

# **Strategy for Biotechnology and Genetic Engineering in Agriculture**

**Ministry of Agriculture and Forestry  
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## **Introduction**

Biotechnology and, in particular, gene technology concerns an increasing number of State officials working in the field of agriculture, and the Ministry of Agriculture and Forestry has to take a stand on various issues relating to the methods involved. Consequently, it was considered necessary to appoint a work group at the Department of Agriculture in order to increase the awareness of what is going on in the other sectors among the people dealing with these issues and to harmonise the positions of the Department of Agriculture in the different sectors. The tasks of the work group included discussions on current national and international issues relating to biotechnology and genetic engineering (agreements, legislation, innovations) that are relevant for the Finnish agriculture and contribute to the development of a policy and strategy for biotechnology at the Ministry of Agriculture and Forestry.

The work group was appointed 27 May 1999. The chairman of the work group was Mirja Suurnäkki and Leena Hömmö acted as the secretary, both from the Research and Extension Unit. The vice chairman was Maria Teirikko from the Unit for Quality Policy, and the members were Jussi Tammissola, Ralf Lopian, Päivi Mannerkorpi, Tero Tolonen and Kirsi Heinonen from the Unit for Quality Policy, Tauno Junttila from the Research and Extension Unit, Mari Männistö from the Unit for Market Policy, Niina Kauhajärvi from the Unit for Horticulture, Juha Palonen from the Unit for Support Policy, Sirpa Karjalainen from the Rural Policy and Structural Policy Unit and Arto Vuori from the Plant Variety Rights Office.

The work group began the drafting of a biotechnology strategy for the Department of Agriculture in autumn 1999 by compiling studies concerning the use of biotechnology and genetic engineering in the field of agriculture as well as through special research projects. The basic survey consisted of two sections, Section A concerning the current state of the legislation, agreements and research, and Section B, which was concerned with the biotechnology research more in detail. Research projects were conducted on the following topics: 'Ethical questions in biotechnology and genetic engineering' (University of Turku, Veikko Launis), 'Economic effects of genetic engineering and genetically modified food in the Finnish food sector' (Agricultural Economics Research Institute, Meri Virolainen and Jyrki Niemi) and 'Transgenic production animals and their potential environmental impacts in Finland' (Agricultural Research Centre, Johanna Vilkki, Tiina Pitkänen, Juha Kantanen and Kari Elo). For the part of the potential environmental impacts of transgenic crops reference will be made to the report 'The risks of biotechnology: The environmental effects of genetically modified plants in Finland' of the Finnish Environment Institute. The studies will be published on the Internet pages and in the publication series of the Ministry of Agriculture and Forestry.

The biotechnology strategy for agriculture was formulated based on the basic survey and research projects, consisting of a summary of the main principles, objectives and proposals for measures, as well as the research reports. The information concerning the different organizations is based on information given by the organizations or on their Internet pages. The organizations had the opportunity to comment on the issues relevant for them, and these comments have been taken into account in the strategy.

## **Main principles and objectives:**

**Development and utilization of biotechnological methods in agriculture and food production is one way of promoting agriculture and food production and creating new opportunities for these sectors.**

**This development must be based on contained use of these methods, starting from sustainable use of natural resources, safety and high quality of the products, openness and transparency of the activity and efficient control.**

**Use of biotechnology in agriculture and food production is developed taking into account the needs of the customers and environmental concerns, based on the objective of developing increasingly varied high-quality products.**

**The use and marketing of genetically modified organisms (GMOs) must be based on an advance approval procedure, where a licence is not granted unless the use of the genetically modified organism in the product has been proven safe for humans, animals and the environment.**

**Decision-making concerning advance approval is based on high-level expertise, scientific risk assessment and precaution.**

**Maintaining and development of scientific expertise required in the application of biotechnology in agriculture and food production is supported through research.**

**In order to ensure adequate information and possibility for choice of the consumers genetically modified products must be appropriately labelled. The production chains must be open and traceable to show the origin, production method, composition and quality of the products.**

**The control of the use of GMOs, marketing of products containing these and the production chains involved must be watertight, and it must cover all parts of the production chain on an equal basis. The development of the control systems and methods as well as distribution of labour and cooperation between the authorities is underway.**

**The openness of the activity is reinforced through efficient communication.**

## **Background**

Biotechnology, and especially gene technology, is considered one of the key technologies in the near future. This technology was first utilized in the pharmaceutical and biochemical industries, but now the need for decisions concerning the strategies and terms for the research and application of the new technologies has arisen in the agricultural and food sectors as well.

