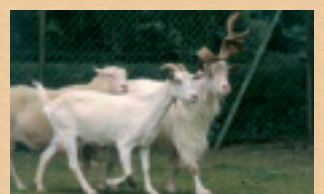




European Technology Platform for Global Animal Health

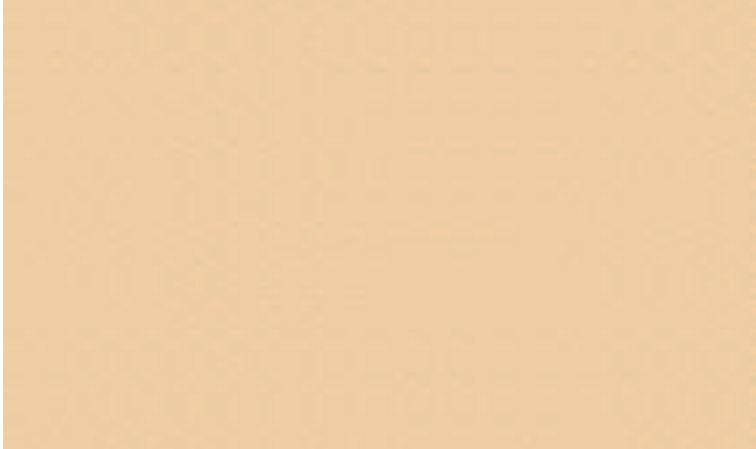
Vision 2015





Contents

Foreword	3
Group of Organisations	4
Signatories Global Animal Health: Vision 2015	6
Executive summary	9
1. The Need for Vaccines, Pharmaceuticals and Diagnostic Tests	12
1.1 A Global Problem	12
1.2 Impact of Animal Disease	12
1.3 Control measures	13
1.4 Vaccines	13
1.5 Diagnostic tests	14
1.6 Pharmaceuticals and Biocides	15
1.7 Conclusions	15
2. The Development of Vaccines, Pharmaceuticals and Diagnostic Tests	16
2.1 Technological advances	16
2.2 Research Position	16
2.3 Industry Perspectives	17
2.4 Regulatory Aspects: Vaccines	19
2.5 Regulatory Aspects: Diagnostic Tests	20
2.6 Regulatory Aspects: Pharmaceuticals	20
2.7 Conclusions	20
3. Developing a Vision for 2015: From Innovation to Delivery	21
3.1 A European Technology Platform	21
3.2 European Objectives	21
3.3 Meeting the Challenges	21
3.4 Research Policy	21
3.5 Global Dimension	22
3.6 Interdisciplinary Research	23
3.7 Intellectual Property Rights (IP)	23
3.8 Industry: Manufacture and Production	23
3.9 Regulatory Aspects	24
3.10 Conclusion	24
4. The Way Forward: Developing a Technology Platform	25
4.1 Partnerships	25
4.2 Main activities	25
4.3 Platform Organisation	26
4.4 Outline for the Strategic Research Agenda	27
4.5 Roadmap and Milestones	27



Foreword

Foreword by Janez POTOČNIK
Commissioner for Science and Research

Major animal infectious diseases can have devastating social and economic impacts in both developed and developing countries.

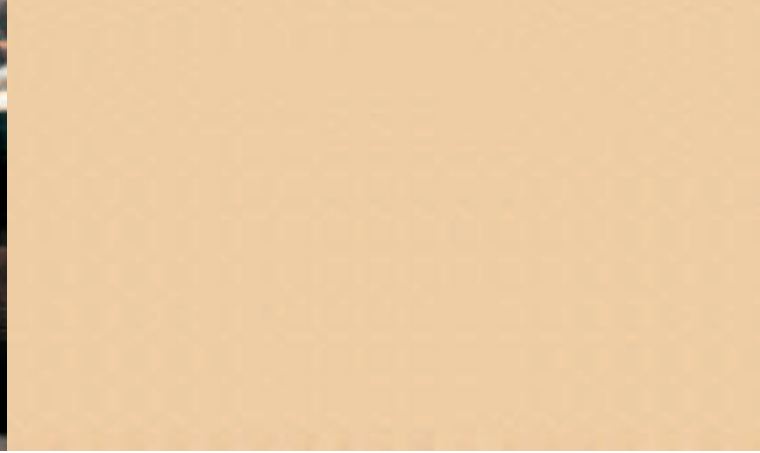
The recent cases of foot-and-mouth, classical swine fever and the current outbreak of avian influenza are prime examples. The latter is an immediate threat to the livelihood of subsistence farmers and industrial production in the region. On a global scale however, a much greater threat looms that of a human pandemic, which risks to kill millions of people and to disrupt the political and economic stability of countless countries.

The creation of the European Technology Platform for Global Animal Health represents an additional effort helping to fight against the spread of such diseases. Through bringing together all the relevant stakeholders, a Strategic Research Agenda will be developed whose implementation will concentrate efforts in the medium to long term on those issues where scientific breakthroughs are needed.

Together with my colleagues Vice-President Verheugen and Commissioners Kyprianou, Michel and Fischer Boel, I wish to thank the European arm of the International Federation for Animal Health for taking the initiative to launch this platform with a truly international dimension. Not only are all the main players at a European level being brought together but also the key international organisations working in this vital field. Moreover, a number of third countries are also participating.

This vision paper constitutes the first milestone in the work of this technology platform and a sound basis to move forward.

I wish everyone involved in Global Animal Health the best of success.



Group of Organisations

AEFRV	Nadia PLANTIER, Interim President of AEFRV
BBSRC	Julia GOODFELLOW, Chief Executive of BBSRC
CEVA santé animale	Philippe du MESNIL, Chairman & CEO of CEVA santé animale
CIDC-Lelystad, EPIZONE	Piet A.van RIJN Coordinator of Network of Excellence “EPIZONE”
CIRAD, EDEN	Emmanuel CAMUS, Director, EMVT Department of CIRAD, EDEN
COPA	Rudolf SCHWARZBÖCK, President of COPA
COGECA	Eduardo BAAMONDE, President of COGECA
CVO Denmark	Preben WILLEBERG, Chief Veterinary Officer (CVO) of the Denmark
CVO France	Monique ELOIT, CVO of the France
CVO Netherlands	Peter W. de LEEUW, CVO of the Netherlands
CVO Slovakia	Jozef BIRES, CVO of the Slovakia
EAEVE	Marcel WANNER, President of EAEVE
EMEA	Peter JONES, Head of Unit Veterinary Medicines and Inspection EMEA
ESV	Peter NETTLETON, President of ESV

EuropaBio	Johan VANHEMELRIJCK, Secretary General of EuropaBio
Facultad de veterinaria, Universidad Madrid	Carmen ACEBAL SARABIA, Vicerrectora de Investigación of the veterinarian faculty, University of Madrid
FAO	Joseph DOMENECH, FAO Chief Veterinary Officer Chief, Animal Health Service
FVE	Tjeerd JORNA, President of FVE
GALV	Ian MAUDLIN, Implementing Director of GALV
Head of the Medicine Agencies	Steve DEAN, UK Presidency of the HMA
IAH, CA FMD/CSF	Martin W. SHIRLEY, Acting Director of IAH, CA FMD/CSF
IABs	Paul Pierre PASTORET, IABs Representative
IFAH - Europe	Brian CLARK, Chairman of IFAH-Europe
ILRI	John McDERMOTT, Deputy Director General Research of ILRI
Intervet	Ruurd STOLP, President Intervet International b,v
MED-VET-NET	André JESTIN, Coordinator of MED-VET-NET
Merial	Jerry BELLE, CEO of Merial
OIE	Bernard VALLAT, Director General of OIE
Vakzine Projekt Management	Albrecht LÄUFER, CEO of Vakzine Projekt Management



