in all their dimensions.

Investment in local markets

Apart from boosting imports and exports, internationalisation will increasingly take the shape of investments in local markets. In the terms introduced in the previous section, this implies investing in local networks as a basis for responsive and flexible operation.

The ambition to grasp the opportunities outlined above is present throughout broad circles in Dutch agribusiness. There are clear signs of intensifying European and global harmonisation, increasing interdependence, frequently changing partnerships and intensified international competition. They are changes which confront individual companies with many questions and dilemmas. Individuals and companies in the agro-sector, including small and medium-sized farms, will find that their capacities for international enterprise are increasingly put to the test.

Capacities for international enterprise

1.4 New alliances between citizen and agribusiness

'Farmer must become citizen among citizens. Cleft with city dweller urgently to be bridged.' These were the title and subtitle of a recent article in a farming journal discussing the NRLO report called 'Agriculture in society: A new perspective'. The report pointed out the danger of increased estrangement between farmers and urban population.

Estrangement between farmer and city dweller

Citizens are not only consumers of food and ornamental products. They also make use of rural areas. The agrarian sector is faced with the task of bringing its spatial claims into line with demands made by other actors who require space for a variety of functions. The agrarian claim to space is under attack from several angles. Apart from spatial claims made on behalf of urban planning (the demand for housing and employment in differentiated residential and working environments) and the desire to enlarge nature areas, space is also required for recreational purposes, infrastructure and the service industry. Meanwhile, the contribution made by farmers and market gardeners as the economic supports of rural areas has dwindled, so much so that they, too, have an interest in taking an active part in establishing other inhabitants and economic activities for the benefit of preserving the quality of life in those same rural areas. A fruitful strategy for the future would be to foster alliances with other users of rural areas. Indeed, such a strategy may be more productive than approaching other users as enemies or opponents. If the agro-sector and other users of rural areas enter into new partnerships, they will have a wealth of opportunities for making innovative and high-quality use of space in the future.

Bringing spatial claims agribusiness into line with demands made by other actors

New partnerships between users of rural areas

In fact, thinking in terms of an opposition between countryside and urban areas is becoming more and more sterile. Increasingly, the interaction between town and countryside is taking central position, developing types of space utilisation that can no longer be characterised as either strictly urban or rural. However, the interaction between town and countryside is by no means served by weakening the specific identity and qualities of rural areas (tranquillity, space, silence, natural phenomena and processes, authenticity, beauty).

Specific identity and qualities of the rural areas

Functional broadening

On the contrary, it is in an urbanising society that a particular need is felt to maintain and develop high-quality rural areas.
The challenge is to create a functional broadening of agribusiness for the purpose of improving the quality of rural areas.

Safe production methods

Citizens are consumers as well. And increasingly demanding consumers at that, not only where the quality and safety of food are concerned, but also about how food production takes place. The concern for safe production methods - in the interests of scenery, the environment, animal welfare and ethics - is an inevitable responsibility for agribusiness. The public response to recent swine fever control clearly showed that although production methods in the agro-sector may appear self-evident from a perspective of animal health or trade policy, they will also be judged on their social implications.
The agro-sector may come to terms with the demands and views prevalent among the broader public by developing its strategies within a broader and more differentiated frame of reference than it did in the past. Consumer-oriented technological innovation and the development of new and comprehensive animal-health strategies are but a few of many potentially successful actions in this field.

1.5 Opting for pluralism

A favourite topic in discussions on the future of agribusiness is the question of whether we should aim for expansion and intensification, for biological farming, for rural innovation or yet some other option.
What emerges from the NRLO foresight studies is the image that the future of Dutch agribusiness is probably best served by making it a pluralist sector. In this context, pluralism should be pursued in several directions: in relations with society at large, in regional development and in developments at business level.

Establishing a pluralist sector in several respects

Open and manifold relationships with society

Open relationships with society are to be pursued in order to enhance the sector's awareness of changes in its social environment and to make sure that any issues pointed out by outside stakeholders are being discussed, examined and eventually translated into adjusted action. In this respect, the agro-sector will feel the need for the widest possible scope, not limiting itself to signs coming from familiar sources, but extending its range of vision to include other branches of industry, politics in general, social groups, other technological domains as well as other countries. This implies that demands are made on the sector's willingness to enter into a different debate, in a different arena, than the one which was going on as late as the 1980s - part of which is still going on today.

Pluralism in spatial developments

Pluralism in regional development is increasing in the countryside. Changing conditions and a growing prominence of other economic functions in the countryside have made it unthinkable for agriculture to remain the sole determinant of regional development and zoning decisions in rural areas. It is spatial-planning views that are becoming directional for agriculture. New opportunities for agriculture will arise mainly as a consequence of environmental changes which the countryside will undergo in the decades to come in function of the implementation of water management, environmental policies, conservation, urbanisation et cetera.
The challenge for an innovating agro-sector is to take advantage of the resulting differentiation and to make creative use of regional diversity.

Diversity at business level

In this context, making use of a wide diversity of development opportunities at business level will be one of the primary challenges for the sector. In addition to expansion strategies we have seen the emergence of diversification strategies, pursuing sideline activities to be deployed alongside agricultural activities. Highly urbanised societies such as the Netherlands present particularly favourable opportunities for interaction with other functions in rural areas as well as with urban activities. An intense debate is going on, extending up to the European level, on the multi-functionality of agriculture and horticulture, or at least parts of those sectors. There is a tendency to look for a contribution that farmers can make to enhancing the 'quality of life', for instance in the context of landscape development, landscape preservation, recreation, health care et cetera. Diversification may also be achieved by combining part-time farming with non-farm activities.
The table below lists some of the principal differences between past and future.

		Pluralism	
		PAST	FUTURE
A	relations with society	Stable, largely inward-looking coalitions ('the green front')	Multiple and open relations with society; dynamic and temporary
B	spatial conditions	Uniformity in spatial conditions as a result of land development interventions being focused on agriculture	Diversity in spatial conditions: agriculture playing a role in interaction with other functions, making creative use of regional diversity
C	business management	High level of standardisation	High level of diversity in sector developments. And-and strategies instead of either-or strategies

2. System innovations

2.1 Innovation needed at system level

If agribusiness wishes to accomplish the tasks and strategies outlined in the previous chapter, then what should it do?
This question can be answered in terms of concrete topics. This is done in the next chapter.
But it is not just a matter of concrete topics. We also need to get a clear view of the nature of changes facing the sector. That is what the present chapter is about.

Difficult change process

The main theme to emerge from the following is that agribusiness should not underestimate the complexity, difficulty and special nature of the process of change. Three interrelated reasons are underlying this conclusion:

- ◇ drastic innovations (system innovations) will be required;
- ◇ realising system innovations is a complex matter in several regards, demanding new networks generating innovation;
- ◇ it is necessary to let go familiar concepts and familiar types of behaviour, both for researchers, government authorities and the business community.

System innovations: comprehensive structural changes

The thoroughness of changes made in innovation processes may vary considerably. Innovation comes in all shapes and sizes. Process or product innovation is in many cases confined to incremental changes. System innovation, on the other hand, involves structural innovations. Such changes generally affect several parties in the sector and often involve participation by a wide range of social actors. One example is the innovation of the auction system in the Netherlands. A system innovation of this kind results in changed interactions with the environment which more often than not necessitate a rethinking of various social, economic and technical functions. System innovations tend to be relatively radical alterations, putting technical systems under review and bringing about shifts in cultural paradigms: older values are replaced by newer ones, which will often trigger resistance.