The advantages and disadvantages of genetically modified microbes were widely discussed in the scientific community already in the 1970s. Towards the end of the 1990s genetically modified plant varieties reached the commercialisation stage, which started the discussion on the use of gene technology in the food chain in the media and various international forums. The discussion has led to a great deal of uncertainty among the consumers and influenced the willingness of feed and food industries to use genetically modified raw material in the production of foodstuffs.

Strong concerns have been raised especially in the Member States of the European Union, and the Community has searched for solutions to the problems relating to the use of new technologies through the legislation. According to the Community rules for biotechnology, GMOs must pass a detailed approval procedure, including an assessment of the health and environmental effects case by case. The purpose of the legislation is to make sure that the production chains of products where biotechnology has been used are safe for humans, animals and the environment by means of risk assessment and control and in accordance with the precautionary principle.

International trade in GMOs is also very likely to be one of the most important issues in the current round of WTO negotiations concerning the liberalization of world trade.

In a broad sense biotechnology refers to the ability of people to use microbes and cells and metabolic products of multicellular organisms. Some of the biotechnological methods are old and well established, such as the swelling of dough, souring of milk and brewing of beer. The knowledge on the genotypes of all living organisms and the regularities of heredity increased rapidly during the 20<sup>th</sup> century. This knowledge laid the foundations for the development of new techniques through which the genotypes of organisms could be modified more and more accurately and rapidly, even across species. Gene technology refers to these methods.

The utilization of gene technology has been very important in the pharmaceutical and diagnostics industries, and the methods are used, in particular, in the production of new medicines and vaccines. Mutations have been established as the cause of many difficult illnesses that are significant in terms of the public health, and this has made it possible to develop new treatments and medicines.

In agriculture gene technology has been hoped to increase the productivity of plants and animals, improve their resistance to various kinds of diseases and environmental stress factors (drought, cold, saltiness) and offer new possibilities for the development of quality characteristics. It may be possible to improve the productivity of crops by means of gene technology, which would be significant in terms of the food security, especially in the developing countries. At the moment research on the use of genetically modified plants and animals for the production of medicines, vaccines as well as their use as the resource for tissue and organ transplants is under way. Today the properties of all groups of production animals can be influenced by means of genetic modification, and it is possible that the commercial production of the first transgenic strains will be started in the next few years.

In 1999 the area under transgenic plants in the world was 39.9 million hectares, which is 44 per cent larger than in 1998. 69 per cent of this is in the United States, 14 per cent in Argentina, 10 per cent in Canada and 3 per cent in China. The area under transgenic plants in Europe is only 0.3 per cent of the total area under genetically modified plants in the world. In Finland GMOs have been approved for use in research and field tests, but the approved genetically modified varieties are not being cultivated, and there are no genetically modified foodstuffs or feedingstuffs on the market.

## **General foundations for the strategy**

### *Definitions*

In this strategy the following definitions are used:

- *a product* refers to foodstuffs, agricultural inputs (e.g. seeds, seedling materials, production animals, feedingstuffs, fertilizers and pesticides) or other products,
- *a customer* refers to a consumer, producer or other customer
- *quality* refers to hygienic, nutritional, sensory, technical and ethical quality as well as quality factors relating to the environment and services.

### *Guiding principle of the Ministry of Agriculture and Forestry*

The Ministry of Agriculture and Forestry lays the foundations for sustainable and diversified use of renewable natural resources and development of the economic and leisure activities in the rural areas, as well as contributes to securing the quality of foodstuffs and health of animals and plants. The purpose of the Strategy for Biotechnology and Genetic Engineering in Agriculture of the Department of Agriculture is to implement the guiding principle of the Ministry and the Department as well as the related objectives.

### *Strategy for the Sustainable Use of Natural Resources of the Ministry of Agriculture and Forestry*

The guidelines for the sustainable use of renewable natural resources have been laid down in the Strategy for the Sustainable Use of Natural Resources of the Ministry of Agriculture and Forestry, where the use of natural resources has been defined as sustainable if it is ecologically, economically, socially and culturally sustainable.