Signatories Global Animal Health: Vision 2015

Nadia PLANTIER
Interim President - AEFRV

Julia GOODFELLOW
BBSRC

Philippe du MESNIL
CEVA Santé Animale

Piet A. van RIJN
EPIZONE

Emmanuel CAMUS
CIRAD, EDEN

Rudolf SCHWARZBÖCK
COPA

Eduardo BAAMONDE
COGECA

Preben WILLEBERG
CVO Denmark

Monique ELOIT
CVO France

Peter W. de LEEUW
CVO Netherlands

Jozef BIRES
CVO Slovakia

Marcel WANNER
EAEVE



Peter JONES
EMEA



Peter NETTLETON
ESV



Johan VANHEMELRIJCK
EuropaBio



Carmen ACEBAL SARABIA
Universidad Madrid



Joseph DOMENECH
FAO



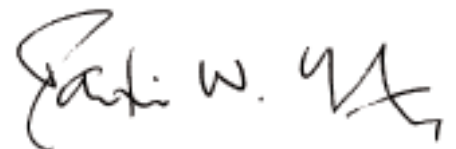
Tjeerd JORNA
FVE



Ian MAUDLIN
GALV



Steve DEAN
Heads of Medicines Agencies -
Veterinary (HMA-V)



Martin W. SHIRLEY
IAH, CA FMD/CSF



Paul-Pierre PASTORET
IABs



Brian CLARK
IFAH-Europe




John McDERMOTT
ILRI



Ruurd STOLP
Intervet



André JESTIN
MED-VET-NET



Jerry BELLE
MERIAL



Bernard VALLAT
OIE



Albrecht LÄUFER
Vakzine Projekt Management
GmbH



Executive Summary

Outbreaks of major animal diseases such as Bovine Spongiform Encephalopathy (BSE), Foot and Mouth disease, Classical Swine Fever, Avian Influenza, Bluetongue and West Nile Fever can have a devastating impact on animal and human health, food safety, the wider economy, the countryside, animal welfare, rural communities and the environment. Europe cannot be isolated from world events and any actions to reduce or eradicate disease agents worldwide will be to the benefit of all.

Effective tools for controlling animal diseases of major social and economic importance are vital not only for Europe but also for the rest of the world. The control of infectious and contagious disease can be complex with education, training, zoosanitary and other hygienic measures having an important role to play. Epidemiological assessments, economic evaluations and risk analysis are part of the approaches, which can be adopted and for which research continues to be required. In the longer term breeding for resistance may have an important role to play in disease control.

However the use of vaccines and diagnostic tests are a key component as they have the potential to support control and eradication and to be highly cost effective. At present there are no antiviral drugs for use against the major viral diseases of animals. Consequently, vaccines and diagnostic tools are often the only solution available for control. Whilst all tools need to be considered the technology

platform concentrates on the development and delivery of vaccines and diagnostic tests in the first instance.

Europe has been at the forefront of advances in genomics and biotechnology over the past decade. These advances provide opportunities to develop new or improved vaccines and diagnostic tests against major animal diseases. The pace of scientific progress continues to increase and Europe must continue to use the opportunities presented by the new technologies to retain its competitive position. However, the advanced research needed to develop new products is expensive in terms of expertise, equipment and facilities.

The animal health industry has created significant socio-economic benefits for Europe, but it must remain competitive if it is to survive. At present several factors threaten the industry's short- and long-term competitiveness. They include the European Regulatory Framework within which it has to operate, the small size of the market segment and the increased development time and costs for new products. The industry's future success depends on the ability of companies to launch and exploit innovative products not only for farm animals but also for companion animals.

The investment by the European animal health industry in research and development (R&D) is nearly 10% of its turnover. (The average is 12% of turnover for multinationals and 6% for small- and medium-sized enterprises.) However, in 2002 the percentage of

that R&D budget that was defensive – spent on keeping existing products on the market – was 35% in Europe compared to 16–18% in the USA. Nevertheless the recent pharmaceutical legislation in Europe adopted in March 2004 has to be implemented in the EU Member States by the end of 2005. This new legal framework includes improvements in the timing of authorisation procedures and the removal of renewal requirements thereby reducing the costs of defensive research significantly.

The delivery of new or improved veterinary medicines (this term includes veterinary vaccines and veterinary pharmaceuticals) and diagnostic tests is a high-risk business that uses many different approaches. Europe currently has a relatively good scientific research base from which to take advantage of the new genomics and technologies but the translation of scientific discoveries into authorised veterinary medicines (vaccines or pharmaceuticals) and diagnostic tests needs to be significantly improved.

This is due to a range of factors including economic, regulatory and social issues. Economic issues such as cost, price, competition and potential earnings are particularly relevant for vaccines and diagnostics for epidemic animal diseases. Regulatory and social issues compound the problem by including ethical considerations. Costs for development can be high and, in the case of epidemic animal diseases, include the costs of containment facilities to meet the requirements for authorisation. Delay in rea-



of products for minor animal species or minor use in major and minor species.

The aim of the Technology Platform is:

- To facilitate and accelerate the development and distribution of the most effective tools for controlling animal diseases of major importance to Europe and the rest of the world, thereby improving human and animal health, food safety and quality, animal welfare, and market access, contributing to achieving the Millennium Development Goals.

The strategic objectives of the Technology Platform in this aim should be to:

- Sustain and strengthen the research environment and infrastructure needed to support visionary research into animal health and in particular the epidemic animal diseases and zoonoses.
- Ensure that Europe has a multi-disciplinary strategic research capacity with the core expertise and facilities to anticipate and respond rapidly to new and emerging animal diseases, including zoonoses.
- Maintain a highly competitive industry working in partnership with the research community, production stakeholders, the public sector and regulators.
- Facilitate the efficient and rapid transfer of discoveries into practical applications such as tests and vaccines for diagnosing and controlling animal diseases.
- Ensure a supportive and harmonised regulatory environment that balances risk against need, not only

ching a financial break-even point and making a profit may act as a further disincentive to the involvement of private sector companies.

These delays are a central problem as the market in Europe for products linked to major epidemic diseases is small. In developing countries the problem is compounded by the inability of poor farmers to pay for these interventions and the concomitant need to use public resources to control epidemic diseases.

A similar problem is encountered in the generating of sufficient interest in the development of products for minor use or in minor species. A new and innovative approach is needed to fund the research, development and delivery of products be they vaccines, pharmaceuticals or diagnostic tests.

There is an urgent need to boost research by developing mechanisms to prioritise requirements and develop more effective funding, so that new or improved veterinary medicines - vac-

cines and pharmaceuticals - and diagnostic tests can be delivered. Closely associated is the effort required to ensure the effective transfer of innovations and breakthroughs from the research base into the development, manufacture, authorisation and distribution of new and safe products for practical use. There are many challenges to be overcome if new products are to become available, especially as this is an area where the return in terms of financial profit may be low but where the social, economic, public health and environmental gains could be high.

For these reasons a “European Technology Platform for Global Animal Health” was launched under the leadership of the industry. The Technology Platform will provide a mechanism for focusing research that delivers new tools for the control of major animal diseases be they vaccines, pharmaceuticals or diagnostic tests. Consequently it will contribute to overcome the constraints on the successful development and delivery

for the authorisation of vaccines and tests but also in terms of sanitary standards required for international trade.

- Develop global alliances with international organisations and non-European countries, including developing and developed countries, to enhance research, development and new product delivery.
- Improve education, training and understanding throughout the whole supply chain from initial research through to the delivery of new products.
- Mobilise the public and private sectors in Europe to commit funds to effective R&D activities through public – private partnerships.

The Platform will bring together all the relevant stakeholders at EU and national levels. It will also include stakeholders from international organisations such as the Food and Agriculture Organization of the United Nations (FAO) and the Office International des Epizooties (OIE), as well as from non-European countries. Substantial benefits that will increase competitiveness and productivity can be expected if all the key stakeholders can be mobilised to work together to create and implement a common vision.

While the European Technology Platform for Global Animal Health will concentrate on animal diseases of priority for Europe, it will take into account the perspectives of the globalised setting in which these diseases prevail. The global nature of these problems and the scale and complexity of new product development means that solutions will not be very effectively produced or very robust if developed exclusively for and/or in Europe. Alliances with non-European

countries and international organisations such as OIE and FAO will be essential.

The scope of the technology platform is currently limited to terrestrial animals.

The primary focus in this vision is the development of vaccines and diagnostic tests for major animal diseases but this does not preclude the development of pharmaceuticals. The efficient control of a number of other animal diseases is also endangered because of the limited arsenal of innovative pharmaceuticals available in animal health.

Multi-resistance of bacterial strains and endo / ectoparasites against pharmaceuticals are more than a threat, but a reality. There is an urgent need to continue research and development of new efficient pharmaceuticals to overcome resistance to bacteria and parasites. Ruminants are not the only species concerned. New antibacterial and ecto/endoparasiticides must not be neglected as vaccines might not always be the most cost effective tools and the most easy to develop.

