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FAO takes a close look at the threat of African swine fever introduction into Eastern Europe

Complementing the recent European Food Safety Agency (EFSA) scientific assessment of the African swine fever (ASF) risk for Europe, the Food and Agriculture Organization of the United Nations (FAO) has undertaken analyses to explore some general patterns in the distribution of pigs, swine production systems and wild boar in Eastern Europe (page 2).

EMPRES-i (EDITED)

Progressive spread of ASF in the Caucasus and Russian Federation from 2007 to September 2010

Swine Teschovirus encephalomyelitis in Haiti

JULIO PINTO (FAO)

Pigs affected by swine Teschovirus encephalomyelitis in Haiti

The appearance of porcine Teschovirus 1 (PTV-1) in Haiti has had negative impacts on swine production systems and, particularly, on the food security and livelihoods of smallholders in rural areas of the Artibonite Valley. The Minister of Agriculture, Natural Resources and Development has requested technical assistance from the FAO/World Organisation for Animal Health (OIE) Crisis Management Centre for Animal Health (CMC-AH), to assess the situation of the disease and to make recommendations for its prevention and control (page 18).

Overview of foot-and-mouth disease in Asia (January to September 2010)

In 2010, foot-and-mouth disease (FMD), an extremely infectious viral disease of cloven-hoofed animals, continued to affect many countries in Asia. The disease is endemic in a number of Asian countries and has entered and spread quickly in previously FMD-free countries in the region, including the Republic of Korea and Japan (previous occurrences in 2002 and 2000, respectively). In Taiwan Province of China, FMD outbreaks have been reported since February 2009, following the Province's previous FMD occurrence in 2001 (page 23).

SHERRILYN WAINWRIGHT (FAO)

Murrah buffaloes at a smallholder farm, Nepal

AND...

African swine fever

FAO takes a close look at the threat of African swine fever introduction into Eastern Europe, specifically Ukraine

Complementing the recent European Food Safety Agency (EFSA) scientific assessment of the African swine fever (ASF) risk for Europe (EFSA, 2010a), the Food and Agriculture Organization of the United Nations (FAO) has analysed the distribution of pigs, swine production systems and wild boar in Eastern Europe. In July 2010, a multidisciplinary FAO team visited Lugansk Oblast, Ukraine's easternmost province, to acquire a better understanding of the backyard/smallholder pig production subsector and the management of wild boar populations, and to assess their potential role in the introduction, spread and persistence of ASF in Ukraine.

JON SPAULL (FAO)

Woman farmer holding piglet, Armenia

About the virus and the disease

ASF is a viral infection of pigs that is transmitted mainly through the oro-nasal route after contact with excretions from infected pigs or through ingestion of pork or other contaminated products (swill and waste) containing the virus. In areas where competent vectors belonging to the soft tick *Ornithodoros* genus exist, transmission via these vectors can influence virus persistence. Feral pigs (escaped domestic species) and European wild boar (*Sus scrofa*) are equally susceptible to ASF, and it is very difficult to eliminate the infection once it becomes endemic in these populations. Humans are not susceptible to ASF infection.

In a suitable protein-rich environment, the ASF virus is stable over a wide range of temperatures and pHs (1.9 to 13.4). As a result, putrefaction, the meat maturing process, freezing and thawing do not necessarily inactivate it. The agent is relatively stable in excretions, carcasses, fresh meat and some meat products; for example, ASF virus may remain infective for at least 11 days in faeces, for months in bone marrow, for 15 weeks in chilled meat (and probably longer if frozen), and for three to six months in cured hams and sausages that have not been cooked or smoked at a high temperature. This has very important implications for the spread of ASF. Undercooked, dried, smoked and salted pork, blood, carcasses and carcass meal are potentially infective if fed to pigs and/or discarded in communal waste sites where pigs may feed.

There is no treatment or vaccine against ASF, so the most effective protection for ASF-free areas is to prevent introduction of the virus. Once established, ASF is very difficult to eliminate and can have a very severe socio-economic impact on people's livelihoods and food security, as well as on international commercial trade. In areas where the infection occurs, pig production is sustainable only through adopting biosecurity measures on individual holdings or through certifying and maintaining ASF-free zones or compartments (compartmentalization and zoning).