The extent to which ecological sustainability can be taken into account depends on the profitability of the industries utilizing the natural resources. It is pointed out in the natural resources strategy that increasing the farm size, specialization and diversification of the production improve the competitiveness and secure the operating conditions for agriculture in the future. In the domestic production and especially in marketing high-quality and special products should receive more and more emphasis in order for the Finnish agriculture to succeed in international competition. According to the objectives of the strategy, most of the Finnish agriculture should be covered by quality systems by 2010, the products must be safe, and the products must be labelled to show their origin.

The Strategy for Biotechnology and Genetic Engineering in Agriculture is based on the view that the development and use of biotechnological applications must comply with all the criteria for the sustainable use of renewable natural resources. The legislation, budget decisions and control regulating the use of gene technology must promote the sustainable use of natural resources. In

order to secure ecological sustainability, the possible environmental damages due to GMOs must be minimized by means of advance risk assessment and control based on scientific research data.

Because of the climatic conditions, Finnish agricultural production is not capable of competing on the international market on the basis of the production volumes. Instead, quality and special products can be significant competition factors. According to a study made at the Agricultural Economics Research Institute, the genetically modified so-called first-generation products (e.g. resistance to pesticides, pests and plant diseases achieved by means of genetic modification) lower the production costs and increase the yields, which would mainly benefit the farmers who would be the first to introduce such new technologies. If the majority of farmers began to apply the new technologies, the benefits would be more evenly distributed across the different links in the production chain, which means that especially the consumers would benefit from the higher production capacity through the lower food prices.

The so-called second- and third generation products (e.g. products with added vitamins or modified fatty acid composition) move towards output thinking where the quality is increasingly important. The producers might get a higher price for these products, such as the various kinds of functional foods. These products generated by means of the second and third wave gene technologies are particularly interesting in terms of the competitiveness of Finnish agriculture.

In order to secure the economic interests of Finland, special attention should be directed at the need for training and research relating to the development and introduction of biotechnological methods in agriculture and food production. In addition to preventing the transfer of know-how across the State borders, protecting the biotechnological inventions and the publication involved may also promote the development of the research and applications in the field, provided that the scope of the patent protection would be strictly defined. Protection should be granted only to the actual inventions, and not to methods that have not yet been discovered.

#### *National Quality Strategy for Foodstuffs in Finland*

Objectives similar to those in the Strategy for the Sustainable Use of Natural Resources are included in the National Quality Strategy for Foodstuffs in Finland. All the parties involved in food production have committed themselves to the strategy, whose main objective is to develop the quality of the products and operations, secure the maintenance of the high quality standard and improve the competitiveness and profitability of the companies by means of joint efforts of administration, research, training and advisory services as well as the whole food chain. It is of primary importance that the quality, purity, origin and production method of foodstuffs can be indicated in a reliable way, and foodstuffs can be produced in accordance with the principles of sustainable development and taking production ethics into account.

The strategy is based on quality and chain thinking. In order to guarantee the high quality of the finished product, the production chain and its control must be watertight and traceable, and quality control and responsibility for the quality of the products must be emphasized at all stages of the chain from primary production all the way to the consumer.

One important aspect in the strategy is customer-orientation. Taking the needs and expectations of the consumers into account is a key factor in terms of the success of the whole food chain, and the products and quality of the activities must respond to the consumer needs. Consequently, the public sector is responsible for making sure that, among other things, different consumer groups, such as

people suffering from allergies or with different philosophies of life have the possibility to select a diet that is in accordance with their needs.

### *Product-specific strategies and programmes*

The Ministry of Agriculture and Forestry has started the drafting of product-specific strategies and programmes for the products and special product that are of primary importance in terms of the competitiveness of agriculture and the Finnish food sector. Examples of these are the national grain strategy and the plan for a potato strategy, as well as the strategy for organic production launched this year. Genetically modified products may also be considered special products that can be used to improve the profitability of agriculture, and thus the formulation of an integrated strategy is highly significant for the development in these sectors.