New control methods must be found in order to keep animals healthy, prevent the spread of disease, protect the public, improve agricultural sustainability, maintain animal welfare, protect the environment, maintain biodiversity, increase security from bio-terrorism, protect consumers of animal products and ensure safe supplies of food.

There is a global public good from helping the world to address major animal diseases. Given the importance of livestock to developing countries, controlling and eradicating where practical animal diseases will have

direct and major impacts on food security and poverty alleviation. Furthermore, the effective control of major animal diseases will have a positive impact in many areas of concern to society. These developments align closely with many EU policies in areas such as research, animal and public health, the internal market with free movement of animals and animal products, food safety, agricultural production and incomes, development, trade with access to markets, the environment and better security from bio-terrorism.

As the European Technology Platform for Global Animal Health will be driven by the industry, short, medium and long-term goals must be established linked to the development of veterinary products (vaccines, pharmaceuticals and diagnostics), which will be needed in the next 15 years. To be successful the platform must retain a specific focus and not become distracted by adopting a very wide remit. In the first instance the platform will deal with major animal diseases. However the Technology Platform Steering Council will consider the position and where appropriate will reassess priorities and objectives.



1. The Need for Vaccines, Pharmaceuticals and Diagnostic Tests

1.1 A Global Problem

During recent years the world has witnessed the emergence or re-emergence of a number of major animal diseases. Several of these have been both costly and damaging; Bovine Spongiform Encephalopathy (BSE), Foot and Mouth disease (FMD), Classical Swine Fever (CSF), Avian Influenza, Bluetongue and West Nile Fever serve as reminders of the devastating economic and social impacts animal diseases can have.

A rise in the level of international travel and tourism has increased the threat from zoonoses and previously unknown diseases such as Severe Acute Respiratory Syndrome (SARS), which may originate from animals. At the same time more and more emphasis is placed on the avoidance of sanitary barriers to trade in both livestock and their products. Through this type of globalisation diseases are reaching the EU much more rapidly and frequently than before.

Worldwide there are extensive movements of live animals for slaughter as traders are attracted by the price differences across international borders. The majority of movements occur in the Middle and Near East with large and small ruminants being imported every year. This constitutes a hazard to Southern and Eastern Europe as diseases such as FMD and Rinderpest can easily spread from country to country.

There also remain many serious diseases on the borders of the EU. The risks these pose to the community remains unclear but climate change may further enhance the probability of accidental introduction. There is the possibility that vectors of diseases such as Rift Valley Fever will move into new habitats and spread out of their existing areas. The potential spread of Bluetongue into new areas within the EU could result in major economic damage to those countries with dense sheep populations.

Furthermore, some of these diseases may be used as bio-terrorism weapons.

Europe cannot be isolated from world events and any action to reduce or eradicate disease worldwide will be of benefit to all. Some diseases affect all regions of the world including developed countries, others are often limited to the developing countries but with major potential to spill over and spread to countries free of the disease concerned.

1.2 Impact of Animal Disease

Animal diseases have a major direct impact on human health. Diseases such as BSE, Avian Influenza, Tuberculosis (*Mycobacterium bovis*), Rabies and Rift Valley Fever are either zoonotic or potentially zoonotic, and are clearly major public as well as animal health problems. Diseases such as

Brucellosis, Rift Valley Fever, Tuberculosis and Trypanosomiasis can add to the health problems of the poor, and in particular those with HIV/AIDS.

Moreover, it is much more difficult to control diseases, especially emerging diseases such as SARS, in an immunosuppressed population which underlines the need to have a global strategy. Food safety is of critical importance and the control of food-borne zoonoses is of major concern to public health.

The introduction of a disease such as FMD or Avian Influenza into countries with free trade has a devastating economic, social and environmental impact as seen both in Europe and Asia. In the developed countries major livestock disease poses a threat to agriculture, food safety, development, trade, the internal market, free movement of animals and their products, the environment and to national economies.

In the developing countries disease remains a severe constraint on development and poverty alleviation as it curtails access to markets for livestock and products. Livestock form an important component of the livelihoods of 70% of the world's poor amounting to some 600 million people. Animal diseases are a major threat to livestock-keepers and are often considered to be one of the biggest constraints to improving livelihoods. In the most marginal areas livestock often

constitute the only significant livelihood strategy for poor people. One of the most significant changes over the past decade and for the foreseeable future is the increasing demand for animal proteins to improve food quality and feed an expanding world population. This is often referred to as the “livestock revolution”.

The importance of the economic burden resulting from endemic diseases should not be overlooked especially as they pose an ongoing threat to the economic viability and competitiveness of the farming industry. This threat is growing with the development of resistance by nematodes, trematodes and external parasites to the available chemotherapies, which may ultimately lead to the loss of all available means to control these diseases.

1.3 Control measures

In many cases outbreaks of the major diseases have been widespread, unexpected, often trans national and have severely challenged the ability of governments to control them. Experience has also demonstrated that control measures to eradicate disease can be very costly.

Effective disease control requires rapid and accurate detection coupled with a fast and effective response to an outbreak. Education and training are important for early detection but the use of effective diagnostic tests for surveillance purposes and for the rapid confirmation of disease outbreaks is essential. New tests that can be used easily by farmers in the field may help to solve these difficulties but can in themselves lead to further problems if not properly applied, monito-

red and controlled by the authorities. The controls on major animal diseases are based to a large extent on the standards published by the OIE in the Terrestrial Animal Health Code. In Europe, control of diseases such as FMD, CSF and Avian Influenza has involved mass slaughter of animals infected with the disease and the precautionary slaughter of those assessed to have been in contact and potentially infected with the same virus.

The emergence of these diseases in Europe and Asia has led to the slaughter of millions of animals at high economic cost. This has given rise to public concern that new technological advances in vaccine production, diagnostic testing and epidemiology have not been significantly employed. For ethical, ecological, environmental, social and economic reasons there is a need for alternative solutions to be found for the control and eradication of epidemic diseases.

Alternative approaches are needed which may supplement or replace vaccination. This is particularly true of the vector borne diseases when management of animal movements, vector habitats and vector life cycle can provide effective tools. The additional advantage of vector control tools is that they offer a generic approach that can cover several different infections and viral serotype whereas the immunological approach must involve specific vaccines for each virus/serotype and may require further research and development if the antigenic specificity changes.

1.4 Vaccines

In the past vaccines have proved to be

effective against a range of worldwide diseases; in the long run they are the most effective and sustainable way to combat infectious diseases, especially in the developing world. Successful eradication of major animal diseases has been achieved in Europe through the combination of preventive vaccination and the application of appropriate policies. In Europe, emergency vaccination strategies and improved diagnostic tests have also been applied for effective eradication or control.

Vaccines may be used prophylactically on a regular basis to build up flock or herd immunity so that contact with the disease agent does not result in an outbreak. This is particularly true in the developing countries where an eradication programme involving slaughter would not be practical or economically justified. Vaccination is also of major interest where wild animals are a reservoir of the diseases and consequently hamper their control.

Vaccines may become increasingly important as an alternative to therapeutic and prophylactic use of disease-controlling pharmaceuticals. This will have a positive impact on production and food safety by reducing or eliminating the need for withdrawal periods, and avoiding the presence of residues in foodstuffs of animal origin. As multinational companies have moved from producing agrochemicals to investing in plant genetics, a similar trend to use alternatives is appearing in companies that maintain animal health. However, there will be a long timescale for the research and development necessary to produce vaccines to replace the use of antibiotics and anthelmintics.

In the UK, the Royal Society's Report



on Infectious Disease of Livestock in 2002 has summarised the following ideal characteristics for vaccines:

- Giving protection against all isolates of the virus in all the affected species, preventing virus carriage and the possibility of shedding and transmission.
- Stimulating a broad level of immunity necessary to drive an effective and long-lasting immune response.
- Cheap to manufacture and simple to administer.
- Safe to use, have long shelf life and are heat stable.
- In the case of live vaccines, are safely attenuated and reversion to virulence is avoided.
- Allowing discrimination between infected and vaccinated animals.
- Giving good levels of maternal immunity.

There remain scientific and developmental obstacles in the way of meeting these criteria especially with the RNA viruses. These often have many variants or a multiplicity of strains. They can evolve rapidly making it dif-

ficult to design long lasting vaccines effective against all strains or variants of the disease.