ASF virus strains differ in virulence, leading to acute, sub-acute and chronic forms of ASF. Following infection with the strain currently circulating in the Caucasus and southern parts of the Russian Federation, which is closely related to virus strains from southeast Africa (Madagascar, Mozambique and Zambia), case fatality may approach 100 percent. With this severity and the clear clinical/pathological signs, ASF outbreaks are unlikely to be missed.

The disease is endemic in domestic and wild porcine species in most of sub-Saharan Africa and on the Italian island of Sardinia in the Mediterranean Sea. Outbreaks of ASF in the Caucasus region were first reported in 2007 and the disease has since spread across the south of the Russian Federation, where pig density is high, and very close to the borders with Ukraine and Kazakhstan.

Current dynamics of ASF and introduction pathways into non-infected countries/areas

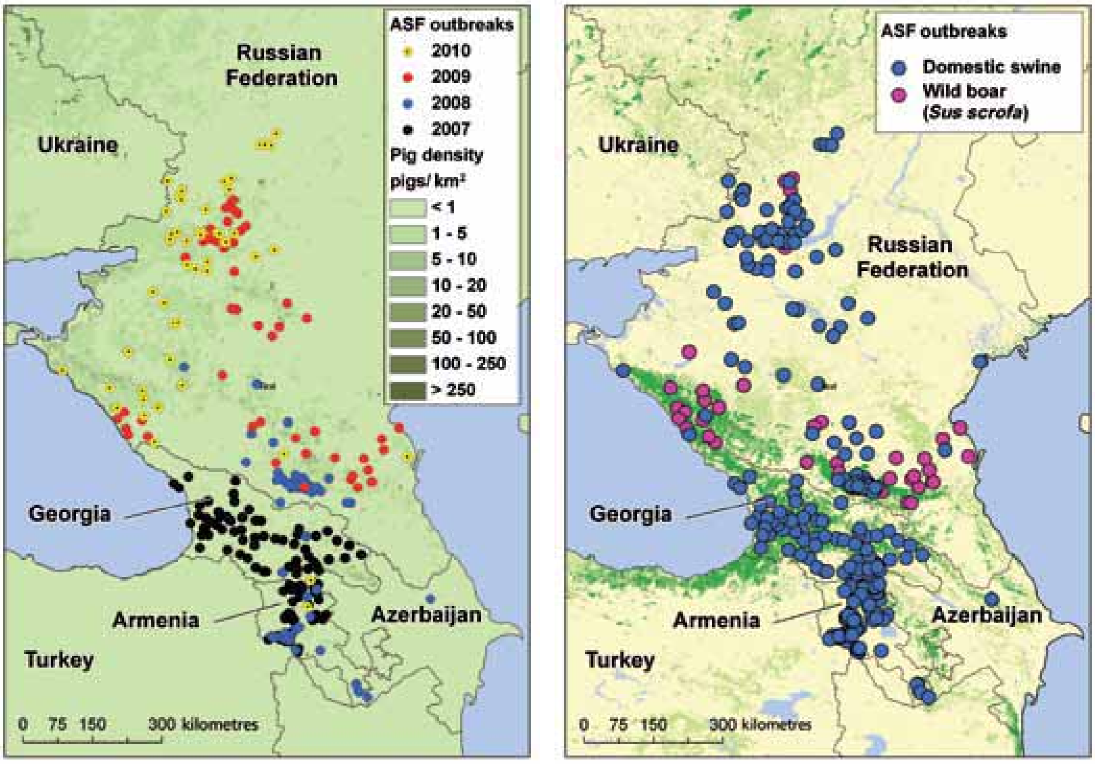
Current dynamics

Earlier indications of ASF dynamics in the Caucasus region (FAO, 2008) and southern parts of the Russian Federation (FAO, 2009) suggest that in areas where smallholder pig production is common, ASF spreads progressively along trade routes, occasionally infecting wild boar (Figure 1). This spread can occur very rapidly, as in the southern Caucasus region. The spread of ASF in the southern Russian Federation – at an average rate of 350 km a year, mainly north- and westwards – and its encroachment (with over 150 reported outbreaks) are believed to be associated with the movement of pigs and pig products within the smallholder/backyard sector. Smallholder/backyard pig production operations have been involved in more than 75 percent of outbreaks reported to the World Organisation for Animal Health (OIE), although commercial farms have been increasingly affected since May 2010. Infected wild boar have also frequently been found, with 47 events reported to OIE across nine oblasts/regions in the Russian Federation. These events involved 128 wild boar, of which 110 were found dead and some live animals tested positive without apparent clinical signs. Several factors are