



Transboundary threats to production, health and environment

THE ISSUE

Recent increases in the number of outbreaks of transboundary animal diseases (TADs)¹, plant pests and diseases and food safety hazards have raised public awareness of their potential impact on human health as well as on livelihoods, food security, national economies and global markets. These outbreaks have underlined the need to address such threats in a comprehensive approach, oriented to the entire food chain. Changing agro-ecological conditions, intensifying food production systems and the expanding global trade supplied by these systems increase the likelihood of animal and plant diseases and pests emerging and spreading farther and faster than ever before and of unsafe food reaching numerous consumers in distant markets. Threats from TADs and plant diseases are often related to improper policies in agricultural intensification, the movement of infected livestock, animal products and planting material within and across countries, the large scale global movement of people and genetic material and the effects of climate change.

For crops, the most threatening are outbreaks of locusts because of their sudden emergence, with little or no warning, triggered by changing ecological conditions, which favour explosive increase of the population. Such massive outbreaks find most countries ill-prepared. The desert locust is the best known example because of the speed at which outbreaks occur and the scale that infestations can reach when plagues become fully developed. Locusts may spread over about 30 million square km and affect as many as 60 countries. Several newly emerging fungal, bacterial and viral plant diseases have been threatening international trade but more importantly the food security and livelihoods of the poorest farmers globally. These include new aggressive strains of wheat rusts, new cassava virus diseases, army worm outbreaks, new aggressive fruit fly species and emerging banana diseases in Africa.

Governments could save billions of dollars by stepping up prevention and control of high impact animal diseases, plant pests and diseases and food safety incidents, some of which pose a direct threat to human health. Animal diseases invariably impact negatively on people's livelihoods and on economic development. Influenza viruses (e.g. H5N1, H1N1), foot-and-mouth disease, Rift Valley fever, African swine fever, *peste des petits ruminants* and rabies are diseases which recently raised particular alarm because of active spread. Various grasshopper species, armyworm, the red-billed quelea bird and some fruit fly species are among the most destructive transboundary plant pests in sub-Saharan Africa. Crop losses owing to armyworms are estimated to be 20 to 60 percent. Areas affected by quelea birds are expected to lose most or their entire cereal crop, and economic losses due to fruit flies are estimated to several million dollars per year. The recent global food safety incidents, such as hepatitis A contaminated green onions

¹ TADs include terrestrial and aquatic domestic and wildlife animals.

and semi-dried tomatoes, salmonellosis outbreak with peanuts, dioxin contaminated pork and melamine contamination of foods resulted in human morbidity and mortalities, trade disruptions and huge economic losses for all concerned. Emerging threats are also related to increased urbanization and strongly growing urban demand for meat, milk and eggs and the corresponding supply response by animal agriculture. The rapid growth and intensification of poultry production in East Asia translated into a five-fold increase in duck meat output between 1985 and 2000. In 2008, over 21 billion animals were produced for food globally, a figure expected to rise by 50 percent by 2020 to meet demand. The costs to animal and human health and to the economy at large from pathogens are expected to rise substantially over the next decades. The 2002-2003 severe acute respiratory syndrome (SARS) outbreak was estimated to have cost China, Hong Kong, Singapore and Canada around USD 50 billion, and the global cost of H5N1 Highly Pathogenic Avian Influenza (HPAI) was estimated in 2005 at over USD 10 billion, yet losses continue today – as do human fatalities in a few countries.

WHAT HAS FAO DONE?

The Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) was established in 1994 with the goal of enhancing world food security and fighting transboundary animal and plant pests and diseases, in particular desert locust and TADs. To contribute to the efforts to reduce the adverse impact of food safety emergencies on global food security and public health, EMPRES Food Safety was established in 2009 to complement the two previously established EMPRES groups in animal health and plant protection. The core principles of the EMPRES programme are:

- early warning
- early detection
- contingency planning
- early reaction
- promotion of environmentally sound control technologies
- close collaboration and partnership with affected countries, national and international agricultural research centres and other international institutions.

To streamline FAO processes for the prevention and management of crises along the food chain, the Food Chain Crisis Management Framework (FCC) was created in 2008 to address food chain crises of animal and plant pests and diseases and food safety origin, in a coordinated, integrated and multidisciplinary manner, under common coordination and governance mechanisms. The three EMPRES groups – animal health, plants and food safety – function within this framework along with related operations, communication, legal and other relevant services within FAO including the networks of decentralized offices.