Recent outbreaks have highlighted the necessity for not only producing new vaccines but also for improving existing vaccines and providing marker vaccines. A number of control programmes envisage the possible use of vaccines in combination with a “vaccinate to live” policy. This in itself poses problems especially in the need to differentiate infected from vaccinated animals, and the potential for asymptomatic carriers to spread disease. Unless new vaccines can be developed in such a way as to avoid vaccinated animals being regarded as infected, there is the potential for an adverse impact on trade. The use of improved diagnostic tests to differentiate infected from vaccinated animals becomes increasingly important.

Vaccines do not exist for many diseases such as African Swine Fever, a highly infectious disease affecting pigs. Some other vaccines could be significantly improved using newer techno-

logy. Examples include the current vaccines for Rinderpest, Bluetongue and Avian Influenza. For some other diseases new instruments for delivery may be necessary, for example, oral vaccination of stray dogs against Rabies. Currently, oral vaccines only exist for the wild fox population.

Vaccination is often the only practical and realistic measure available for controlling endemic diseases in wildlife such as Rabies in foxes and stray dogs, Classical Swine Fever (CSF) in wild boar, and Tuberculosis in badgers. The delivery of such vaccines to the target species is critical for success. The Rabies control programme using live vaccine in baits delivered to foxes has resulted in the eradication of the disease in many parts of Western Europe.

Vaccines that induce an early onset of immunity that results in a long duration of immunity are needed in the case of emergency vaccination. The development of multivalent vaccines has advantages as this would reduce the number of inoculations to animals, reduce the handling cost and avoid animal suffering.

1.5 Diagnostic tests

Recent outbreaks have highlighted an urgent need to improve existing diagnostic tests. The Report of the EU Scientific Committee on Animal Health and Welfare in 2003 identified a number of limitations to existing diagnostic tests. In order to overcome these problems the Committee recommended that there was a need to develop:

- Methods for inexpensive and effec-

tive screening of animal products.

- Simple and rapid tests (e.g. pen-side) for use in the field, and regional laboratories to support clinical suspicion of disease.
- Rapid and highly sensitive tests to detect animals as soon as they become infected.
- More sensitive and specific tests to detect infection in an individual animal, without the need to screen the whole herd.
- Rapid and sensitive methods for differential diagnosis.

There is no Community legislation for the authorisation/licensing of diagnostic tests for animal health. This is a significant gap particularly with the advent of marker vaccines, which rely entirely on the use of effective diagnostic tests to distinguish the immune response from the field antigen to that of the vaccine antigen. Recently the OIE developed a new procedure for validation of diagnostic tests in accordance with the Manual for Diagnostic Tests and Vaccines for Terrestrial Animals.

1.6 Pharmaceuticals and Biocides

The use of pharmaceuticals to control animal diseases, either in the face of an outbreak of infection or as an adjunct to a vaccination programme, is a rationale strategy for bacterial and parasitic infections. The use of pharmaceuticals as a first line defence has a track history in limiting the spread of disease. However, a number of concerns have arisen including:

- The emergence of human health concerns in the face of antimicrobial resistance.

- An increasing level and scope of resistance to antiparasitic compounds.
- A public concern for the level of residues in food driven by an increasing demand for efficiency of food production.

To satisfy these concerns the rising level of regulatory control has been claimed to stifle the development of pharmaceuticals for minor species and for minor diseases. In both cases these can have significant impact on regional economies.

Vaccination provides a promise of disease control and prevention but in many cases this is not yet achievable and does not eliminate the need for pharmaceutical treatments in the face of disease outbreaks.

Areas for potential development include:

- Novel routes of administration to reduce the potential risk of residues at injection sites.
- Safety and residue studies to expand availability into the minor use/minor species areas.
- Pharmacokinetic studies to reduce animal experimentation and provide effective dosing schedules to reduce incidence of resistance and maximise efficacy.
- Pain management.
- Prophylaxis to effectively limit the spread of disease.
- Synergy between pharmacological solutions to disease outbreaks and vaccination.

Traditionally pharmacological solutions have been limited to bacterial infection control and symptomatic management of disease. The new therapeutic solutions to viral infections

have limited application at present but would offer advantages where in contact animals need protection during emergency vaccination strategies.

The use of biocides to limit the environmental dissemination of disease is also an important area of disease control where biosecurity has important implications in the limiting the epidemiological spread of disease in animal groups and between animal groups.

1.7 Conclusions

There is a demand for research into the availability and effectiveness of the different strategies for disease control that may include vaccination alone, vaccination and slaughter, a combination approach between immunological solutions and pharmacological strategies or eradication without vaccination.

New and improved vaccines are required for a range of major animal diseases. In addition, improved diagnostic tests must be developed to enable the early diagnosis and detection of outbreaks along with tests to demonstrate the effectiveness of control programmes. The acquisition of new tools to control major diseases and reduce dependency on prophylactic and therapeutic pharmaceuticals will also have beneficial effects. However, the development of new pharmacological or biocidal solutions to the containment and control of disease outbreaks may be more appropriate in some circumstances and should not be ignored.



2. The Development of Vaccines, Pharmaceuticals and Diagnostic Tests

2.1 Technological advances

Most of the vaccines currently in use for the control of animal diseases have conventional origins. Genomics offers new opportunities through gene sequencing and a range of other new techniques. These have allowed the identification of the genes in pathogenic agents that are responsible, for example, for causing ill effects or stimulating an immune response. This will enable the development of potential vaccine strains in which the genes causing the disease have been disabled or removed while preserving the immunogenicity inducing potency of the strain.

Identification of new vaccine candidates will speed up as a result of sequencing pathogen genomes. Genetic engineering can potentially lead to the development of new recombinant varieties based on an altered gene, vector or sub-unit with the future possibility of DNA vaccines and a range of other candidates. Marker vaccines are also under development. These are essential for ensuring the differentiation of infected animals from vaccinated ones when an eradication programme involving slaughter and/or vaccination is in place.

More effective delivery systems for the vaccines and pharmaceuticals are urgently required to replace the present cumbersome and invasive techniques. Novel vaccines produced in plants or insect cells are under development, which could lead to new delivery systems in the form of edible

and vector borne products.

In the case of pharmaceuticals an area for exploration involves the potential for synergistic action between pharmacologically active substances and immunostimulants. These may yield useful prophylactic strategies and programmes especially if combined with biosecurity measures. Phage treatments may also offer an interim solution to disease control but have not so far been brought to a practical application.

There are a number of areas for development of diagnostic tests, which include the technology of micro-arrays, which could be grouped, by specific diagnostic areas such as gastroenteric disease. This technology could also be used to attain safer and more reliable purity control in vaccines to detect cross contamination during production stages. Other technologies include the development of multiple PCRs.

The move from R&D to successful deployment of new tools is complex, and involves many different players who need to interact and cooperate. The objective is to bring into action high quality, safe and effective products. The main challenges and constraints to success can be considered in three overlapping components of the R & D chain:

- Research Position.
- Industry Perspective.
- Regulatory Aspects.

2.2 Research Position

At present Europe leads in a number of key technologies, one of which is research into epidemic animal diseases. Research work to control infectious diseases is a large part of EU research funding because of the importance of animal health to agriculture and the production of safe food. The quality of research remains high in Europe, but is at risk of expenditure cuts in most Member States.

Research may be undertaken in public or private laboratories. In either circumstance the research phase comprises complex processes that are labour-intensive, require a multi-disciplinary approach and are of unpredictable duration. The success rate in producing candidate antigens for a vaccine, for example can be low with less than 10% of projects reaching a successful conclusion. Costs are steep as a result of the technologies involved and the containment facilities needed to protect both human and animal health.

Currently, there are two main problems concerning the facilities to perform challenge trials using animals which need to be urgently addressed. There is a lack of suitable containment facilities throughout the EU. This in turn can delay the development period for a vaccine with a direct impact on the competitiveness of the companies as the product is launched much later than necessary.

There is also a lack of definition of the conditions of use of these specialised

premises. The Regulatory authorities have not clearly defined which microorganisms should be handled under which type of containment. There is an urgent need to define clearly and precisely which microorganism should be used in contained facilities.