### *Securing the safety and quality of foodstuffs through legislation and control*

The general and sectoral, both international and national rules for biotechnology and genetic engineering must constitute an integrated whole to guarantee the safety and high quality through the whole food chain. Advance approval systems and risk control based on scientific risk assessment and precaution, comprising the whole food chain, are important aspects of the national and Community rules regulating the use of GMOs (Commission and Council Directives concerning GMOs, Regulation concerning novel foods and other sector-specific legislation, and the national Act and Decree on Gene Technology as well as special sectoral legislation at the national level). GMOs must be safe in the production system and the production inputs and foodstuffs produced using these may not cause any health or environmental damages. Administration and control systems must be developed in order to respond to the new requirements due to the use of biotechnology and genetic engineering, and the different authorities must engage in well-coordinated cooperation to which all the actors in the whole food are also committed.. Thus, for example, the assessment of the health and environmental impacts of GMOs utilized in agriculture will be conducted in cooperation between the agricultural and forestry, environmental and health administration, both in Finland and on the EU level.

### *Labelling of genetically modified products*

Products modified by means of gene technology must always be appropriately labelled. This principle has been accepted in all national and Community legislation concerning GMOs. Labelling is necessary to provide the appropriate information to customers and guarantee their possibility for choice.

### *Formulation of positions concerning biotechnology and genetic engineering*

In performing their duties the officials working at the Ministry of Agriculture and Forestry and in its administrative sector take a stand on biotechnology and genetic engineering as well as the approval and control of products manufactured using this in agriculture and the food sector e.g. in the planning of policies, preparation of legislation (on the international, EU and national level), inspection and control activities as well as research. The most important fields in this respect are the breeding of plants and animals, quality of agricultural inputs and foodstuffs and the related control, organic production as well as directing research. The positions established in the different fields of the administrative sector must follow common basic guidelines and principles, and they must be constructed on the same grounds.

## Detailed objectives and measures

### Food safety and quality issues

#### *Background*

As a result of the development of the production methods in agriculture and the food sector and the breeding of plants and animals the availability and quality of food are at a high level in Finland. The safety and quality of the production inputs and environment of foodstuffs and their raw materials have been guaranteed through legislation and control (advance approval procedure, quality and health requirements, quality checks).

The development of the information on genes and the related technologies especially in the last quarter of the 20<sup>th</sup> century made it possible to increase the efficiency and accuracy in the breeding of microbes and plants, and since 1996 varieties of soya, maize, rape and cotton bred by means of gene technology have been cultivated in many countries. Among the horticultural crops there are genetically modified new varieties of tomatoes, melons and cucumbers. In Finland genetically modified plant varieties are not yet used in production.

#### *Objectives*

Foodstuffs and agricultural inputs on the market are safe and of high quality independent of the production technology or location of the production. The domestic agriculture and food sector is competitive on the international market. Production chains are open and traceable, and the origin, production method, composition and quality of the products can be indicated in a reliable way. The control of the products and production chains is watertight, extensive and equal.

As the markets for genetically modified foodstuffs develop further, Finland will also be prepared to produce genetically modified high-quality foodstuffs, which are appropriately labelled.

#### *Measures*

- the safety and quality of the products and the production chains from farm to fork are secured in cooperation with other competent authorities by means of scientific risk assessment and advance approval procedure based on precaution as well as through cooperation between the legislation, control and the whole food chain so that the origin, production method, composition and quality of the products, including genetically modified products, can be indicated in a reliable way and the products can be appropriately labelled,
- safe and appropriate genetically modified products are developed through more efficient differentiation of the approval procedure according to the relevant applications, based on risk assessment,
- the development of the methods of gene technology is made safer. In risk assessment special attention will be directed at GMOs containing genes that cause resistance to antibiotics used in the medication of humans or animals. Antibiotic resistance markers that may cause damage to the health of human or animals or to the environment will not be used,
- the cooperation and coordination of activities in the field of administration influencing the quality and, in particular, issues relating to biotechnology and genetic engineering is developed by setting up cooperation, drafting or coordination work groups of the authorities and administrative sectors concerned to deal with specific issues or more extensive topics as deemed necessary,

- the product control systems and methods as well as distribution of labour and cooperation between the different control authorities are developed in cooperation between different authorities, with special attention to the need for efficient control arrangements for genetic modification,
- the voluntary actions of the food chain to promote the quality and variety of the products are supported through administrative measures (e.g. research, advising, training and information),
- biotechnological and gene technological research targeted at developing quicker, cheaper and more accurate methods for securing the hygiene standard of foodstuffs are supported within the limits of the available resources and based on management by result (various kinds of diagnostic methods for detecting bacterial or virus contamination),
- the resources of biotechnology and gene technology are concentrated to the development of the quality and health effects of the products (special products, functional foods, probiotics, etc.),
- participation in the financing of national research programmes in the field of gene technology within the limits of the available resources, provided that these contribute to the needs for know-how in agriculture and the food sector relating, in particular, to product safety.