Dutch agriculture today is in a phase when a fundamental changeover to sustainable agriculture, a process of social reorientation and new networks and alliance will be necessary. At the same time, the use of rural areas is being drastically redefined. Actors playing a role in the use of rural areas are trying to find and create new opportunities to increase the functionality and quality level of rural areas.

Improvement of existing systems insufficient

Over the past few decades many incremental improvements have been achieved within existing agricultural systems. However, improving current systems is

unlikely to be sufficient to find solutions for the great diversity of problems in relation to customer orientation, environmental protection, animal health and welfare, degeneration of scenery and nature, and reduced social legitimacy of agriculture. To solve these issues it will be necessary to achieve far-reaching reorganisations as well as innovations that transcend both individual business levels and the short-term interests of agribusiness.

Thus, the proposals discussed in the following chapter of this report will centre on system innovation. The table below lists some examples of system innovations.

Examples of system innovations

- new systems for logistics and distribution of agro-food and ornamental plant products
- new function combinations in rural areas
- new farming systems (combining design requirements interests in terms of labour income, animal and plant health, environmental protection, animal welfare, and working conditions)
- environment-friendly system innovations at higher aggregate levels (closing cycles of substances between agriculture and other sectors)
- new comprehensive animal health strategies (i.e. strategies that satisfy both veterinary-zootechnical and public-health, economic, ecological, social, ethical, administrative and political requirements)

2.2 System innovations: a selection of knowledge and innovation priorities

The most important and complex challenges for agribusiness are to be found in system innovations. An additional requirement is knowledge development in a range of scientific disciplines. However, since this is not a real bottleneck in taking up major challenges facing agribusiness. The present report will focus on system innovation.

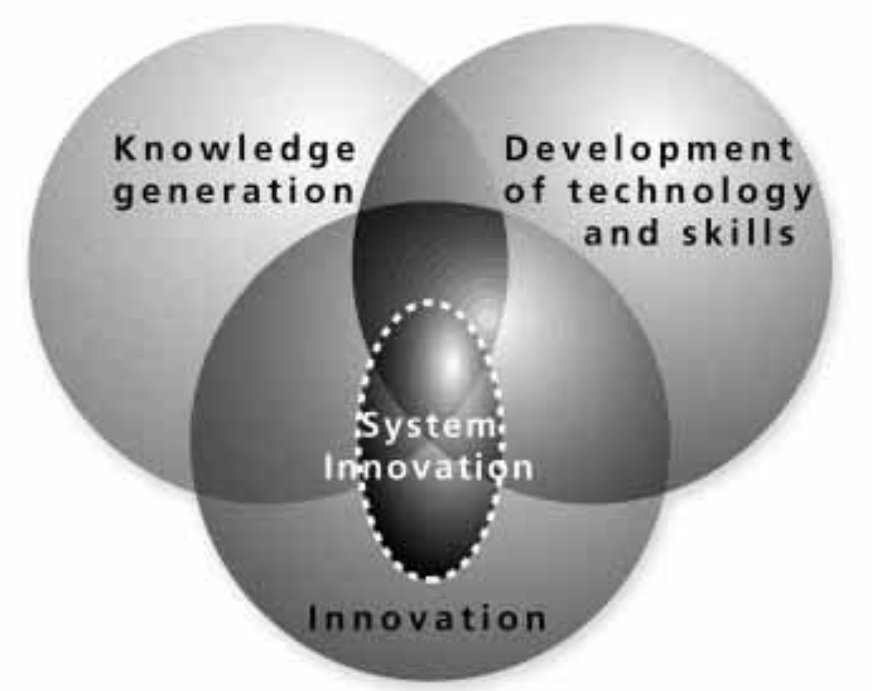
In setting knowledge and innovation priorities for the future, the NRLO has distinguished between three domains of creation. They are: knowledge generation; development of technology and skills; and innovation. The three domains each have their own value and their own dynamics. At the same time, they interact. The relation between the three domains of creation can be said to be an 'LAT relationship': Living Apart Together. The figure below presents a graphic illustration of the LAT model. What is needed to realise innovation in addition to other activities such as production, marketing and financing usually also includes the development of technology and skills, and sometimes generating (fundamental) knowledge. In the diagram the central segment represents the domain of system innovations.

Three domains of creation

LAT relationship

System innovation: a combination of innovating, developing technology and skills and generating knowledge

In the second half of 1998 the NRLO will produce a report dealing with other issues on the knowledge and innovation agenda, more particularly new fundamental science and technology developments which have an impact on the agro-sector.



2.3 System innovation: actor networks

Conditions for success of system innovations

System innovations are an essential requirement for the vitality and sustainability of agribusiness into the 21st century. However, system innovations are difficult to achieve from an organisational, cultural and financial point of view. Not only do system innovations require the amalgamation of highly divergent disciplines, individuals and organisations into concerted action, they also require specially adapted working methods on the part of researchers and a specific financing system:

Explicit and implicit knowledge

- System innovations not only require scientifically tested knowledge, but also practical experience and know-how. Innovating requires procedures to achieve that explicit and implicit knowledge bases are mobilised and combined.

Problem owners and experts

- System innovations require intensive interactions between problem owners and professionals. Mostly, they will be problem owners with diverse interests and professionals with diverse qualities. Private-public partnerships will frequently be a condition for success.

Private-public

Facilitating operations

- Careful organisation and high-quality execution of facilitating operations will be essential for system innovations to be successful. This applies especially to process elements such as: taking the initiative in innovation (defining the problem, initiating action and 'pulling'); negotiation and brokering; combining ideas, energy and interests; giving directions; and individual and collective learning.

Exploration, design, integration and selection

- Exploring, designing, testing and implementation are the primary activities of system innovations. A leading role will be played by activities such as data collection, creativity and selection, knowledge integration and making new combinations of available technologies rather than generating new knowledge.

Expertise coming from the humanities and social sciences as well as natural science

- System innovation requires expertise coming from both the humanities and social sciences as well as natural science. It is not sufficient to consider only purely scientific or technological aspects of innovations; rather, they will also involve analyses of organisational, administrative, political, economic, ecological, structural and cultural elements associated with developing and implementing innovations.

Qualities and working methods of researchers

- In order to make valuable contributions in exploring and designing system innovations, research efforts will need essentially different methods and qualities as compared with knowledge generation: from analysing and explaining towards synthesising; from monodisciplinary towards multidisciplinary activities , transcending boundaries between individual disciplines; from optimising current reality towards designing new systems; from specialities towards "T-shaped skills" or the ability to combine interdisciplinary thoroughness and scope; from purely scientific research towards co-innovation in close collaboration with various groups of both researchers and non-researchers.

Goal-oriented innovation creating networks

- System innovations should be organised in such a way that heterogeneous parties may take concerted action. Innovation creating networks (consortiums, strategic alliances) are highly appropriate in this respect. Particular attention should be paid to the flexibility and outcome orientation of networks. Also, the network design to be selected should be dependent on both the nature and context of the innovation process.

Adequate financial structures

- Innovative policies aiming to achieve system innovations will need financial structures that encourage various professionals and parties to take concerted action in order to accomplish drastic innovations. This implies that economic resources should not be allocated in advance to specific institutes for conducting research or providing information. It is crucial that funds are made available to the innovation project as a whole. Management of funds may be entrusted to a consortium leadership, which will earmark and assign financial means to activities and qualified parties that are needed to accomplish the innovation. Finally, an adequate accounting and assessment system should be made operational.