likely to have an impact on the spread of disease: the practice of feeding pigs with household/kitchen waste; the presence, during much of the year, of free-roaming pigs that may feed on contaminated waste or come into contact with infected wild boar or other free-roaming pigs; and the lack of effective compensation, which deters pig keepers from reporting the disease.

Several factors are likely to have an impact on the spread of the disease

Several issues should be taken into account when assessing a swine population's capacity to sustain the circulation and propagation of ASF. In the absence of *Ornithodoros* ticks, maintenance of this highly lethal ASF viral strain in domestic pigs depends mainly on the existence of sufficiently large, continuous populations of hosts (pigs and wild boar), in high densities and with high reproductive or turnover rates, to ensure the constant availability of naïve hosts for new infections and further spread. However, stored infected pork products may act as a reservoir, causing the disease to reappear whenever these stored products are retrieved for human consumption and food scraps are fed to pigs. Formal and informal movements and mar-

Figure 1: Spread of ASF in the Caucasus and the Russian Federation, 2007 to September 2010



The left-hand map shows the spread by year, with total pig population density as background. The right-hand map shows the spread by species affected, with forest cover as background.

Note: Outbreaks in Orenburg and Leningrad Oblasts in the Russian Federation are not shown on the map because they are distant from the Caucasus region. *Sources:* Data on ASF outbreaks from WAHID (OIE) and EMPRES-i (FAO); data on pig densities from Gridded Livestock of the World: www.fao.org/ag/againfo/resources/en/glw/home.html; and data on forest cover from EROS Data Center of the United States of America.

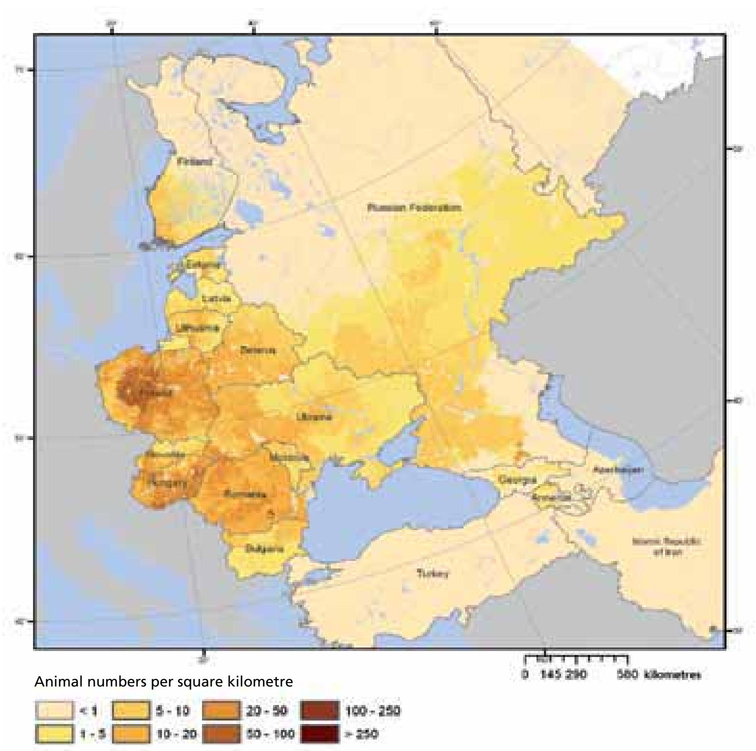
keting of pork products (especially those originating from backyards), pork processing and consumption patterns at the household level, and the use of household waste by pig keepers are therefore of great importance to the maintenance of ASF.