European research into epidemic diseases is often spread over a relatively small number of public institutes. Research into zoonotic diseases however, is more fragmented, being spread over many institutes. This becomes a serious problem in terms of resources, particularly the availability of expertise, expensive equipment and facilities needed to maximize utilization of the new technologies.

No clear picture or overview is available of the totality of current research into the major diseases throughout the EU or indeed globally. There is no readily accessible information on research funding by public authorities at a national or regional level, by large animal health companies or the smaller biotech firms. Information on planned or proposed research is equally unavailable. While animal health companies may have extensive research programmes, competition and the protection of intellectual property rights often limit the exchange of information.

Within the EU, the lack of a formal mechanism to identify research gaps increases the reliance placed on scientific communities, panels and workshops to assess these needs. Assessments are limited and need continuous updating. Much of the current public research funding is targeted at problem resolution or at providing the evidence on which to base policies. Consequently, funding for innovation is less than is appropriate resulting in difficulties in filling gaps.

No single organisation or group has an overview to ensure an integrated and coordinated R & D programme across Europe. Provision of such an overview would reduce duplication of effort, lead to a more effective use of resources and limited funds, encourage synergies and enable major gaps in research to be identified and filled.

New and emerging infections will continue to pose a risk to human and animal population. There is a need to anticipate and adopt a proactive approach for new virus discovery in order to respond rapidly to new and emerging animal diseases, including zoonoses. There is also concern over the capacity for research in Europe and indeed worldwide, particularly the availability of suitable premises with appropriate containment facilities, both for early stage research and later stage clinical trials.

A similar concern exists for the availability of veterinary medicines for minor species or for minor use in major animal species. In the USA a specific programme has been successfully funded and progressed to deal with this problem. This may have applications to the European situation not only for the minor species but also the development and delivery of vaccines and tests for diseases which either do not occur in Europe or are of rare occurrence.

In the EU the critical mass of expertise and the availability of qualified and skilled researchers are under threat causing a potential impact on the long-term viability of some programmes. For many of the diseases, expertise is limited to a single individual. In some Member States, a worrying decline in the number of veterinary graduates entering research has been identified and this trend is likely to continue.

2.3 Industry Perspectives

Large multinational companies, especially in the USA and the EU, dominate the animal health industry. These companies have manufacturing facilities in different parts of the world, and the profitability of the industry is influenced by the existence or otherwise of national trade barriers.

More than 50,000 full time jobs in Europe depend on the animal health industry, with 15,000 directly involved in R&D, production, marketing, sales and administration. The remainder are indirectly involved as a consequence of the industry's purchase of goods and services and the multiplier effect in other industries. Total European sales in 2003 were 3,700 million euros, comprising 33.3% of worldwide sales. The industry estimates that the lead-time to bring a new product to market is between 5 and 10 years at a cost of up to 50 million euros.

The investment in R&D by the European animal health industry is nearly 10% of turnover with an average 12% of turnover for the multinational companies in Europe and 6% for the small- and medium-sized enterprises (SMEs). However, in 2002 the percentage of that R&D budget which was defensive and spent on keeping existing products on the market is 35% in Europe compared to 16–18% in the USA. Nevertheless the recent new pharmaceutical legislation in Europe adopted in March 2004, must be implemented in the EU Member States in the last trimester of 2005 (Regulation 726/2004; Directive 2004/28/EC amending Directive 2001/82/EC).

The new legal framework includes improvements in terms of timing of authorisation procedures, removal of renewals (thereby reducing the costs



ducts. Similar problems were identified in the USA.

In the past companies considered that the regulatory framework created problems for innovation by increasing development time and costs, creating significant uncertainty and redirecting resources into defensive R&D. While there were similar regulations in the USA, its companies are not subjected to the same constraints and detailed regulations as their European counterparts. There was a measurable and significant negative impact on costs, time and risks of developing new products and maintaining existing ones.

As already indicated the survey and report are out of date (2002). The EU pharmaceutical legislative framework that will prevail until 2015 is the newly adopted one which must be implemented by the end of 2005. It will be important to assess whether the new regulatory framework results in improvements by comparison to the results of the 2002 benchmarking survey. It would be unwise to judge the impact in advance of the implementation.

The technical annex, (Annex 1 of Directive 2001/82/EC as amended by Directive 2004/28/EC), fixing the quality, safety and efficacy data requirements to be submitted in an application for a marketing authorisation for veterinary medicines is currently undertaken is under revision. This will take account of the achievements obtained through the International Cooperation on Harmonisation of Technical Requirements for Registration of Veterinary Medicinal Products (VICH) and further developments in the sector of veterinary medicinal products. This revision will lead to simplification of the general requirements that are needed in so far as to use resources for the development of new veterinary medicinal products in

of defensive research significantly), broadening the scope of the so-called central authorisation of specific veterinary vaccines (thereby opening the eligibility in the whole Community for veterinary vaccines against major Community related animal diseases – Article 3.2 of Regulation 726/2004).

The above statistics are from the 2002 survey. It would be appropriate to conduct an up to date survey to take account of the new EU legislation and to assess the comparative position between the USA and Europe in 2005.

For new conventional vaccines, the development phase is labour- and cost-intensive with an average success rate of 30%. For live recombinant vaccines to be successful an environmental impact assessments (EIA's) will be required and this is difficult to quantify. The cost and time needed to research and develop new products has increased and is foreseen to continue to increase for a number of reasons. Costs are higher for biotechnology-derived vaccines than for conventional vaccines. This is compounded as the market for veterinary vaccines is relatively small and is also very

fragmented with a multiplicity of target species and diseases. Consequently the costs for R&D and authorisation do not balance with the expected profitability.

In the centralised authorisation procedure (Regulation 726/2004), the fees for the authorisation of vaccines are currently half the costs for that of pharmaceuticals. In particular the overall fees of central authorisation of veterinary medicines are considerably lower than for human medicines.

A report presented to FEDESA, now IFAH (International Federation for Animal Health), in January 2002 benchmarked the competitiveness of the European animal health industry. The findings in the report were based on two quantitative surveys and a series of qualitative interviews with companies in Europe and the USA. The companies identified innovation as the major driver for long-term competitive success. However, this success depended on a number of critical factors that affect on the process of innovation, including the marketing authorisation procedure, the small size of the market segments and the closure of European markets to certain pro-

an economic way and to promote enhanced activity in this area. Additional guidance on requirements for the specific marketing authorisations applications, such as generics, authorisation in exceptional circumstances, will be provided in line with the corresponding Annex 1 to Directive 2001/83/EC relating to medicinal products for human use.

2.4 Regulatory Aspects: Vaccines

The potential of new advances in vaccine development cannot be fully exploited if there is no public acceptance of the technologies involved. Safety and ethical concerns have to be taken seriously and attempts need to be made to inform and educate the public on the benefits and risks of new technologies. Regulations on the manufacture, production, authorisation, distribution and use of vaccines are critical to protect human and animal health, animal welfare and the environment. They are also important in establishing and maintaining consumer confidence in the safety, quality, and efficacy of products.

The regulatory requirements are very much predicated on societal values of the day. These are reflected in the requirements of the legislators in particular to ensure that all aspects of safety are addressed both in the authorisation of veterinary and human medicines.

Considerable investments have to be made to meet regulatory requirements. The manufacturing phase requires quality assurance systems that are important for the quality of the product and the safety of the environment and the workers. To meet the demand for predictable safe and constantly effective vaccines, new techniques need to be used which will inc-

rease testing and development costs. The production phase is governed by Good Manufacturing Practice, other legislation and monographs of the European Pharmacopoeia that cover all stages from the starting material to the finished product.

Scientific assessments of applications for marketing authorisations of veterinary medicinal products in the EU is operated either centrally by the European Medicines Agency (EMA)/ Committee for Veterinary Medicinal Products (CVMP) or nationally (National Regulatory bodies) and includes the strict evaluation of the safety, quality and efficacy of the products. A given veterinary medicine could be authorised in all 25 EU Member States (Community authorisation), or in 2 to 25 Member States (Mutual recognition) or only in one Member State (Strictly national authorisation).

As a consequence a vaccine authorised by one Member State will not necessarily be authorised for use by the other 24. This is true in the case of many vaccines against epidemic disease such as FMD, Avian Influenza, and Bluetongue. CSF vaccines are the only ones that have had a Community authorisation and consequently are authorised in all 25 EU Member States.