Part with familiar concepts and habitual behaviour

An additional complication in bringing about system innovations is that actors often find it difficult to part with familiar concepts and habitual behaviour. Some of these difficulties may be indicated as follows:

- If the objective is innovation, it is inadequate to think in terms of "a division between policy-making and implementation" or "boards of policy-makers and trade and industry providing need definitions while research institutes will carry them out". Innovation requires that problem owners, researchers as well as other parties involved will combine their efforts to find solutions.
- The desire to avoid establishing new institutional facilities as well as to maintain a strict division of tasks between industry, government and knowledge institutes is counterproductive to achieving system innovations. System innovations require a network approach and specific innovative structures created in the context of the innovation process.
- In order to make effective contributions to innovation, many research institutes will have to change their organisational cultures. Also, researchers must be willing to act as co-innovators.
- The institutional design as well as the allocation mechanism currently used by the Ministry of Agriculture, Nature and Fisheries (LNV) in its knowledge policies are inadequate to achieve system innovations. Providing financial support for research programmes and research institutes is one thing, but financing innovation themes and innovation creating networks is quite another matter.

3. Proposals

Introduction

What are the issues that may be taken up by agribusiness in order to accomplish the tasks and strategies outlined in chapter one? And are the stakeholders willing to make the necessary efforts? These are the questions that will be addressed in the present chapter. The central issue is the mobilisation and channelling of energy (commitment, intellect, money, etc.) for the purpose of system innovations as outlined in the previous chapter. Another important issue is a partial renewal of training and education for those who will be working in agribusiness in the 21st century. Also, information services provided for those involved in agribusiness should be considerably improved on a number of points.

Ten proposals will be made in this chapter. The proposals are intended to help agribusiness take a major step forward in accomplishing far-reaching adjustments as needed. They have been widely supported by a total of 200 prominent stakeholders - some 50 per proposal - who were asked to reflect on them, representing the agribusiness community, social organisations, government agencies and knowledge institutes.

Six of the ten proposals are related to the development of knowledge, technology and skills for the purpose of system innovations. Two pertain to a new educational programme. Two also are pertaining to initiatives to renew or at least greatly improve information services. The matrix below presents an overview of the various proposals, representing key qualities only.

Proposals are intended to help agribusiness take a major step forward, receiving wide support

Three types of proposals

Outline of proposals	Type of programme		
	SYSTEM INNOVATION	TRAINING	INFORMATION SERVICE
1. International training centre for agribusiness top management		■	
2. Innovation programme on chains & logistics	■		
3. Information and knowledge network on new markets			■
4. Innovation programme on environment-oriented system innovation	■		
5. Social sciences network for environmental issues in agriculture	■		
6. The agriculture and environment information network			■
7. Inn spatial integration of agricultural and external developments	■		
8. Animal health strategies innovation programme	■		
9. Tra veterinary quality managers		■	
10. Integrated animal farming systems innovation programme	■		

Several programmes aimed at supporting system innovations will also have an impact on training and information services. This element will be given ample attention in the descriptions of proposals in the following sections.

New knowledge and innovation creating networks

Apart from their relevance for agribusiness, the proposals also share a certain degree of complexity. They can only be realised by making great efforts and in close collaboration between a wide variety of actors. They presuppose the establishment of new networks for creating knowledge and innovation.

Considerable innovation required in knowledge institutes as well

It should be noted that the agro-sector is not alone in facing dramatic new developments. In the years to come, considerable innovation will also be necessary in the knowledge institutes supporting the sector. In fact, a process of structural innovation is already taking place in the agricultural knowledge system, prompted by the so-called 'Peper report'. In addition, the culture and performance of knowledge institutes will require innovation in several respects as proposed in NRLO reports nrs 96/9, 97/17, 98/1 and 98/2. Key issues here include:

- strengthening the integration and design capabilities of agricultural sciences;
- strengthening pluralism of scientific work at the Wageningen Knowledge Centre (KCW);
- an increased need for tailor-made scientific research;
- transforming Dutch agro-knowledge institutes into international knowledge enterprises.

These changes in the structure and functioning of the agro-knowledge system will not be addressed any further here. The reader is referred to the proposals contained in the reports mentioned above. Other initiatives aimed at gearing the knowledge infrastructure to the demands of the next century have been taken by the Agricultural Research Department at Wageningen Agricultural University (DLO/LUW) and by the Netherlands Organisation for Applied Scientific Research (TNO; see "Concept Strategische Visie Kenniscentrum Wageningen" and "Strategisch Plan TNO 1999-2002").

For each proposal, the sections below will address the following questions:

- what is the relevance of the issue?
- what is the essence of the proposal?
- what views have been expressed by stakeholders?
- what could be the first step towards realisation of the proposal?

3.1 International training centre for agribusiness top management

Considerations

Considerations

Globalisation and liberalisation of world markets both have their impact on Dutch agribusiness. The emphasis will shift from traditional trade to direct investments in local markets (both in and from the Netherlands). This will produce a strong European and, indeed, global interweaving in agribusiness. Investments make it easier for companies to nestle in markets and local networks, at the same time making themselves more familiar with differences between local markets and using them. New European and international networks comprising both large and small players will emerge, capable of responding swiftly to market developments. This changing arena for agribusiness will confront companies with new issues and strategic options, requiring them to make a turn of thought: from a national to an international perspective.

Proposal

Proposal

Dutch agribusiness should not only be strong in technology, but also in international enterprise.

The Dutch knowledge cluster may address this need by complementing its strong international position in the technological domain with the acquisition of a strong position in the domain of international enterprise with special reference to agribusiness. This task may be met by taking the initiative to establish an international training centre for top managers in the agribusiness. An important organisational requirement would be to secure the participation of both agribusiness and strong foreign and Dutch knowledge institutes.

The programme developed here will be focused on international enterprise, knowledge management, international market developments, strategy formation and learning how to operate in an international and multicultural environment. Key issues that are specifically relevant to agribusiness would include: developments in world trade in agricultural, ornamental and non-food products, direct investments, the formation of 'agro-networks', the development of directive functions for both information services about the flow of agricultural goods and their financial bases, and international politics in the fields of agriculture and nutrition.

Stakeholders' views

Stakeholders' views

The proposal to establish an international training centre is supported by the majority (over two thirds) of the responding stakeholders, with particularly strong approval coming from the business community. It is felt to be an absolute 'must' to contribute to a strong European and global network in

agribusiness by means of a training programme. In addition, attention was asked for 'tailor-made' training courses and additional training for individual companies. The training programme, it was felt, should also link up with entrepreneurial problems in connection with 21st-century themes such as food, water and the environment. Stakeholders from government and knowledge institute circles also generally support the proposal. Special attention was asked for keeping up a strict distinction between public and private functions.
More than half of the stakeholders indicated a desire to be somehow involved in establishing the training centre.

Follow-up

In setting up and running the training centre, three points of view should be taken into account.
In the first place, the international component should be an overriding concern. This means that, from the very outset, foreign partners will have to be selected who already occupy strong positions in parts of the domain involved. This will allow a speedy build-up of an international network while providing an international perspective from which to link up with global developments in agribusiness.
In the second place, the success of the initiative will be highly dependent on agribusiness itself playing a major role both in devising the international curriculum and in the actual training. For this training centre, international agribusiness also acts as a co-designer and partner rather than just a buyer or customer.
Dutch knowledge institutes will be able to serve as a breeding-ground for the centre only if they can supply internationally acknowledged top quality. To achieve this it will be necessary to combine the expertise currently available at various institutes. Cooperation, for instance in the form of a strategic alliance between the Wageningen Knowledge Centre (KCW), Erasmus University Rotterdam, Nijenrode, Maastricht University (including the Maastricht Economic Research Institute on Innovation and Technology) and TNO, would seem the obvious choice.
The Wageningen Knowledge Centre might take the initiative for further action, in close collaboration with partners both at home and abroad.