Through the **Food Chain Crisis Management Framework (FCC)**, FAO addresses the risks to the human food chain in an integrated and interdisciplinary manner. The FCC supports FAO member countries in the global governance of threats to the human food chain at all stages from production to consumption. It addresses the risks to the human food chain, such as the increasing number of outbreaks of TADs (terrestrial or aquatic), plant pests and diseases (agriculture and forest plants) and food safety hazards, having an impact on human health and livelihoods, food security, national economies and global markets. The FCC integrates prevention of and preparedness to emerging threats to the food chain, long-term risk analysis, risk communication and rapid-, medium- and longer-term response to potential or verified emergencies threatening the food chain.²

The FAO HPAI Global Programme has been supported by donors to the extent of more than USD 350 million and was implemented through over 170 projects, actively involving more than 130 beneficiary countries. More than sixty countries have been affected since 2004, but sustained coordinated action supported by FAO, has progressively reduced this number to five countries (Bangladesh, China, Egypt, Indonesia and Viet Nam) where the virus is considered endemic, but sporadic outbreaks still occur in a few others. This was achieved by assisting national veterinary services to develop preparedness and contingency plans, improve surveillance systems, acquire laboratory resources and disease diagnostic

² DGB No.2010/24 Rev.1.

capacity, develop response capabilities, promote biosecurity along production and value chains, coordinate with public health authorities and support public-private cooperation. The programme has limited the impact of the disease and established stronger national systems and regional coordination for disease preparedness, prevention and control. These improvements have led to reductions of outbreaks of H5N1 HPAl in poultry and in the number of human cases. The programme has also increased awareness of the importance of livestock for livelihood support and economic development and the relevance of veterinary systems to protect human health.

Global Rinderpest Eradication Programme

Rinderpest does not affect humans directly, but it is lethal to cattle and buffalo and numerous wildlife species. Death rates during outbreaks can approach 100 percent. FAO spearheaded a decades-long programme to assist countries to isolate and eliminate rinderpest in its last remaining pockets. The last outbreak was reported in 2001 in Kenya, and FAO concludes that all rinderpest virus lineages are extinct in domestic and wild animals. Most countries are now internationally recognized as rinderpest-free and in October 2010, FAO's Director General announced the end of field operations prior to a full announcement of eradication in mid-2011. After smallpox in humans, this will be the second time in history that a disease has been eradicated worldwide.

FAO initiated a series of global meetings on animal health in the 1980s, which culminated in the launch in 1994 of the Global Rinderpest Eradication Programme. FAO worked closely in partnership with key international organizations, including the World Organisation for Animal Health (OIE) and the African Union – Interafrican Bureau for Animal Resources (AU-IBAR) among others. FAO acted as the coordinating Secretariat and channelled significant technical assistance to countries to help them address outbreaks and put in place the systems and measures needed to remain free. FAO, through its joint programme with the International Atomic Energy Agency (IAEA), developed and transferred new diagnostic technology, and together with OIE, established performance indicators to assess the programme's progress.

FAO estimates that additional production owing to rinderpest eradication in India alone, from 1965 to 1998, amounted to USD 289 billion. The benefits in Africa have been estimated at around USD 1 billion per year during the same period.

Transboundary Aquatic Animal Diseases (TAADs)

One of every two fish produced comes from aquaculture, now growing faster than any animal food producing sector with millions of people depending on it directly or indirectly for food and nutritional security and livelihoods. The sustainability of the sector is threatened by TAADs that has been introduced and spread through irresponsible and unregulated global movement of live aquatic animals. Recent examples include the epizootic ulcerative syndrome (EUS), which has recently expanded its geographic range to Africa affecting both wild and cultured populations. Koi herpesvirus (KHV) continues to spread affecting the important food fish common carp and the high value ornamental koi carp. Infectious salmon anaemia has devastated many salmon producing countries. Infectious myonecrosis virus (IMNV), originally reported only from Latin America and now in Asia, is threatening the white shrimp aquaculture industry in Asia. The disease situation in aquaculture is changing rapidly in an unpredictable way as a result of the current period of rapid change in the international trading environment. The devastating impacts of TAADs include direct production losses, increased operating costs, restrictions on trade and impacts on biodiversity and threats to livelihoods, food security and nutritional well-being of fishfarming communities. Managing aquatic animal health and biosecurity in aquaculture is particularly challenging because of the dynamic and complex nature of the aquatic environment and the great diversity of the aquaculture sector in terms of species cultured, the range of culture environments, the nature of containment, the intensity of farming practices and the variety of culture and management systems. Once a pathogen or disease agent has been introduced and becomes established in the natural aquatic environment, there is very little or almost no possibility for neither treatment nor eradication; therefore prevention is the best strategy.