The procedures for approval and authorisation of vaccines are becoming more complicated and costly with the need for pre trial approval before genetically manipulated candidates can be considered for release from the laboratory. The national arrangements in relation to the authorisation of studies for testing GMOs as opposed to the licensing system for veterinary medicines are fraught with difficulties as there are usually different authorities, committees and groups involved in each Member State.

These differences make the process from development to delivery unclear leading to difficulties in developing new vaccines and performing Europe-wide trials.

In order to exploit the results of research and to deliver new products, a number of important stages in the R&D chain need to be successfully completed. These involve an integrated approach to product development, production, good manufacturing practice, initial clinical trials and finally the large-scale field trials in order to reduce the time-to-market and cost of a product. To achieve this, a cooperative interaction is essential among the different parties involved in the process from discovery to delivery. This suggests early regulatory agency involvement, enabling the regulatory requirements to evolve in parallel with technology advances. For Community authorisation applications, scientific advice may be provided by the CVMP in the early stages of product development and consequently benefits the whole processing of such application and the delivery of veterinary medicines.

A good regulatory framework is beneficial for the animal health companies by preventing dangerous products entering the market, improving product quality and reassuring the public. Good regulation also provides a powerful stimulus to innovation by protecting the investments in intellectual property, facilitation of product entry into global markets and provides consumer confidence in the products. Conversely, poor regulation will reduce the number of products, divert R&D, increase costs, time and risks of development and ultimately lead to fewer products and the possible migration of the industry out of Europe.

At present there is a need to examine

the regulatory framework and to seek the consensus of all stakeholders as to the right balance between protection and avoidance of risk and the need for disease control products. While consumers expect new technologies to be fully utilised in controlling diseases, the time for the development of these products is increasing, leaving the industry reluctant to invest in them.

2.5 Regulatory Aspects: Diagnostic Tests

There is as yet no formal mechanism for the approval or authorisation of diagnostic tests, although international guidelines for the validation and standardisation of diagnostic tests do exist. The OIE established a “procedure for recognition” of diagnostic tests, including commercial kits, through its worldwide network of over 150 reference laboratories in 31 developed and developing countries. This is of particular importance with the selective tests to differentiate vaccinated from infected animals and where international endorsement is essential if importing countries are to accept the tests. These tests ultimately determine the status of a country.

Four development requirements have been identified:

- Validation.
- Standard protocols.
- International reference sera or materials.
- Proficiency test.

One of the problems in authorising tests in the EU is the availability of vaccinated animals to be challenged with the pathogen but which, because of the seriousness of the disease, cannot be challenged outside very high-category containment facilities. Consequently most of the testing would have to be carried out in the developing countries where the disease is endemic.

2.6 Regulatory Aspects – Pharmaceuticals

The key regulatory issues that have affected the development of pharmaceuticals are consumer safety particularly in respect of residues, and resistance. Environmental safety is another important consideration. With a review of residues legislation planned by the EU, a process that assures the safety of consumers without the need for expensive and repetitive residue depletion studies is desirable. For resistance, the science is being developed in several areas but the assessment of optimum dose and acceptance by the regulatory authorities of new methods is slow to evolve.

A more rapid acceptance of new advances in pharmaceutical science and the development of an improved application of Risk Benefit analysis would be helpful in encouraging the development of new and innovative treatments.

2.7 Conclusions

All of this underlines the need for a coordinated, transparent and multidisciplinary R&D effort from basic sciences through to the emerging technologies and onto product development, production, authorisation and distribution. There are a number of constraints on the successful transfer from breakthrough to the deployment of new and improved veterinary medicines be they vaccines or pharmaceuticals, and diagnostic tests for the major animal diseases:

- Research: lack of investment, fragmentation, duplication, lack of coordination, no overview, no mechanism to identify gaps, lack of EU and world wide expertise and facilities, high costs of cutting edge science, costs of containment facilities.

- Production and Manufacture: high risk, uncertain profitability, low financial returns, increasing costs, low demand from developed countries, and inability of the developing countries to pay.
- Regulatory: extensive tests, with high costs for authorisations, potential problems with GMOs prior to the medicine authorisations, poor implementation of mutual recognition principles during the authorisation process, lack of coordination between Member States’ interpretation of the harmonised technical requirements – mainly in safety and efficacy, while worldwide authorisation and quality control needs to be developed further.



3. Developing a Vision for 2015: From Innovation to Delivery

3.1 A European Technology Platform

To meet the many and varied challenges discussed in this paper, a European Technology Platform for Global Animal Health was launched on 16 December 2004. This will provide a mechanism for focusing and prioritising the research that ultimately delivers new or improved tools such as veterinary vaccines and diagnostic tests. It will also help to speed up the delivery of new products to the market by overcoming the constraints identified throughout the supply chain.

The Technology Platform will be instrumental in developing a comprehensive approach through the preparation of a visionary Strategic Research Agenda. The elaboration of this and the associated implementation plan is the central element of the process. It would be ambitious, medium- to long-term in span, explicit in setting out priorities and updated regularly.

3.2 European Objectives

There are a number of challenges implicit in the global disease situation and the risks facing Europe. Overall European objectives must be to:

- Protect Europe from the incursion of epidemic animal diseases and zoonoses.

- Deal rapidly and effectively with outbreaks in Europe should they occur.
- Assist in speed of access to market, facilitation of world trade and the alleviation of poverty by reducing the impact of these diseases in developing countries.
- Reduce worldwide levels of disease and thereby indirectly protect Europe from disease spread by people or trade.

3.3 Meeting the Challenges

There is a pressing need to facilitate and accelerate the development and deployment of these new tools to enable effective control of animal disease and to meet the above objectives. In the first instance, the delivery of new tools such as vaccines and diagnostic tests for a range of epidemic animal diseases and zoonoses is essential. Linked to this is the need to ensure public support for these aims and to ensure society's demands for safe and effective medicines are met.

Europe cannot afford to miss out on the benefits offered by the new tools for animal disease control that the advances in biotechnology and genomics will generate. It is important to capitalise on the potential of the new tools but at the same time recognising society demands that safeguards be built into the regulatory system. This is especially so with GMOs where there are important public concerns as to the risks associated with these pro-

ducts.

A number of important challenges need to be overcome. The production of new tools such as vaccines and diagnostic tests, involves a supply chain beginning with research and passing through development to manufacture, production, authorisation, sale and finally distribution. The European Regulatory Framework (Veterinary Medicines and Community Animal Health I legislation) establishes conditions for the authorisation of veterinary medicines, for vaccination policy ("vaccinate to live policy") providing or not the incentives to companies to develop product and inevitably impacting on the final delivery of veterinary medicines.

This is an extensive agenda and in order to meet these challenges Europe must take steps forward in relation to its:

- Research Policy.
- Global Dimension.
- Interdisciplinary Research.
- Intellectual Property Rights.
- Industry Issues.
- Regulatory Framework.

3.4 Research Policy

Europe has a long tradition of research into major animal diseases and in the development of vaccines and tests. With high-calibre academic and government research institutes, Europe is well placed to continue with innovative research in these areas. However there is a need for:



chain contribute.

Most large animal health companies do not engage in the research themselves but let universities and small biotech start-ups identify some potential product from which they buy the intellectual property and then develop it further. Given the nature of this research, it is important to work closely with the commercial companies to move innovations to actual products, but at the same time to also have a range of companies or groups to undertake fundamental strategic research to identify better vaccines and tests.

3.5 Global Dimension

The benefits of reducing global risks and thereby the threat of introducing diseases into Europe and improving global equity are considerable. In addition there will be increasing livestock business opportunities in developing countries. Demand for livestock and livestock products is growing at more than 5% per annum in the developing world, much faster than in Europe. This increasing demand will offer new markets for livestock inputs including vaccines, pharmaceuticals and diagnostics.

The focus of the Strategic Research Agenda should not be aimed exclusively at a European level, but should also consider the global dimension of the technologies concerned. Improved links to R&D worldwide should be a priority. The scale and complexity of vaccine and diagnostics development is such that alliances with other countries and international organisations such as the OIE and FAO will be essential. Participation by

- Enhanced identification of opportunities in close cooperation with the industry.
- Coordination and enhanced public private research partnerships to move beyond the normal arrangements and to ensure that discoveries are fully utilised.
- Collaboration to avoid duplication between public sector and private industry research.