3.2 Innovation programme chains & logistics

Considerations

Considerations

Mass individualisation has become a significant trend in Western society. Consumers have become more volatile and momentary, less predictable in their manners. Similar individualisation trends can be expected to pick up shortly on emerging markets as well, particularly in urban areas. Apart from making specific quality demands on products, the same trend will require delivery on the spot at the right time.

This development is largely determined by a changing consumption pattern. While in response to mass individualisation, retail trade has evolved from the supermarket to the domestic services provider, consumers will also increasingly procure their food through other channels: company cafeteria, take-away meals, snack bars, care facilities et cetera.

In addition to making demands on technology development, these trends require responsive adjustment to highly changeable market demands. This will set new demands for the organisation of agricultural production chains. Essentially, what is required is an evolution of the chain concept, resulting in responsive networks which combine the advantages of mutual adjustment with the flexibility of loosely related organisations. These independent enterprises will cooperate closely in the network in order to realise desired customer values at the lowest possible cost.

Furthermore, there is growing concern about the burden placed on the environment, space and quality of living by the transport of agricultural products. By far the greater part of all transport is carried by road and the sector accounts for 40%(!) of all inland road haulage.

This calls for a revision of agricultural production chains and the corresponding transport and distribution systems on the basis of a comprehensive concept, a revision aimed at increasing the economic efficiency of production, transport and distribution systems while at the same time limiting the use of space, environmental impact and road congestion.

Proposal

Proposal

As for the development of expertise on chains and networks it is suggested to make a great leap forward by combining organisations that have emerged in recent years (e.g. Stichting AKK (Agro-Chain Competence Foundation), the Centre for Transport Technology and others) into a Centre for Integrated Chain and Network Studies. This initiative should explicitly embrace aspects of transport, distribution and logistics as well as the use of information and communication technology (ICT). Intensive collaboration between the government, the business community and knowledge institutes is underway to

draw up plans for a Knowledge Centre on 'Chains, Logistics and ICT', to be jointly financed (public/private) by government and business. The initiative is undertaken partly with a view to encouraging a vitalisation of physical-economic structures in the Netherlands as envisaged by the Inter-Departmental Commission on Economic Structure (ICES).
Further elaboration of these plans should specifically address internationalisation and educational aspects.

Stakeholders' views

A large majority (80%) of the stakeholders felt that it was desirable to establish such a centre. Still, some of them (one third) did make additional observations: do not set up a new institute; a virtual network node or coordination point would be preferred; chains and logistics should not be seen in isolation from consumer issues and technology; the business community should feel adequately represented; and what could be the role of consultancies in this context? It was also said that the international component should be given due attention.
Almost 70% of the stakeholders are prepared to play an active role in bringing about and/or carrying out the programme.

Follow-up

It can be concluded that the proposal is widely supported, with many parties wishing to be actively involved. Thus, the chains & logistics innovation programme merits further elaboration. An appropriate setting would be found in currently active partnerships between government, agribusiness and knowledge institutes as referred to above.

Stakeholders' views

Follow-up

3.3 Information and knowledge network on new markets

Considerations

Considerations

A portfolio analysis of the position of Dutch agribusiness in various markets around the world shows that its position is strong in saturated or slowly growing markets in the EU and Central Europe. Dutch presence is limited in fast-growing markets, such as the emerging markets of Latin America, the Pacific Rim, China or India. This means that the share of the Dutch agribusiness in world trade will diminish unless the sector proves capable of acquiring a greater market share in those new markets.

In all likelihood, the most promising approach to enter emerging markets is the strategy of 'focused differentiation'. It is predicated partly on the distance, but also on the characteristics of the markets as well as on the presence of other suppliers on those markets.

For such a strategy to be successful it is necessary to have a basic knowledge of market structure, consumer behaviour, cultural patterns and relevant institutions. This knowledge is frequently lacking. Especially, small and medium-sized businesses that are considering to enter those markets will be largely dependent on public knowledge which, if anything, is not systematically available. Some knowledge is available as to the market opportunities of products in relation to disposable income. In many emerging markets, purchasing power is rising, bringing within reach products that offer opportunities for Dutch agribusiness. In what direction will these markets develop? There may be considerable differences between individual markets. In addition, products may be experienced quite differently in various cultures. Another issue is whether one should opt for export from the Netherlands or for local production. In either case it will be desirable to cooperate with local partners.

Proposal

Proposal

For these initiatives to be successful, the system of data collection and knowledge development on unknown (and/or remote) markets and consumers will have to be improved significantly. The objective here would be both to strengthen Dutch knowledge infrastructure and to make the information about these markets, which is now scattered across a variety of sources, even internationally, more easily available to the agribusiness community. A number of key actors are currently working together on the necessary improvement of the knowledge infrastructure, partly as an initiative taken by the NRLO. Participants include the government (LNV), agribusiness and research institutes led by the Agricultural Economics Research Institute and the Agricultural Research Department (LEI-DLO). They are concentrating on drawing up a

goal-oriented line of approach. Their purpose is to establish a 'data warehouse' prototype for agribusiness. One of the elements in working out the plans concerns the division of financial responsibilities: basically, the government will take responsibility for developing both basic knowledge and a search system, whereas agribusiness will finance specific search assignments.

Stakeholders views

Over 80% of the stakeholders entirely or partly agree with the view that such an information and knowledge system for new markets should be set up. However, several (40%) made additional comments on various elements of the proposal, such as: make sure that the agribusiness community is sufficiently involved; work together with others; do not set up a separate institute; be aware that problems in new markets frequently are the result of bureaucracy, obscure regulations, a cumbersome administration, varying directives and differing interpretations of rules. Attention was called to the division of responsibilities between government and agribusiness and to the need for safeguarding an adequate demand-and-supply structure with an added value over existing systems. Research and training elements were also mentioned, particularly in relation to consumer behaviour and cultural differences. The success of the initiative was said to depend on who is going to manage it, on accessibility and on a low threshold, especially for small and medium-sized businesses.

Follow-up

The proposal to establish an information and knowledge network on new markets is widely supported, provided the various suggestions made are given due attention in elaborating the plan. Close consultation between knowledge institutes (with LEI-DLO as 'leader'), agribusiness and government would be an appropriate setting.

Stakeholders' views

Follow-up

3.4 Innovation programme on environment-oriented system innovation

Considerations

Considerations

End-of-pipe and process-integrated solutions at business level will not suffice to achieve long-term environmental objectives. If burdening the environment is to be reduced by a factor 10-20, additional and incisive changes will have to be made at higher system levels (sector, region, nation, continent). Such reorganisations will be necessary, for instance, to promote the exchange of raw and waste materials between agrarian and non-agrarian sectors. Reorganisations should prepare the sector for future design objectives that will be set on the basis of a variety of social goals (in social, economic and ecological domains). Particularly, there will be interesting long-term opportunities for system innovations.

Many research efforts are analytical, reductionist, discipline-specific and explanatory in character rather than synthetic or design-oriented. Research taking a transdisciplinary approach combining natural science, humanities and social science expertise is virtually non-existent. In so far as it does exist, its primary focus is to improve current systems.