Regarding ASF transmission and maintenance through soft (*Ornithodoros*) ticks, the geographical distribution of these ticks within the region is unclear. *Ornithodoros* ticks feed mainly on animal species such as rodents and reptiles that live in burrows. Pigs are predominantly accidental hosts, and the tick/pig infection cycle may become important only when pigs are kept in old shelters/sties with cracks in the walls where ticks can hide. Wild boar have never been found infested by *Ornithodoros* spp. (EFSA, 2010b). In the current situation, the role of ticks in disease transmission is considered negligible.

Introduction pathways

The critical question now is how ASF could enter non-infected countries in Eastern Europe or even Asia (Figure 2). Introduction into the pig sector is most likely to occur in smallholder premises, which include backyard holdings and small commercial farms, where awareness is low, biosecurity measures weak and there is poor compliance with animal health regulations governing home slaughter, swill feeding, movement control, reporting of suspected cases, farm registration, animal identification and traceability, etc. Moreover, ASF prevention and response at the smallholder level is a challenging task for veterinary services because of lack of precise information about the location and numbers of smallholder premises and about practices such as home slaughter, processing and the associated consumption patterns, as well as the trade flows of live pigs and pork products. Large-scale commercial pig farms, with their higher awareness, biosecurity and compliance with regulations, are less vulnerable to ASF introduction and more likely to control the disease effectively if prevention fails. However, the implications for disease spread from an unreported ASF outbreak on a larger farm are far more serious than they are from an outbreak in the backyard sector.

Figure 2: Modelled pig distribution in Eastern Europe



Sources: Figures have been adjusted for the first administrative level (oblast) in the European part of the Russian Federation (2010), Ukraine (2010) and Belarus (2008); and for the national level in Moldova (2009), Lithuania (2007), Estonia (2007) and Latvia (2008). Official statistical data sources are listed in the reference section. Data for other countries were provided by FAOSTAT.

The most probable pathway of introduction and further spread in a previously non-infected country or region is through the (mostly informal) movement of contaminated pork and other pig products, followed by swill/scrap-feeding of pigs, mainly in smallholder settings, or discarding of food leftovers at communal waste sites, where feral and free-roaming pigs or wild boar may feed. These informal movements of pork products can be either small quantities transported by individuals for personal consumption or larger quantities smuggled for trade purposes. In the Russian Federation, the detection of ASF virus in Orenburg Oblast (near Kazakhstan) in July 2008 and in Leningrad Oblast (near Estonia and Finland) in October 2009 clearly demonstrated how the transportation of pork can result in long-distance dispersal of ASF. As ASF becomes established in southern parts of the Russian Federation, and possibly beyond, virus dispersal by people carrying pork products will increase in importance, particularly if commercial pig production chains become infected. Commercial meat products have already been implicated as the major mechanism in the rapid propagation of disease in Rostov Oblast in 2009, when infected pigs from an affected farm entered local market chains, resulting in a number of outbreaks in backyard holdings that were feeding swill containing commercially available pork products (Vlasov, 2009).

JON SPAULL (FAO)

A veterinarian from the local farmers' association inspecting a piglet with the help of a Telefood beneficiary

The movement of live pigs is believed to be less important as a channel for ASF introduction into a non-infected country or area, because the ban on importation and movement from ASF-infected countries or areas is easier to enforce on live pigs than it is on pork. However, once ASF is introduced into a disease-free country or area, the spread through live animal movement becomes more important, particularly involving ASF-incubating animals, but also carrier animals that have survived infection.

Although not fully understood, the role that wild boar may play in the introduction, persistence and spread of the virus must be considered and further investigated, particularly in areas where both free-range pigs and wild boar abound. Infected wild boar could transmit ASF to domestic pigs, either through direct contact with mainly free-ranging pigs, or indirectly through the feeding of (hunted) wild boar offal or meat scraps to pigs. ASF-positive, usually dead, wild boar have frequently been reported in the Russian Federation. Whether these are spill-overs of the infection in domestic pigs or the result of wild boar populations maintaining the disease is still subject to debate. The spread and persistence of the ASF virus within the wild boar population through animal-to-animal transmission is improbable because of the high lethality of the pathogen, the generally very low density of wild boar (Figure 5) and the high fragmentation of suitable habitats. Although the majority of infected animals would most likely be killed rapidly by the disease, ASF virus can survive in carcasses for a long time, and can even over-winter in frozen and snow-covered carcasses. The virus may also remain viable in improperly disposed of ASF-infected domestic pig carcasses. Wild boar could then become infected when scavenging these contaminated carcasses, a characteristic behaviour for this species, particularly during the cold months when food is scarce.