The 6th EU Framework Programme seeks to reduce fragmentation, develop synergies, avoid duplication, and enhance integration and coordination of the programmes of research. With major animal diseases it is important to strengthen competencies and networking aimed at increasing collaboration between research centres, reference laboratories and other stakeholders. This is an essential component in strengthening the research area and in ensuring that Europe's position is not undermined.

To meet some of these concerns the EU has established networks of excellence. One of these is the MED-VET-

NET, which has a remit to prevent and control zoonoses. A group, which considers the research activity, manages each network. There are regular workshops to communicate the results back to industry. There is consultation with the public through open fora when their views and opinions can be incorporated into the research direction. Another network of excellence is EPIZONE, which aims to improve research on preparedness, prevention, detection and control of epizootic diseases. The ERA-NET scheme aims to support cooperation and coordination of national or regional research programmes.

However, none of these networks has the full participation or integration of the animal health or biotechnology industries to assist in coordination and collaboration and avoid duplication of effort. In order to avoid repetition, a much wider mechanism is needed to evaluate all the research from innovation to application in a specific area of work. One way of achieving this is to develop a Strategic Research Agenda to which all those involved in the

developing countries e.g. through reference laboratories of the OIE and FAO, would be highly beneficial especially in the field trials of some diagnostics and vaccines for exotic diseases such as FMD which is absent from the EU but endemic in other countries.

Research carried out in the countries of origin of these diseases will provide lessons on the epidemiology of the problem. It also allows for the testing of control approaches including vaccines and diagnostics. Many epizootic pathogens cannot legally be introduced into Europe for research purposes. More importantly, research such as field trials of diagnostic tests can be conducted in the developing world, which, for both technical and practical reasons, cannot be carried out in Europe. Ethical issues must be taken into account in these circumstances when research is proposed in developing countries which would not be permitted in Europe.

Full engagement of developing country partners will be critical to conduct research in an effective manner and to having researchers within these countries that understand the issues and support the implementation of subsequent control programmes. Thus active engagement of the developing countries and modern research partnerships are essential for the Platform to be effective. This implies the need for strategic joint programmes involving research and capacity building. A postgraduate programme for developing country nationals and EU nationals might be a cornerstone of the initiative, creating a powerful international network to handle global problems.

3.6 Interdisciplinary Research

There is a strong requirement to encourage interdisciplinary research with more collaboration between groups working on human and animal disease and zoonoses. Therefore, this should be explicitly built into the design of the Platform to make sure the lessons are shared. Animal research has potential to produce important lessons for human vaccine development and thus to speed up the process for the control of key human diseases such as malaria, tuberculosis and HIV/AIDS and vice versa.

Close links must be developed with the other technology platforms especially those for innovative medicines, sustainable chemistry, and nano-technology – all of which can contribute to this Technology Platform.

3.7 Intellectual Property Rights (IP)

An innovative systems approach involving diverse stakeholders is very important. Industry should clearly play an important role, but it will be necessary to have the representatives think ‘outside the box’. Ideas about handling IP are going to be crucial if progress is to be made. There is increasing recognition that too heavy an emphasis on IP protection is hindering the progress of science in addressing big societal issues. Public-private partnerships will be key to such progress. Analysts from beyond the animal health industry will have to be brought on board to think through the science policy issues involved.

3.8 Industry: Manufacture and Production

Despite the scientific advances and technology already available to the animal health industry, progression in vaccines and diagnostic tests has been limited. One of the reasons for this is that companies consider both the potential demand and acceptable sale price for vaccines or tests to be too low for them to recoup their investments. It is important to provide incentives for vaccine research and to ensure that if vaccines and tests are developed, they are genuinely answering the users’ demands, reach the correct targets and comply with international standards on quality, safety and efficacy. There are strong arguments for global partnerships to spur vaccine development and ensure that the appropriate vaccines are available to those who need them.

Vaccines for epizootic diseases may not always be profitable for the private sector depending on demand for them and the volumes manufactured. The market potential for diagnostic tests is even smaller and there are few incentives for the industry to invest in R&D. This leads to a broader area of policy research: how to assess the risk of these outbreaks of major animal diseases and how to pay for a strategy which will benefit whole societies, as was seen by the costs of FMD in the recent UK outbreak. Thus, the Platform should also include a component on the economics of handling these risks. Such research would have to go beyond the traditional cost-benefit analysis and include social costs and consumer attitudes, including the animal welfare perspectives and the interest to involve public

resources in a field considered as an International Public Good.

This should provide the arguments for public investment in research and for finding mechanisms to pay for the private sector involvement in the production and maintenance of vaccine banks to respond quickly to outbreaks. These mechanisms could be handled at a national or regional level. Companies cannot be expected to deal with these issues in the usual way i.e. by selling each vaccine in doses. They should instead be involved in service contracts to provide risk mitigation at a certain price. This involves thinking quite differently about private and public roles in dealing with outbreak risk.

In a world of decreasing support for publicly funded development initiatives, strong coalitions are needed to build the confidence of the financial sector. These coalitions should work wherever possible to attract funds through sound proposals based on cooperation between key players to optimise the productivity of available resources. This requires consensus building between stakeholders.

Regarding the international collaborations that the EU Animal Health industry may have with institutions in the developing world, the most obvious category is technology transfer. It is feasible that the private sector in some developing countries could manufacture products under licence. A more important aspect in vaccine development will be in joint ventures with both the public and private sectors in developing countries. Developing country partners can bring local knowledge of the disease situation, the business context and the regu-

latory environment. The key inputs of the European partners would be in the research and development process. Partnership agreements and the resolution intellectual property rights will be important factors for success.

3.9 Regulatory Aspects

The impact of emerging technologies on discovery and development of new vaccines and diagnostic tests is clear. However tests of the resulting genetically based products pose immense challenges. Efficient new tests, methods and tools need to be developed to meet the safety, quality and efficacy standards. As a consequence, a shift in regulatory requirements for the authorisation of new vaccines and development of harmonised requirements for the approval of diagnostic tests may be required. A continuous dialogue between regulators, academics and the animal health industry is required in order to keep pace with the technological development and its application to disease control.

Unfortunately regulation can have a negative impact on innovation and those responsible for the development of products – particularly vaccines for epizootic animal diseases where the data and information required to justify an authorisation can be expensive and difficult to obtain. The regulatory rules in Europe and in each Member State are complex but with the new European legislation the authorisation processes for veterinary medicines are evolving. However further streamlining and improvements are needed in the processing of applications for the testing of GMOs.

It is apparent from the present situati-

on – which is mirrored in the medical field – that a number of issues need to be resolved in relation to the development of new tools for major animal diseases such as vaccines:

- The need for better implementation of the harmonised regulatory requirements among EU Member States for vaccines used to control epizootic diseases.
- Clear fast track facilities for Europe-wide marketing authorisations to be obtained for such vaccines.
- Improved communication of information providing an overview of the regulatory requirements to be available to academia and the SMEs.
- Improved involvement of the regulatory authorities as an integral part of the process from innovation to delivery.
- The need for epizootic animal disease vaccines to have marketing authorisations covering the 25 Member States.
- The need for diagnostic tests to be validated and independently approved in compliance with international standards to give confidence to countries and their traders using the tests.
- The need for better use of pharmaceuticals to limit and combat disease, especially in the face of resistance.

3.10 Conclusion

To meet these challenges Europe must develop and implement innovative solutions working in partnerships through the Technology Platform, which should have specific well-defined activities and outcomes.



4. The Way Forward: Developing a Technology Platform

4.1 Partnerships

The Platform brings together all the relevant stakeholders at EU and national levels. It will consist of networks involving a range of partners based around industry and including academia, animal production stakeholders, policy makers, consumers and other key partners including international organisations such as OIE and FAO, International Research Institutes such as ILRI and other countries. The driving force for the platform will be all the stakeholders working together.

A high degree of industry-academia collaboration is important, as it will improve access to expertise and result in shorter lead times to market for products. Collaboration is particularly important for the small biotech companies but even the larger companies benefit through access to academia and publicly funded research institutes. The platform should also create a competitive environment where many small players, both private and public, can obtain funding in smaller amounts to explore ideas.