## **Consumer aspect**

### *Background*

Different consumer groups have quite different attitudes to nourishment, including genetically modified foods. Some consumers have special requirements concerning the healthiness of food, some lay particular emphasis on production ethics or environmental concerns, and for some the price may be of primary importance. Some consumers are strongly opposed to the use of gene technology in foodstuffs. Food production must serve all these different consumer groups.

### *Objectives*

The consumer may rely on the safety and high quality of the foods available on the market and the raw materials used in these. The consumer has the possibility to choose the products he or she wants. Different consumer groups, e.g. people suffering from allergies or who need a special diet due to their health or for ethical or religious reasons must be taken into account in the food production chain. The consumers can rely on the public sector to arrange for the appropriate control of the production, manufacture, marketing and labelling of genetically modified, conventional and organic products.

There is enough information available on genetically modified products and the related administration as well as the activities of the food chain, and there is open public discussion on these issues in the society.

### *Measures*

- the activities of the administration and food chain in the development of biotechnology and gene technology and the related questions start from the expectations and requirements of the customers,
- the safety and high quality of the products, including genetically modified products, and the appropriate labelling of these to guarantee the availability of information to consumers and ease their choice is secured through legislation, control, and cooperation throughout the food chain (cf. measures relating to food safety and quality),

- communication concerning the genetically modified products and activities of the administration and food chain relating to these are developed, together with active participation in organised discussion on these issues, with special attention to the consumers' need for information,
- researchers are encouraged to take part in the public discussion on genetic modification and to bring forward the real, scientifically proven advantages and disadvantages that genetic modification may bring to agriculture and the food sector, the environment and consumers.

## **Control of environmental impacts**

### *Background*

The advantages and disadvantages of the use of organisms (plants, animals, microbes) in the production depend on the characteristics and species as well as the methods and the environment where these are used. What is decisive is the outcome – not the techniques utilized in the processing as such, but the way these techniques are used. Understanding the ways the genes function help to develop new production methods that save the environment. Thus the advantages and disadvantages of the use of the GMOs to the environment must be assessed scientifically and case-by-case, taking into account the current cultivation and processing methods. No human activity is completely free of risk, and socio-economic decisions are needed to establish an acceptable level of risk.

### *Objectives*

As a result of risk assessments based on scientific information the environmental impacts of the GMOs and related processes used in agriculture and the food sector are known. The possible harmful impacts of GMOs on the environment have been minimized.

Applications of genetic modification improving the state of the environment have been developed.

### *Measures*

- the obtaining of licences for the research and use (contained and open use) of GMOs is based on scientific risk assessment and control,
- cooperation between authorities and administrative sectors participating in the assessment of the environmental impacts of GMOs is developed,
- research relating to the risk assessment and control in the Finnish conditions is supported within the limits of the available resources and based on management by result. In the research special attention is directed at the special characteristics of the different groups of living organisms (micro organisms, different groups of plants and animals) and ecological impacts,
- studies are made to find out the possibilities to reduce the environmental damages caused by agriculture, such as fertilizer emissions and erosion, by using genetically modified organisms in the production,
- studies are made concerning the environmental impacts of the cultivation recommendations for herbicide or pesticide resistant genetically modified crops,
- studies are made concerning the total impact of genetically modified foodstuffs and feedingstuffs on the environmental balances based on life cycle analysis.

## **Sustainable plant breeding, crop production and horticulture**

## *Background*

Due to the northern climate the productivity of Finnish agriculture cannot reach the same level as in the competing countries. The quantity and quality of the crop can be raised through breeding e.g. by increasing the resistance of the plants to cold, diseases and pests. In view of the international competition the development of new quality characteristics and products increasing the value added may bring along significant benefits to the farmers, small and medium-sized enterprises as well as the consumers.

## *Objectives*

Plant production and horticulture in Finland are economically and environmentally sustainable and they produce safe and high-quality raw material to the processing industry (including non-food). Raw material produced in Finland is internationally competitive, and we have certain special products based on a high level of expertise, possibly gene technology, which can be marketed abroad with success.