Proposal

Proposal

The final goal, to be achieved in 5 to 10 years time, will be a finely meshed network of researchers and non-researchers, natural, social and humanities scientists, agriculturalists and non-agriculturalists, all of them involved in the design and experimental testing of system innovations capable of improving environmental efficiency by a factor 10-20. Central issues will include sustainable energy supply, re-use of water and waste substances, and alternative forms of land use. In order to achieve this goal, the innovation programme should be drawn up by a task force comprising problem owners, financiers and knowledge institutes.

In view of the complexity of system innovations and the resulting need for making adjustments in the (agro-)knowledge infrastructure, implementation of the programme will be conditional on a small, independent centre acting as a leader, broker and programme coordinator. The experience gathered in Sustainable Technology Development (DTO) and Agro-Chain Competence (AKK) may be useful in creating such a centre. Priority tasks of that unit would be to bring about an exchange of ideas among a wide variety of experts, to commission feasibility studies and model designs. The unit would require an annual budget of several millions (NLG), to be supplied by government and agribusiness.

Stakeholders' views

Over 90% of the stakeholders are of the opinion that environment-oriented system innovations are a priority issue. Two-thirds are prepared to play an active role in working out and/or implementing the programme. Over 80% of the stakeholders feel entirely or partly comfortable with the organisation and management of the programme as proposed. Still, a number of observations were made on organisational issues. Several respondents wondered, for various reasons, whether conditions were sufficiently ripe for innovation. Would the programme not be unduly dominated by (Wageningen-based) knowledge institutes? Would it not be better to raise subsidies for existing innovative organisations such as the Centre for Agriculture and Environment (CLM)? Would the proposed set-up have a chance of success within current frameworks for research programming? Would it be possible to set sufficiently ambitious targets? Would interdisciplinary cooperation really get off the ground? Would problem-owners be willing to make a commitment? Would it not be a more fruitful option to have a competitive approach involving a range of alternatives? The centre should primarily serve an intermediary role, making sure that new networks are created. One voice was heard saying that KCW might take a coordinating role.

Follow-up

It can be concluded that the proposal meets with broadly based support and a widespread willingness to actively participate. The Ministries of Agriculture (LNV) and Housing, Physical Planning and Environment (VROM) should take the initiative to work out more detailed proposals, paying explicit attention to the issues raised above. A link-up with the National Initiative for Sustainable Development (ICES-KIS) appears to be an attractive option.

Stakeholders' views

Follow-up

3.5 Social sciences network for environmental issues in agriculture

Considerations

Considerations

Now that real progress has been made as to the availability of environmentally safe technology, the lack of knowledge about social and behavioural processes - and how to influence them - is more and more beginning to appear an important bottleneck. Social and behavioural changes towards more sustainable forms of agriculture are making insufficient or sluggish progress. Insufficient integration of technological knowledge and knowledge based on the social sciences is hindering the identification and solution of environmental problems. More use should be made of the expertise of the social sciences in areas such as public administration, law, sociology, sociopsychology and cultural anthropology.

Proposal

Proposal

Incorporating expertise from the social sciences into agricultural research might be extended and improved by:

- ◇ strengthening interaction and cooperation between the social and natural sciences;
- ◇ strengthening the role of the social sciences as interpreters, integrating developments relevant to environmental issues in agriculture into research efforts made by the social sciences outside the KCW;
- ◇ enlarging the critical mass of the social sciences within the KCW.

It is proposed to build a network of social-scientific research into agricultural issues, with environmental issues in agriculture as one of its major fields of interest. The core competence of the network would be to integrate theories originating from a range of social sciences and to enhance their applicability by establishing links with technological approaches. Apart from its research mission, the network would also have an advisory task to policy-makers as well as an educational function. This regrouping, integration and extension of social research and education should be a major point of consideration in developing KCW policies, calling in experts from outside agricultural circles. Coordination is desired with other initiatives such as the formation of the Mansholt Institute and the operation concerning Social Research into Issues of Nature and the Environment (GAMIN; National Environmental Policy Plan (action NMP-3)).

Stakeholders' views

Stakeholders' views

Ninety-five per cent of the stakeholders fully or partly agree with the view that it is desirable to extend and improve embedding of social-scientific expertise into agricultural research. The definition of the three points of interest mentioned above is fully or partly supported by three-quarters of the stakeholders. A few comments were made. Some respondents asked how an

integration of the social sciences may be combined with improved cooperation with the natural sciences. Is it really a sound conclusion to pursue a concentration of the social sciences? Several respondents argue in favour of strengthening social research within existing frameworks (Mansholt Institute, KCW) while stimulating cooperation between social and natural sciences on a project basis, for instance in designing system innovations. Some pointed out the need for the KCW to enter into strategic alliances with external groups of social scientists without attempting to stock all required knowledge itself. About half of all stakeholders are willing to play an active role in realising the proposal.

Follow-up

The conclusion is that there is a sizeable support base for making more and better use of theoretical understandings derived from the human and social sciences, with many participants willing to actively participate. Still, various comments were made on the suggested approach.

The KCW is currently in the process of rethinking the position and organisation of the human and social sciences, partly in the light of points of special interest mentioned in the proposal.

3.6 The agriculture and environment information network

Considerations

Considerations

As a social learning process, sustainable development makes high demands on factual information regarding the use and emissions of environmentally harmful substances, their distribution and their environmental impact in relation to actor behaviour. In order to provide policy-making authorities and business management with the handles needed to deal with these issues, their environmental, technical and socio-economic aspects should be studied in conjunction, bearing in mind the distinction between different levels of integration (business, sector, region, nation). This is beyond the scope of existing monitoring and management information systems, which can only produce a fragmented view of policy effects and business decisions on environmental quality, on the one hand, and on the socio-economic position of a business or business sector, on the other.

Proposal

Proposal

It is proposed to set up a network for monitoring and management information on the agricultural environment with the aim of:

- ◇ harmonising and standardising the collection and calculation of technical, socio-economic and environmental parameters;
- ◇ combining these various types of parameters at national, regional and business levels;
- ◇ improving access of collected data for a variety of user groups (government agencies, the business world, social organisations, knowledge institutes and citizens).

Realisation of this network will require setting up a small-scale national coordination centre, uniting experts from various disciplines whose chief responsibility will be to streamline data collection as well as processing and retrieving procedures used by different organisations. The leader role in infrastructure design will be a government responsibility (Ministries of VROM, LNV, V&W (Transport & Public Works); Inter-Provincial Consultation (IPO)). It would be desirable to link up with existing infrastructure, such as the Environmental Planning Office.

Stakeholders' views

Stakeholders' views

Practically all respondents find it desirable to establish a network for monitoring and management information. Both its objectives and the methods suggested for bringing about such a network are supported by three-quarters of the respondents. To many of them, linking the initiative with existing activities at national level would be a must. Although a great deal of activity is going on

in monitoring and linking databases, it was felt that the acceptance and application of those data made by users still left much to be desired. Several respondents pointed out the risk of a costly, unwieldy and user-unfriendly instrument and a preponderance of an accounting approach. It was suggested to work towards a dual structure in which a distinction is made between government-related target groups and other interested parties. Another comment was that having a basic conception of the issue would be a prerequisite for determining what data should be collected and interconnected. Half of all respondents are willing to play an active role in creating this network.

Follow-up

This initiative, which finds a broad base of support among the stakeholders, has been tabled as part of the Knowledge Network Environment-Related Information which is being developed on behalf of ICES-KIS. Also, an attempt is made to get relevant agricultural institutes to participate more closely in the inter-administrative infrastructure for environmental monitoring which has been under development for several years now (action from NMP-2).