FAO works to reduce risks from aquatic animal diseases by building capacity to prevent their introduction. This includes promoting responsible movement of aquatic animals through effective national strategies, national policies and regulatory frameworks as basis for enhancing compliance with regional and

international treaties and instruments; applying risk analysis to support timely assessment of threat/s from new or expanding species; surveillance programmes and diagnostic services to detect and identify the emergence and spread of diseases; emergency preparedness through rapid and timely response; empowering and educating farmers with information and tools such as better management practices, simple and practical biosecurity measures at farm level, organization into clusters; and use of vaccination as a prevention tool. Assistance provided by FAO to member states includes technical assistance to KHV outbreak in Indonesia, emergency response to EUS incursion in southern Africa and an ongoing assistance on IMNV containment and contingency plan to Asian countries.

Desert Locust

FAO has supported the strengthening of the preventive desert locust management capacity of 18 locust-affected countries in Africa and the Near East to minimize the risk of desert locust plagues. The EMPRES Desert Locust programme is reinforced by FAO's Desert Locust Information Service, which monitors locusts and environmental conditions on a daily basis and provides forecasts, alerts and early warning to member countries. FAO has succeeded in reducing the response time to the onset of locust emergencies by 60 percent, thereby contributing to more effective emergency prevention at a reduced cost.

Countries in the Red Sea region and development partners, which invested USD 18 million since 1997 in locust crisis prevention and preparedness, successfully prevented desert locust upsurges from developing into a plague in 2003 and again during the period 2007-2009. This was not the case for the countries in North and Northwest Africa when the upsurge started in 2003. As a result, these countries had to spend around USD 400 million to bring the upsurge under control in 2005.

Locust control in Timor-Leste

In March 2007, a locust outbreak was developing in the most important maize and rice growing region of Timor-Leste, and increasing numbers of locusts were damaging crops, leading to an estimated 75 percent reduction in the maize production. Because of the difficult terrain, control operations had to be carried out mostly by air, but the presence of major water courses in the area impeded the spraying of conventional chemical pesticides. Consequently, FAO and the Timor-Leste Ministry of Agriculture approved the use of a biopesticide (formulated with the spores of a fungus specific to locusts and grasshoppers) to be applied from an helicopter: from mid May to June 2007, 56 high-density adult swarms covering more than 2 300 hectares were controlled during aerial spraying operations supplemented by some ground treatments. The locust outbreak was stopped, and the crop protected. It was a successful demonstration, and the first one in the framework of an emergency situation regarding the role that biopesticides can play in areas impacting directly on rural communities and aquatic environments.

Locust control in Eastern Africa

In 2008, aerial surveys undertaken by the International Red Locust Control Organization for Central and Southern Africa (IRLCO-CSA) detected an unusual increase of Red Locust, *Nomadacris septemfasciata* population. The extent of the infestation was greater than the last major upsurge in 1994-96 because outbreaks took place simultaneously in three countries: Malawi, Mozambique and Tanzania. This situation posed an immediate threat to marginal and small-scale agricultural production in the whole region. Around 15 million people of the Democratic Republic of the Congo, Kenya, Uganda and Zimbabwe were extremely vulnerable and at risk to additional livelihood-threatening shocks. An unchecked Red Locust plague would have added to the prevailing humanitarian crisis in the region. It was, therefore, crucial to launch intensive survey and control operations by no later than May 2009. A full locust campaign against adult Red Locust swarms was launched and conducted from 22 May to end of July 2009 in western Tanzania. To avoid long-lasting harm to many unique non-target species, the operation included the use of the biocontrol product, Green Muscle®, for the first time at an operational scale in ecologically rich and diverse areas in Africa, such as the Ikuu wetlands of the Katavi National Park. The move towards the use of a biopesticide was enthusiastically supported by the Tanzanian National Park Authorities and fully accepted by IRLCO-CSA and the Government. The overall control programme was successful. The early intervention and timely

response prevented a major humanitarian crisis stemming from the Red Locust in Central and Southern Africa. No crop losses were detected or reported, and no major swarms escaped from any of the outbreak areas in Malawi, Mozambique or Tanzania, following the commencement of control activities.