The host distribution in the region

In the parts of the Russian Federation that border Ukraine, where some of the latest ASF outbreaks have been reported, backyard pig production is common and accounts for more than 50 percent of the total pig population. On the Ukrainian side of the border (in Lugansk, Donetsk and Kharkiv Oblasts), backyard pig numbers are the lowest in the country; they increase from the industrialized east to the west of the country (Figure 4), where the human population is predominantly rural. In central and western parts of Ukraine, backyard pigs are three to ten times more abundant than commercial pigs.

Commercial pig distribution is almost the reverse of that of backyard pigs, with low density on the Russian side of the border, where ASF outbreaks are being reported, and high density in Ukraine's Lugansk Oblast, which extends westwards along a central band in the eastern half of the country. The lowest commercial pig densities in Ukraine are reported in the southern and northern provinces (Figure 3). Commercial pig production plants are prominent in the Russian oblasts north of Ukraine (particularly Belgorod Oblast), Belarus and the countries further west (the Baltic countries, Poland, Hungary and Romania).

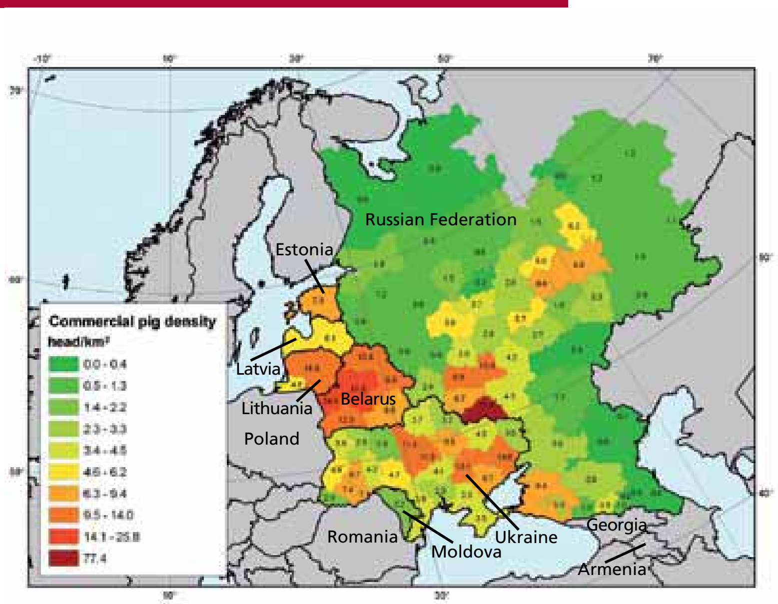
The highest wild boar densities are reported from the southernmost part of the Russian Federation in the Caucasus, where ASF has been reported repeatedly in wild boar, and in the Baltic countries, Belarus and northwestern oblasts of the Russian Federation (Figure 5). Control of ASF would become more complicated if wild boar became infected in these latter areas, where they are widely distributed (sometimes overlapping with backyard pig distribution) and where seasonal movements of wild boar may occur, including the crossing of international boundaries. In the rest of the region, wild boar densities are generally very low, and wild boar habitats are usually highly fragmented and restricted to mountainous woodlands that are large enough to support the animals' year-round survival.

Case study: Lugansk Oblast in Ukraine

Lugansk Oblast, where an FAO mission took place in July 2010, is the easternmost oblast of Ukraine. It is expected that many of the basic characteristics of smallholder pig production and associated commercial activities commercialization found in this oblast will be replicated in the rest of the country. Lugansk Oblast is considered to be at high risk of ASF introduction despite having some of Ukraine's lowest populations and densities of swine (both backyard and commercial) and wild boar (Figures 3, 4, 5 and 6). The oblast shares an 800-km long border with the Russian Federation, mainly with Rostov Oblast, where more than 47 percent of Russian ASF outbreaks reported in 2010 occurred. Several of these outbreaks were reported from less than 10 km away from the Lugansk border; a village in Lugansk Oblast fell within the