3.7 Innovation programme on landscape quality improvement through spatial integration of agricultural and external developments

Considerations

Considerations

In our affluent society the environment is becoming more and more important. Our appreciation is partly determined by the quality of the landscape. Changing conditions and a growing prominence of other economic functions in the countryside have made it unthinkable for agriculture to remain the sole determinant of future spatial developments and zoning decisions in rural areas. It is spatial-planning views that are becoming directional for agriculture. New opportunities for agriculture and the countryside will arise mainly as a consequence of environmental changes which the countryside will undergo in the decades to come in function of the implementation of water management, environmental policies, conservation, urbanisation et cetera.
Planning and design are the means to be deployed in an effort to guide these processes of change in such a way as to either create a new and vital man-made landscape or to make it possible for valued man-made landscapes to be preserved. At the same time, the various functions (agriculture, nature, recreation and housing) should be enabled to flourish.

Proposal

Proposal

The challenge is to achieve that variegated land use will be adjusted to the special characteristics of each location. Thus, developments will have to find a meaningful match with the social context (agriculture, nature, recreation, housing), the cultural history and the physical and biotic characteristics of the area.
If agriculture is to make an adequate contribution it will have to be more explicit in making its spatial demands. The resulting plan should not seek to re-establish sectoral domination but rather map the junctions which connect agriculture with other functions and clearly position agriculture in relation to regional zoning and planning.
It is important that spatial processes of change initiated by other forms of land use will be met with active response and that new coalitions are formed with other actors involved in spatial development. This approach will open up perspectives for creating new agricultural opportunities, bringing outcomes that may be interesting for the landscape as well.
It is proposed to designate key areas in which the government and other actors jointly create the conditions for a well-planned transformation process and/or a quality leap, making an integrated use of all instruments, including spatial planning instruments.

If scientific research is to make a meaningful contribution to that transformation process, it will have to adapt to partly new demands. A stronger appeal will be made on sensibility, creativity, design skills and an interactive response to social developments.

Stakeholders' views

A large majority of the stakeholders (75% fully, 24% partly) agree that an innovation programme aimed at improving landscape quality by creating new combinations of agricultural and spatial developments should be given high priority. Questions and remarks mainly concern: feasibility and steering; how to go about it; how to really get things moving? It was suggested that it would be necessary to mobilise insights into skills and strategies involved in transformation processes. Research, it was felt, should be supplemented with education and information services.

As for the methods to be used it was suggested to start collaboration with town planners on a project in which priorities are set on the basis of both the rural perspective and urban issues. One idea is to select a 'case' in the Arnhem-Nijmegen complex, where an urban area is embedded in a vital agricultural region, with the Veluwe area and southern lateral moraines at a short distance.

Follow-up

An approach focusing on a specific area appears to offer the best chances of success. Further consultation on areas to be selected will be needed. It is essential to link up with initiatives that are being taken by a variety of actors.

Stakeholders' views

Follow-up

3.8 Animal health strategies innovation programme

Considerations

Considerations

In the Dutch situation, with high animal densities and voluminous transport streams, current EU safeguarding strategies with non-vaccination are not effective enough. Outbreaks lead to high costs and increased social resistance against drastic but necessary measures to restore the free-of-disease status? The dominant role played by the government in animal disease control is hardly conducive for agribusiness to take its own responsibilities. New animal health strategies need to be developed. These strategies will have to focus on veterinary-zootechnical issues, but they should also address problems found in public/private combinations and problems related with the wider social framework (including the environment, social well-being, spatial quality). This requires new combinations of natural and social sciences, new partnerships and new forms of participatory knowledge development.

A major bottleneck in the development of animal health strategies is the lack of knowledge about the pathobiology (including assessment) and epidemiology of animal diseases (potential sources in the wild, possible vectors and infections in the immediate surroundings and contamination risks). Fragmentation of knowledge, particularly in information about the risks of contagious animal diseases being disseminated within population and across populations (zoonoses), in relation to such issues as sectoral organisation and the organisation of husbandry systems, constitutes a considerable obstacle to finding effective methods to deal with infectious animal diseases.

Proposal

Proposal

It is proposed to initiate an innovation programme for animal health strategies which will focus on:

a. gathering and processing empirical animal disease data;
b. carrying out cohort studies based on specific research questions;
c. designing new strategies for organising and policing animal disease control;
d. designing models in which the effects of strategy designs can be simulated and visualised;
e. setting up and carrying out small-scale pilot projects in the field.

The innovation programme should bring veterinary and zootechnical knowledge in connection with knowledge in the fields of risk analysis, information technology, management, economics, sociology, ethics and physical planning. The innovation programme will lead to the formation of a structural network of expertise on animal health strategies. The network will have a dual structure, comprising a data collection and processing network (covering items a and b), on the one hand, and a network for designing and experimenting (covering items c, d and e), on the other. The two network structures should be developed

by making new combinations of existing knowledge institutes, which are motivated initially by a small and independent unit that will act as a broker and leader.

Stakeholders' views

Ninety per cent of the stakeholders fully agree - 10% agree partly - with the formation of a network of expertise on animal health strategies. Over 80% feel partly or fully comfortable with the organisational setup of the network as suggested. Eighty per cent of the respondents are willing to participate actively in setting up and running the design branch of the network, while the data collection and processing branch is promised the active support of over half of all respondents.

Some respondents wondered whether preconditions necessary for the proposed innovation were met sufficiently. Considerable resistance to innovation was said to be present in existing institutes. Cooperation based on a common responsibility was seen as a weak point of current infrastructure in the field of animal health. Change here would require more than a merely facilitating unit; some respondents felt it would require a full-scale reorganisation of existing educational and research programmes as well as a serious screening of the institutes themselves. Some believed that the task set for the animal health strategies network should be broadened to include providing directions for animal disease control as well as supervision of all related streams of information, including assistance in policy-making. Pioneers should be given an active role in the development of new animal health strategies while the chain should get involved as well.

In relation to the data collection and processing network, respondents pointed out the importance of experimental research under controlled conditions in combination with well-targeted data collection in the field. It was seen as a must by several respondents to link up with the zoonosis network set up by the Ministry of Public Health, Welfare and Sport (VWS) and the National Institute of Public Health and Environmental Protection (RIVM). It was furthermore observed that working with large observational data files demands sharply defined research questions and efficient data handling. The network was believed to have a chance of success on condition that the existing institutes in the network should be willing to sacrifice some of their current interests and responsibilities in order to focus on their common interest. Given the dual structure of the network (i.e. monitoring and design) it was considered essential to establish proper links between the two branches.

Follow-up

The stakeholders' response shows wide support for this proposal. Thus, it should be given high priority in discussions on the reorganisation of the veterinary complex initiated by the Ministry of LNV.

3.9 Training programme for policy-defining epidemiologists and veterinary quality managers

Considerations

Considerations

The transition from currently used methods that are still mainly based on clinical assessment and treatment to a preventive type of animal health care that is increasingly based on risk and cost/benefit analyses will lead to the emergence of new niches on the labour market. There will be a demand for a new type of professionals, referred to here as policy-defining epidemiologists and veterinary quality managers.

Policy-defining epidemiologists play a central role in the development and management of control and safeguarding programmes for animal diseases. They will operate mainly among policy-makers in government and agribusiness; as a result, they will need to have some understanding of and a feeling for political and administrative processes.