FAO Wheat Rust Diseases Global Programme

Several new strains of the wheat rust fungus have recently evolved and spread through the wind to new countries and continents. The new virulent strain of a fungal disease, wheat stem rust (Ug99) was first characterized in East Africa in 1999. This strain is virulent to over 80 percent of all wheat varieties grown globally and could cause devastating crop losses if its spread is not prevented. Since its emergence, it has been reported in Ethiopia, Iran, Kenya, South Africa, Sudan, Uganda, Yemen and Zimbabwe. Rust spores are highly mobile being wind-borne or accidentally carried by humans. Similar monitoring mechanisms to those successfully used for desert locusts are now being applied to Ug99 with FAO coordinating a global rust monitoring network and information system. The regions of Eastern Africa, the Near East and Central and South Asia at immediate risk account for some 37 percent of global wheat production. The cultivation of high yielding wheat varieties with a similar genetic base for disease resistance has favoured the development of large scale epidemics. The same regions are now also at risk from new aggressive strains of yellow rust. These new strains pose a risk to millions of hectares of wheat from North Africa to South Asia. Several countries are now experiencing severe disease outbreaks.

Through its Wheat Rust Disease Global Programme (WRDGP) initiated in 2008, FAO is promoting global action to reduce the world's vulnerability to emerging wheat rust diseases and facilitate a sustainable international system to reduce the threat of these diseases. The WRDGP covers 29 countries in East and North Africa, the Near East and Central and South Asia. The Programme is focusing on supporting national policy for preparedness and contingency planning, surveillance and early warning, improved national wheat registration programmes for release of resistant varieties, seed multiplication and distribution systems of resistant varieties and on improved wheat rust management at the field level through farmers' training.

National Food Safety Emergency Response Planning

Food contamination events with global public health, socio-economic and trade impact have occurred many times in recent years. Food safety threats pose a tremendous challenge to developing countries, many of which are only in the process of building their food safety system. Therefore, many member states have requested a technical assistance in strengthening preparedness starting with the development of national food safety emergency response plans. FAO and the World Health Organization (WHO) jointly conducted an expert meeting to develop the framework document, entitled "FAO/WHO framework for developing national food safety emergency response plans," which was published in 2010.

FAO and WHO convened a subregional workshop for Southeast Asia, involving 13 countries, using the document to train the relevant national food safety authorities. Furthermore, at the FAO/WHO Global Meeting of the International Food Safety Authorities Network (INFOSAN), the document and a seminar on the key elements of the framework, which are reinforcing preparedness and recognizing and responding rapidly to food safety emergencies were provided to many other countries. Upon several members' requests, the concrete follow-ups are being conducted to start developing and implementing the plans at national level.

International Food Safety Authorities Network (INFOSAN)

INFOSAN is a global network of national food safety authorities, managed jointly by FAO and WHO with the secretariat at WHO and the focal point in FAO as one of the three pillars (early warning, emergency prevention and rapid response) of EMPRES Food Safety. This is why it is essential that the early warning activities are conducted through INFOSAN Network. WHO's access to public health information facilitates obtaining and disseminating food safety information from and to government public health agencies. FAO is in a unique position with its decentralized structure and strong cooperation with government agriculture agencies to contribute to the efforts in managing international food safety incidents by obtaining and sharing food production-oriented information related to the concerned food safety incidents.

Through its efforts to substantially contribute to INFOSAN, EMPRES Food Safety achieves the key objective in providing early warnings of food safety threats to the member countries. Since the official endorsement of the EMPRES Food Safety programme in November 2009, FAO has increased significantly the level of

engagement with INFOSAN, which has resulted in better and more effective communication with FAO members on food safety emergencies.

WHAT NEXT?

EMPRES has served as the leading international organization on technical issues related to preparedness and response to HPAI, rinderpest, desert locust, global food safety emergencies and other diseases and pests. Its strengths are its ability to work across borders; the depth and breadth of expertise in food and agriculture; its proven track record of experience in animal health, including disease management and control; emergency prevention and preparedness; and its strong and effective leadership, as highlighted in the rinderpest campaign. The successful management model on transboundary threats will be adapted to other emerging threats in the future.