This should be accompanied by broad funding for basic science with potential to provide new generic tools for vaccine and diagnostics development (pre-competitive research) on an agenda developed by not only the best minds of academia and commercial companies but also all the stakeholders including producers and consumers. This research would also support the development of effective regulatory approval processes.

4.2 Main activities

The key activities of the Technology Platform will be to:

- Prepare with all stakeholders a Strategic Research Agenda and associated implementation plan not only to identify the new and innovative solutions for veterinary vaccines development and diagnostic tests but, also to cover broader issues relating to global animal health and improved methods to control animal disease.
- Provide a European dimension to the plan, with the promotion of a coherent policy to develop co-ordination of research and stimulate cross-disciplinary collaboration throughout Europe.
- Ensure a research environment that stimulates innovation, backed up with a critical mass of research capability including a satisfactory infrastructure, adequate funding, capacity to react rapidly to new and emerging problems and produce the tools for existing animal disease problems including zoonoses.
- Identify mechanisms to mobilize public and private financial support for R & D from Member State private companies and investors.
- Enhance the transparency of R&D in Europe, the Member States, the regions, and locally.
- Mobilise and involve all stakeholders to develop more effective information networks, consensus on methods priorities and values, avoid duplication and ensure a critical mass of research through the collaboration of public – private partnerships.
- Maintain a competitive edge with industry working in partnership with academia, the public sector and regulators to develop and improve the ability to convert innovation into the delivery of practical tools for the control of animal disease.
- Ensure a supportive and harmonised regulatory framework that balances risk against need, working in agreement with all concerned as to the acceptable levels of risk. Identify constraints with respect to regulation which impact on the delivery and use of authorised products at the front line.
- Improve education, skills and training for those involved in the stages from innovation to application
- Establish an ongoing communication and dialogue process with the public to build confidence in the new technologies and raise awareness. Address public concerns to increase consumer confidence in the quality and safety of livestock products.



4.3 Platform Organisation

The Technology Platform will be industry led and enable all stakeholders including farmers to interact and contribute to the development of the long-term future. The involvement of all the key stakeholders as partners will be essential for the development of a shared vision and Strategic Research Agenda.

The Industry led Technology platform will provide:

- A process to manage the input and expectations of multiple stakeholders and promote understanding and consensus between diverse groups.
- A forum for all stakeholders to work together to create a common vision for the future of disease control and to address the constraints to the delivery of that vision.
- A mechanism for the development of a Europe-wide agreed Strategic Research Agenda for Global Animal Health with an implementation plan detailing priorities and milestones to ensure the vision will be achieved.
- A financial plan to mobilise public-private resources for collaborative R&D to meet the research and

development priorities.

The proposed Technology Platform will have 5 components:

- A Steering Council.
- An Executive Board.
- A Stakeholder Forum.
- Member State “mirror groups”.
- A Secretariat.

The Steering Council is at the core of the ETPGAH. It is a network connecting the platform to the major stakeholder and the pool of ideas. It will oversee the technology platform and act to move the platform forward. The precise role of the Steering Council will be published separately.

It is possible that not all stakeholders will be on the Steering Council. Membership of the Council should be a balanced and where appropriate there may be single representation from each of the main stakeholder groups. There should be around 25 members, with a quorum of two thirds. Membership of the Steering Council should include the key stakeholder organisations at a European level. Developing countries would be represented on the Steering Council by the OIE and the FAO, their research bodies and institutes would be represented by ILRI.

An Executive Board will be responsible for developing and administering the technology platform. The detailed role of the Executive Board will be published separately. It will comprise 7 members drawn from the Steering Council. This would include 1 member each from industry, users (vets and farmers), academia, research institutes, regulatory authorities and international organisations. In addition the Executive Board will be chaired by IFAH-Europe.

A Stakeholder Forum is essential as the active and committed involvement of all the stakeholders is vital to the success and credibility of any Technology Platform. The forum will be a multi-disciplinary consortium including industry, public and private research institutions, universities, public authorities, livestock, producers, civil society, consumers, funding bodies, third countries, international organizations (e.g. OIE, FAO,) and International Research Institutes (e.g. ILRI). There would be approximately 75 stakeholder members of the forum representing the major organisations with an interest in the platform.

For those who are not invited to participate at meetings of the stakeholder forum it will be essential to ensure good communication channels. A list of all potential stakeholders should be established and would include representatives from NGOs. The wider stakeholder base would be involved via email and the website. All documents should be available on the website for information and comment.

Member States: To be successful and allow coordination the Technology Platform will need the participation and commitment of the Member States. The interface between the Technology Platform and Member

States can be organised in a number of ways. These need to be explored to identify the most effective mechanisms (e.g. the use of mirror groups).

The Secretariat to support the platform is essential. This could be provided by industry and academia sharing the costs or by identifying a specific source of funding. The secretariat will deal with the administrative matters of organising and running the day-to-day arrangements for the platform.

Working Groups will be set up to elaborate the recommendations for the Strategic Research Agenda. The stakeholders will nominate their experts to these groups.

4.4 Outline for the Strategic Research Agenda

The Strategic Research Agenda will cover a period of 10–15 years which will allow long-term priority requirements to be identified as well as the potential funding from the public and private sector. The Strategic Research Agenda also needs to address the key issues of European competitiveness although the immediate purpose is to develop vaccines to prevent and control disease by using new technologies and making the most effective use of technologies currently available.

The detailed Strategic Research Agenda will need to be formulated by all stakeholders and will need to consider a range of requirements to meet the aims of the platform. A preliminary discussion among the High Level Group identified three potential areas for R&D. The initial suggestions were:

- Focus on R&D, which could provide a more evidence-based regulatory framework by developing bet-

ter diagnostic test methodologies. These would enable the effective assessment of the safety, quality and efficacy of new or modified candidate vaccines, diagnostic tests and medicines.

- Develop innovative technology leading to more effective vaccines
- Research into the basic immunological responses in all target animal species for different diseases.

Other suggestions included the vectorisation of antigens and focusing on vaccines inducing early immunity. It should also be recognised that vaccines are not the only tools and the development of pharmaceuticals including antibiotics and anti-virals should not be ruled out.

The initial discussions on the Specific Research Agenda (SRA) at the stakeholder forum on 24 February identified three main themes: Research, Technology Transfer, Horizontal issues. Cross cutting issues, which would need to build into a matrix with the three themes included, sustainability, competitiveness, security from bio terrorism, public health including food safety, food security and market access.

Other area for consideration include breeding for disease resistance and the potential use of advanced technologies for control of disease.

It was agreed that three working groups would be established to develop the research agenda for the three themes. Terms of Reference, mandates, membership and identification of the chair will be developed. Working groups will consist of about 25 people and would meet twice during the development of the SRA.

Nominations to Working Groups to be done by each organisation before end of March.

Throughout the SRA elements such as food quality, public health, food security, competitiveness, market access, sustainability and environment must be taken into account.

4.5 Roadmap and Milestones

The launch of the Technology Platform is the start of the activities. At this early stage the goal of the technology platform should be to bring together representatives of all interested stakeholders to cooperate to:

- Refine and finalise the vision.
- Determine the research requirements.
- Define a dynamic research agenda including the design and framework of EU and external alliances.
- Identify strategic priorities.
- Prepare and agree the Strategic Research Agenda.
- Develop an implementation plan with milestones.

Implementation plans will be developed to ensure the Strategic Research Agenda delivers the vision. Road maps will be produced with milestones that will need careful monitoring. The road map derived from the Strategic Research Agenda will be for all parties involved and for the private and public sectors to realise together. A mechanism will be needed alongside the support of the Steering Council to monitor progress and take action to terminate programmes if it becomes apparent that they will not deliver.

For further information on the European Technology Platform for Global Animal Health, please contact:



Mr. Declan O'Brien, Managing Director – IFAH-Europe
Tel +32 2 543 7569 – E-mail: Animaltp@ifahsec.org



Dr Isabel Minguez-Tudela – Research DG
Tel +32 2 299 21 09 – E-mail: Isabel.minguez-tudela@cec.eu.int

Dr Philippe Steinmetz – Development DG
Tel + 32 2 295 30 57 – Email: Philippe.steinmetz@cec.eu.int

Useful Web addresses

<http://www.ifah.be/Europe/EUplatform/platform.html>
http://www.europa.eu.int/comm/research/biosociety/index_en.htm
<http://www.cordis.lu/technology-platforms>

Printed by De Smet
Belgium