The key task of veterinary quality managers is to advise sectors, chains and individual animal farmers on their choice of programme and to assist them in implementation. Veterinary quality managers, who will be active mainly in agribusiness, are required to have some affinity with the various aspects of the production process. It is essential for both types of professionals that they are able to deal with quantitative data, statistical analyses and management information systems. Current education does not provide these new professionals with the necessary qualifications - and if it does, in a highly fragmented fashion only.

Proposal

Proposal

It is proposed to set up a training programme with the following objectives:

a. to provide training for policy-defining epidemiologists, combining elements from a variety of subject fields such as veterinary medicine, zootechnics, (business) economics, information analysis, public administration and political science;
b. to provide training at university level for veterinary quality managers (species-oriented) with expertise in such fields as veterinary medicine, zootechnics, general management, quality management, business administration, marketing, information analysis and economics.

The two courses may rest on a common foundation.

The training programme is directed at students and workers in animal health care. Development and implementation are to take place in close consultation with (potential) employers in government and agribusiness. Insertion into a common curriculum within the training capacity of the Department of Veterinary Medicine of Utrecht University (FD) and Wageningen Agricultural

University (LUW) would seem a natural choice. In addition, training modules may be financed directly by specific target groups. The FD and LUW may jointly take the initiative to set up a training programme by working out ideas and submitting them to major stakeholders for approval.

Stakeholders' views

The desirability of establishing a training programme for policy-defining epidemiologists and veterinary quality managers is fully endorsed by 70% of the respondents; 20% show qualified approval while the remaining ten per cent offered no opinion. Two-thirds of them fully agree with the proposed course of action, 20% partly agree while the remaining 10% once again offer no opinion. Over half of all respondents are willing to make an active contribution to realisation of the programme.

A number of stakeholders observed that while a joint FD-LUW training programme would indeed be highly desirable, cooperation between the two institutes has proved to be a toilsome affair. Still, to make a short-term start of the programme possible, it was repeatedly suggested that veterinary quality managers should be trained mainly in Utrecht whereas policy-defining epidemiologists should be trained in Wageningen, with teachers exchanged between the two universities. Others believed that the dynamics resulting from setting up the KCW offered new opportunities for strategic alliances with the FD (Working Group on Strategic Alliances between LUW and Utrecht University). Some respondents urged that the training programme should soon be broadened up to include professionals currently working in animal health care, such as veterinarians and public health service employees. The relevance of some disciplines was emphasized, including communication (for veterinary quality managers) and international law (for policy-defining epidemiologists). It was furthermore remarked that zoonoses demand different experts as opposed to other animal diseases. In addition, a distinction should be made between experts in preventing animal diseases and experts in disease control.

Follow-up

FD and LUW might jointly take the initiative to set up this training programme by working out ideas and submitting them to major stakeholders for approval.

3.10 Integrated animal farming systems innovation programme

Considerations

Considerations

Accommodating animal health demands in animal farms will cause tensions with demands made in other areas, such as the environment, well-being, economics and labour; the result may be sub-optimal situations. This applies both to the 'hardware' in the form of business systems and the 'software' in the form of considerations on the part of animal farmers. The integration of future design specifications stemming from a variety of social perspectives will be a great challenge for the knowledge infrastructure in the next decade. In the past, good ideas launched by individual organisations to achieve drastic innovations in agribusiness systems often fell on barren ground. In order to break with old habits in the development of agribusiness systems, a more structural approach has become an urgent necessity.

Proposal

Proposal

It is suggested to build a network of temporary, problem-oriented task forces, combining a variety of disciplines. A small independent unit should act as leader, broker and programme coordinator. Core activities would include rallying relevant parties in order to jointly develop ideas and commissioning feasibility studies, model simulations and model designs. An additional aim would be to achieve new research combinations made by natural sciences and social sciences as well as new functional partnerships between existing institutes. The network will function as a think-tank and virtual design centre for new agribusiness systems. The network's educational mission is focused mainly on researchers with some years of experience, since this group is particularly familiar with system theory. Positive experiences gained in the Sustainable Technology Development (DTO) programme may serve as an inspiration in working out the innovation programme and the organisation of task forces. Joint financing by business and government is desirable, with initial government financing gradually replaced by business financing, largely on a project basis.

Stakeholders' views

Stakeholders' views

Over 90% of the stakeholders fully agree with the proposal to set up an innovation programme for integrated agribusiness systems. The other respondents showed qualified approval. The proposed course of action is fully supported by almost 50% of the respondents and partly by 40%, with 10% showing disapproval. Eighty per cent of the respondents are willing to make an active contribution to the development and/or implementation of the programme. Major points of interest that were mentioned included: participation by chain-related agribusinesses and consumers is essential;

financing by government and business on a 50/50 basis; first explore design requirements, based on different scenarios; focus on the manager rather than the agribusiness system.

Follow-up

In view of the wide support for the proposal, it would seem a natural choice to have it elaborated into further detail. LNV might play an initiating role by appointing a leader who would be responsible for drawing up a technically, financially and administratively feasible plan in consultation with major stakeholders.

NRLO documents

Note: If English summary of document is available, title is given in English. Otherwise, title is listed in Dutch, with English translation added between square brackets.

- NRLO Work Programme 1995-1997, July 1995

Theme 'Social perspective for agriculture'

- 'Maatschappelijke en culturele positie van landbouw en natuur in de 21e eeuw' [Social and cultural position of agriculture and nature in the 21st century]. Initial memorandum. May 1995
- Background studies and workshop reports:
  - 'Maatschappelijke en culturele aspecten van landbouw en natuur in de 21e eeuw' [Social and cultural aspects of agriculture and nature in the 21st century]. Plan of action, June 1996, NRLO report 96/13
  - 'Agriculture and society; a history of repelling and attracting'. Essay, March 1998, NRLO report 97/39
  - 'Finished and done with? Agriculture, country planning and design'. Essay, March 1998, NRLO report 97/40
  - 'Agriculture: shop-window of societal issues'. Essay, March 1998, NRLO report 97/41
  - 'On continuity and change - the constants of agricultural development'. Essay, March 1998, NRLO report 97/42
  - 'Veranderende relaties tussen landbouw en maatschappij op weg naar 2015' [Changing relationships between agriculture and society on the road to 2015]. Report round table conference, 12 September 1997, NRLO report 97/43
- Integration report: 'Agriculture in society; a new perspective. Future initiatives for knowledge and innovation.' February 1998, NRLO report 98/1

Theme: 'Globalisation and Agribusiness'

- 'Afzet-, verwerkings- en produktiesystemen in de 21e eeuw' [Sales, processing and production systems in the 21st century]. Initial memorandum. May 1995
- Background studies and workshop reports:
  - 'Agribusiness in 2010 onder invloed van internationalisering' [Agribusiness in 2010 - the impact of internationalisation]. Plan of action, January 1996

- ‘Views on agribusiness and internationalisation’. June 1997, NRLO report 97/11
- ‘Agribusiness, R&D and internationalisation - Internationalisation strategies of agribusiness firms and their implications for the firms’ knowledge management’. June 1997, NRLO report 97/12
- ‘Agribusiness, R&D en internationalisatie’ [Agribusiness, R&D and internationalisation]. Workshop report, 9 June 1997
- ‘Government, R&D and globalisation’. June 1997, NRLO report 97/13
- ‘Overheid, R&D en internationalisatie’ [Government, R&D and globalisation]. Workshop report, 12 June 1997
- ‘Agricultural policy and internationalisation - Developments and dilemmas in agricultural policy towards 2015’. June 1997, NRLO report 97/14
- ‘Knowledge organisations and internationalisation - The position of agro-food related knowledge organisations in the international knowledge market’. September 1997, NRLO report 97/15
- ‘Kennisinstellingen en internationalisatie’ [Knowledge institutes and internationalisation]. Workshop report, 10 September 1997
- Integration report: ‘Globalisation and Agribusiness - Future initiatives for knowledge and innovation’. February 1998, NRLO report 98/2