The research-advising-farmer chain makes information on new cultivation methods, including the cultivation of genetically modified crops, available to farmers without delay and supports and regulates the production.

## *Measures*

- the safety of the genetically modified products intended for food and plant production in terms of the humans, animals and environment is guaranteed, including the participation in the development of regulations and agreements concerning the use and marketing of GMOs and products containing these (cf. measures relating to the safety and quality of foodstuffs),
- cooperation between authorities involved in the approval of the products and control is developed,
- the special fields where investments should be made in plant production research and plant breeding are selected based on the expectations and requirements of the farmers and consumers and the market policy situation, and support is directed at these fields (e.g. certain species of cereals or processes),
- financing is promoted by guiding researchers to closer international cooperation in the rapidly developing field of genetic engineering,
- participation in international cooperation in plant breeding research, including issues relating to the utilization of gene technology,
- studies are made concerning the possibilities for contract production of genetically modified products in Finland,
- advisory organizations are guided to actively follow the development work and research results in gene technology and to transfer this information to farmers without delay in order to achieve the potential competitive advantage.

## **Sustainable livestock production**

### **Animal nutrition**

## *Background*

Feed materials and additives used in feedingstuffs manufactured using a special production technique may get a marketing licence in the EU through an advance approval procedure. The approval procedure, safety and quality requirements as well as control guarantee the safety of the products used in animal nutrition for humans, animals and the environment.

Gene technology has been applied for some time in the additives used in the feedingstuffs of production animals in order to improve the microbes producing enzymes, antibiotics and amino acids. Some genetically modified crops have been approved for use in animal nutrition on the EU market (soya, maize, rape), but these are not found on the Finnish market.

### *Objectives*

In order to secure the high quality of livestock production and foodstuffs of animal origin, the feedingstuffs for animals available on the market are safe, competitive and of high quality. The whole feed production chain is open and traceable and the control of this must be watertight, extensive and equal. Gene technology is utilized in the development of the control methods as well as improvement of the nutritional properties and quality of both feedingstuffs and foodstuffs of animal origin e.g. amino acid composition, fatty acid composition).

Along with the development of the markets for genetically modified products Finland will be prepared to use gene technology to produce feedingstuffs of even higher nutritional quality, which have been appropriately labelled to provide adequate information to ease the consumer choice.

### *Measures*

- the safety of genetically modified products intended for food and plant production for humans, animals and the environment is secured; participation in the development of regulations and agreements concerning the use and marketing of GMOs and products manufactured from these (cf. measures relating to food safety and quality),
- cooperation between authorities participating in the approval of the products and control is developed
- the existing bodies and networks of experts are used in the national evaluation of novel feedingstuffs and additives used in feedingstuffs,
- research directed at developing new quicker, cheaper and more accurate methods for guaranteeing the safety and quality of feedingstuffs is supported within the limits of the available resources and by means of management by result,
- the current resources available for research in biotechnology and genetic engineering are concentrated to the development of quality and nutritional properties and, through this, to the improvement of foodstuffs of animal origin.

## **Breeding of livestock**

### *Background*

The commercial production of genetically modified production animals will probably start during the next few years. Rabbits, goats and cows have already been bred for medical purposes to produce treatment proteins that are important for the human health that cannot be produced by means of genetically modified microbes. Production animals can also be bred through more efficient

utilization of the nutrients in feedingstuffs, which also reduces the environmental damages due to livestock production. So far no genetically modified production animals have been used in Finland.

### *Objectives*

The objective is economically profitable and environmentally sustainable livestock production, which is based on healthy and internationally competitive animal material achieved through long-term breeding efforts. New special products will be introduced, including functional foods and foodstuffs intended for particular consumer groups. The health, welfare, productivity, fertility and durability of the production animals will improve and the environmental damages due to production are going to decrease. Breeding populations are genetically diverse.

### *Measures*

- breeding objectives will continue to be based on the so-called Nordic breeding profile, where, besides the production properties, attention is directed at health and structural properties,
- the survey of genes relating to yield and health properties of production animals continues within the limits of the available resources,
- research in biotechnology and genetic engineering that is ethically and environmentally sustainable and aimed at healthier and higher yielding production animals that cause less environmental damages is continued,
- studies are made concerning the advantages and disadvantages of genetically modified production animals in terms of medicine and food production,
- research concerning risk assessment and risk control relating to genetic modification of different groups of production animals is launched.