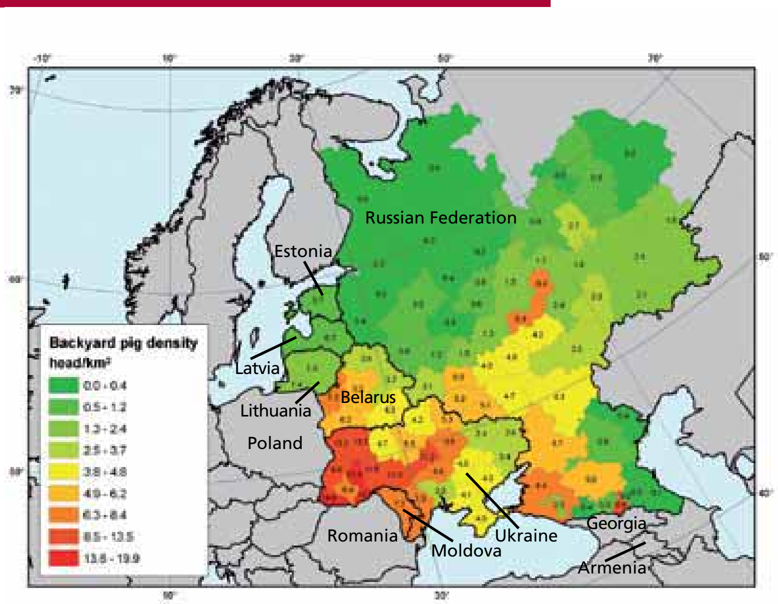
Lugansk Oblast is considered to be at high risk of ASF introduction

Figure 3: Density of commercial pigs in Eastern Europe



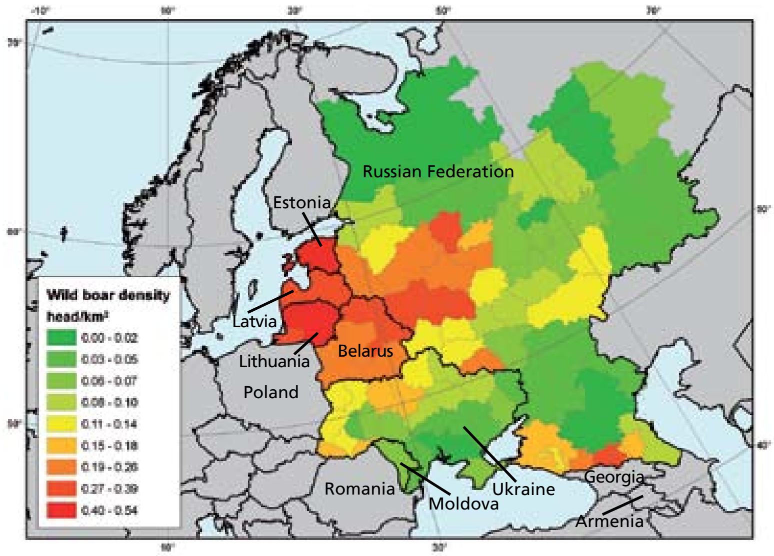
Sources: Data are for the oblast level in the European part of the Russian Federation (2010), Ukraine (2010) and Belarus (2008); and the national level in Moldova (2009), Lithuania (2007), Estonia (2007) and Latvia (2008). Official statistical data sources are listed in the reference section.

Figure 4: Density of backyard pigs in Eastern Europe



Sources: Data are for the oblast level in the European part of the Russian Federation (2006), Ukraine (2010) and Belarus (2008); and the national level in Moldova (2009), Lithuania (2007), Estonia (2007) and Latvia (2008). Official statistical data sources are listed in the reference section.

Figure 5: Density of wild boar in Eastern Europe



Sources: Data are for the oblast level in the European part of the Russian Federation (2010, 2006), Ukraine (2010) and Belarus (2008); and the national level in Moldova (2009), Lithuania (2007), Estonia (2007) and Latvia (2008). Official statistical data sources are listed in the reference section.