Theme: ‘Market and Consumer’

- ‘Afzet-, verwerkings- en produktiesystemen in de 21e eeuw’ [Sales, processing and production systems in the 21st century]. Initial memorandum. May 1995
- Background studies and workshop reports:
  - ‘Markt en consument 2010’ [Market and consumer 2010]. Plan of action, September 1995
  - ‘Consument, voeding en milieu’ [Consumer, food and the environment]. November 1995, NRLO report 95/7
  - ‘Voedingsmiddelen, milieu en gezondheid’ [Foodstuffs, environment and health]. January 1996, NRLO report 96/1
  - ‘Ketenlogistiek’ [Chain logistics]. Conference report, 9 November 1995, NRLO report 96/3
  - ‘Markt en consument 2010’ [Market and consumer 2010]. Workshop report, 11 June 1996, NRLO report 96/4
  - ‘De milieubewuste consument’ [The environmentally aware consumer]. September 1996, NRLO report 96/6
  - ‘FLAK 2010: Flexibele Agrarische Ketens in de 21e eeuw’ [Flexible agricultural chains in the 21st century]. November 1996, NRLO report 96/25

- ‘Bio-active components in food’. Report NRLO/RGO workshop, 1 April 1997, NRLO report 97/16
- ‘Food production: consumer wishes and technology required’. September 1997, NRLO report 97/22
- ‘Data warehouse new emerging markets’. December 1997, NRLO report 97/38
- Integration report: ‘Market strategies and consumer behaviour. Future initiatives for knowledge and innovation’. February 1998, NRLO report 98/3

Theme: ‘Agriculture and Environment’

- ‘Afzet-, verwerkings- en produktiesystemen in de 21e eeuw’ [Sales, processing and production systems in the 21st century]. Initial memorandum. May 1995
- Background studies and workshop reports:
  - ‘Drastische verbetering van de nutriëntenbenutting in de dierlijke produktie’ [Drastic improvement of nutrient utilization in animal production]. January 1996, NRLO report 94/3
  - ‘Hulpstoffen en energie in landbouwsystemen in 2015’ [Auxiliary substances and energy in agricultural systems in 2015]. Plan of action, March 1996, NRLO report 96/12
  - ‘Facts and figures on changes in the environmental burden of agriculture’. June 1997, NRLO report 97/4
  - ‘Designs for a clean agriculture’. June 1997, NRLO report 97/5
  - ‘Instrumenting learning processes’. June 1997, NRLO report 97/6
  - ‘An exploration of institutional arrangements’. June 1997, NRLO report 97/7
  - ‘Not through government regulation alone’. June 1997, NRLO report 97/8
  - ‘Contours and silhouettes of agriculture and the environment in 2015’. June 1997, NRLO report 97/9
  - ‘The socio-administrative feasibility of solutions’. October 1997, NRLO report 97/10
  - ‘Environmental targets and policies for agriculture in Europe’. January 1998, NRLO report 97/18
  - ‘Agro-Ecosystem Health’. Seminar proceedings, 26 September 1996, NRLO report 97/31
  - ‘Bestuurlijke innovatie voor een schone landbouw’ [Administrative innovation for a clean agriculture]. Workshop report, 17 April 1997
  - ‘Innovatie voor een duurzame relatie’ [Innovation for a sustainable relationship]. Workshop report, 22 April 1997
- Integration report: ‘Agriculture and the Environment - future initiatives for knowledge and innovation’. February 1998, NRLO report 98/4

Theme: 'Towards healthy animal production'

- 'Diergezondheid 2015' [Animal health 2015]. Initial memorandum, November 1996
- Background studies and workshop reports:
  - 'Welzijnsproblematiek in een aantal veehouderijsectoren' [Welfare problems in a number of animal production sectors]. February 1995, NRLO report 95/2
  - 'Op weg naar vrijwaring van specifieke infectieziekten in de varkenshouderij' [Towards safeguarding against specific infectious diseases in pig farming]. February 1995, NRLO report 95/4
  - 'Towards a healthy animal production in 2015 - five essays'. December 1997, NRLO report 97/30
  - 'Diergezondheid 2015' [Animal health 2015]. Workshop report, 25 September 1997
- Integration report: 'Towards healthy animal production. Future initiatives for knowledge and innovation'. February 1998, NRLO report 98/5

Various subjects

- 'Innovatie, concurrentievermogen en de agrokennisinfrastructuur' [Innovation, competitiveness and agro-knowledge infrastructure]. March 1995, NRLO report 95/3
- 'Wageningen in profiel. Landbouwwetenschappen in 2010: de positie van de LUW' [Profile of Wageningen. Agricultural sciences in 2010: the position of Wageningen Agricultural University]. NRLO/OCV, October 1996, NRLO report 96/9
- 'De toekomst van de agrosector en de ontwikkeling van wetenschap en technologie' [The future of agribusiness and the development of science and technology]. Speech made by Mr A.P. Verkaik, 14 November 1996, NRLO report 96/27
- 'Vitaliteit van agrosector en landbouwkennissysteem' [The vitality of agribusiness and the agricultural knowledge system]. Speech made by Mr A.P. Verkaik, 18 December 1996, NRLO report 97/1
- 'Challenges and concepts for future agricultural knowledge policy'. Essay by A.P. Verkaik, November 1997, NRLO report 97/17
- 'Organisatie van innovatie; uitdagingen en concepten toekomstig landbouwkennisbeleid' [Organising innovation - challenges and concepts for future agricultural knowledge policy]. Workshop report, 25 November 1997, NRLO report 97/28
- 'Innovation processes in Dutch agriculture and horticulture towards 2015; essays and reflections'. December 1997, NRLO report 97/44
- 'Co-operation in innovation - Organisational concepts'. April 1998, NRLO report 98/7

◇ ‘Ontwikkelingen Nederlandse landbouw en strategieën voor de komende jaren’ [Developments in Dutch agriculture and strategies for the years ahead]. Speech made by A.P. Verkaik, 29 January 1998, NRLO report 98/9

List of abbreviations

AKK	Agro-Chain Competence
CLM	Centre for Agriculture and Environment
DLO	Agricultural Research Department
DTO	Sustainable Technology Development
FD	Department of Veterinary Medicine, Utrecht University
GAMIN	Social Research into Issues of Nature and the Environment
ICES	Inter-Departmental Commission on Economic Structure
ICT	Information and Communication Technology
IPO	Inter-Provincial Consultation
KCW	Wageningen Knowledge Centre
KIS	Knowledge Infrastructure Working Group
LEI	Agricultural Economics Research Institute
LNV	Ministry of Agriculture, Nature and Fisheries
LUW	Wageningen Agricultural University
NMP	National Environmental Policy Plan
NRLO	National Council for Agricultural Research
RIVM	National Institute of Public Health and Environmental Protection
TNO	Netherlands Organisation for Applied Scientific Research
V&W	Ministry of Transport & Public Works
VROM	Ministry of Housing, Physical Planning and Environment
VWS	Ministry of Public Health, Welfare and Sport