FAO, OIE and WHO have agreed to enhance their collaboration for more effective detection and control of high impact diseases, known and new, zoonotic and non-zoonotic. Drawing on the Organization's past experience in animal health emergencies, FAO can make a key contribution to the prevention and global response to disease outbreaks and to the management of risks of disease emergence, including improving knowledge of disease-emergence drivers in agricultural production and in associated ecosystems.

Animal Health

The Regional Animal Health Centres (RAHCs) established by FAO and OIE in the context of the Global Response to avian influenza in 2006-2007 are pivotal in engaging countries in target regions in the detection, surveillance, prevention and control of such diseases. RAHCs, which combine the expertise of FAO's multidisciplinary Animal Health teams, with OIE and regional organizations, are recognized as making a key contribution to global and regional efforts to safeguard animal health and livelihoods from the threat of infectious diseases and mitigating the risk to public health arising from animal sources.

The maintenance and further operation of FAO teams at the the RAHCs – in Africa, Middle East, Asia and Latin America - is crucial for effective strengthening of national efforts and regional coordination of such efforts to contain the impact of these transboundary threats. Substantial voluntary contributions (estimated at USD 39 million for RAHCs and FAO headquarters over a three-year period) are required to support these centres and for enabling the Animal Production and Health Division to deliver on its function as agreed in Strategic Objective B (Increased sustainable livestock production – Reduced animal disease and associated human health risks) and contribution to other relevant Strategic Objectives (on food safety or response to emergencies).

Key coordinated activities include:

- enhancement of disease early warning and detection systems;
- strengthening of capacity for surveillance and response;
- identification and assessment of disease drivers in food animal production and natural resource management;
- strengthening of the capacity of public veterinary services in preparation, prevention and response to animal disease occurrence;
- assessment of the social and economic impact of diseases;
- coordination with public health systems; and
- associating private sector stakeholders with public sector action in livestock and wildlife health.

Plant Protection

In 2009, FAO undertook the initiative to address the challenges of large-scale emergencies emanating from various transboundary plant pests beyond the desert locust and wheat rust more effectively. This initiative is based on the desert locust experience with the aim to strengthen the national and regional early warning systems and to enhance preparedness and networking among affected countries and regions. In this regard, FAO prepared programme concepts to address other emergency plant pest issues than locusts in West Africa, and Eastern and Southern Africa in a more comprehensive and holistic manner and also

started a programme to manage various locust species in the Caucasus and Central Asia. The expanded EMPRES Plant Protection programme is leading international, regional and national efforts in preparedness and management of transboundary plant pests critical to food security. EMPRES Plant Protection ensures that plant pest preparedness plans and transboundary pest management activities are coordinated through a multi-institutional and multi-disciplinary forum covering policy development and capacity building activities at the regional, national and local levels.

Food Safety

EMPRES Food Safety has set up a framework for horizon scanning activities to monitor low key signals and indicators for emerging food safety issues. The signals may include changes in food consumption trends, shifts in climate and other environmental patterns, or identified vulnerabilities in the food chain, including high-risk food handling practices. In the framework, trend analysis and data/information collection are identified as key activities to prioritize food safety threats. This data can be fed directly into INFOSAN system to provide early warnings. Also following the published national food safety emergency response planning tool, a series of guidance documents will be developed to complete the set of preparedness plans.

In order to carry out the activities according to the framework and roadmap of EMPRES Food Safety, extrabudgetary contribution to the efforts is essential. Key activities for the immediate future include:

- Develop horizon scanning system for emerging food safety issues (include in kind contributions and capacity development to generate food safety surveillance data and early warning in developing countries).
- Engage with and strengthen INFOSAN to provide early warning of international food safety threats and develop a modern early warning IT platform.
- Hold expert consultations (emerging food safety issues, prioritization, trend analysis) and publish a list of research needs to fill knowledge gaps to better prevent food safety threats from occurring.
- Develop tools and provide advice and assistance to member countries to build resilience to food safety emergency: implement food safety emergency preparedness plans, risk analysis in the context of emergencies, traceability and food recall.
- Support countries to effectively implement preparedness tools and guidance as a key element of future capacity development programmes.

PARTNERSHIPS

FAO works through a collaborative, cross-sectoral, multidisciplinary approach, which uses regional and country-customized mechanisms towards the progressive control of high impact animal diseases and plant pests. Technical departments work closely with international and local academic and research institutes, numerous FAO Reference Centres, regional organizations, relevant ministries and a vast array of international and local NGOs.

EMPRES activities are crucial for food security and food safety.