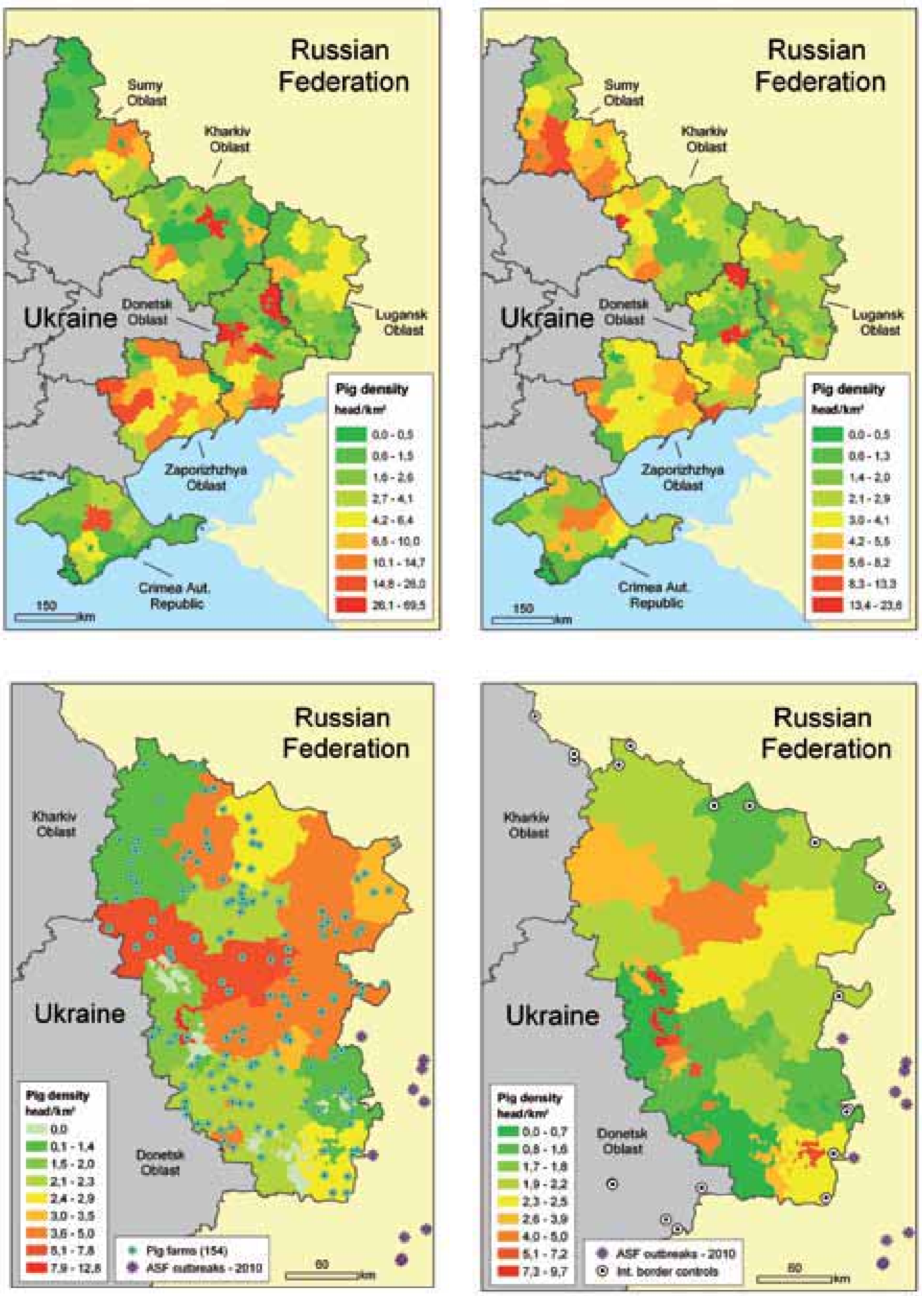
control zone (Figure 6) of one ASF outbreak in February 2010 and was put under movement restrictions for a month.

Effective control of the border with the Russian Federation is challenging. The border is very porous and towns such as Melovoe spread into both countries. Informal imports of small amounts of pig products by individuals are very likely to occur and nearly impossible to control. Moreover, current legislation allows the import of foodstuffs of up to 50 euro in value for personal use. This legislation may have to be amended to ban such imports, in line with European Union (EU) legislation. Smuggling of meat products across the border has also been reported and represents a constant risk, although pork prices are usually higher in the Russian Federation than in Ukraine. There are two types of border control posts: international border control posts with veterinary inspection; and local/simplified control posts for local residents only, without veterinary inspection. Since the ASF outbreaks in the Russian Federation, the use of local/simplified border control has been limited to foot passage only; all vehicle transport is now subject to the stricter international control posts.

The smallholder pig sector

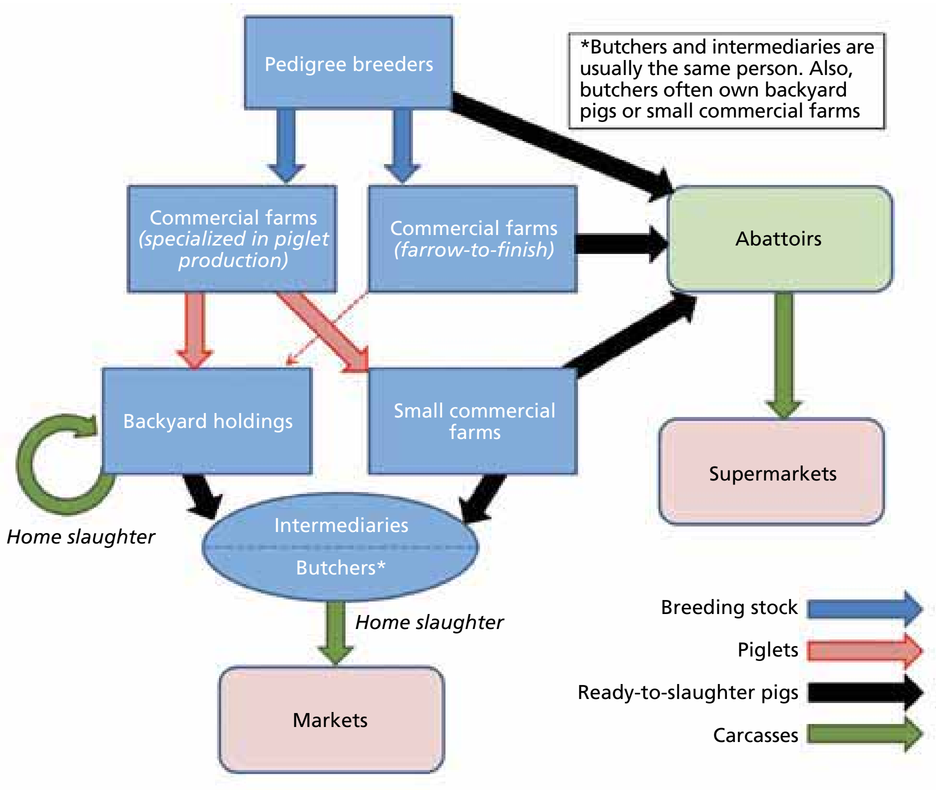
The smallholder pig sector represents the highest risk for ASF introduction. This section explores behaviours and links in the pig and pork market chains, some of which will be critical to identifying the most likely routes for the ASF virus to enter Ukraine's pig population (Figure 7).

Figure 6: Commercial (left) and backyard (right) pig densities in the six easternmost oblasts of Ukraine, and Lugansk Oblast (lower maps), including the distribution of commercial pig farms and international border control posts



Sources: Official 2010 survey data, district-level resolution; location of pig farms from Lugansk Regional Veterinary Inspection; and international border control posts from www.logist.com.ua/lib/usefull/custom_border_ukraine.htm.

Figure 7: Formal market chains for live pigs and carcasses in Lugansk Oblast, eastern Ukraine



Although all the premises that keep pigs are registered (in principle), only pedigree farms identify individual animals. Pigs raised for meat are usually identified at time of sale. A paper-based system records the movement of pigs and carcasses, allowing the tracing back of where live pigs were purchased and slaughtered and where their meat was sold. However, this identification system does not include pigs kept for home consumption, making it possible for non-registered trade/movements of meat to occur within and among villages. Certificates for live pig and carcass movements and sales are issued by local veterinary stations, each covering one or a few villages. Most sensitization of smallholder breeders to ASF prevention is carried out verbally by veterinarians at these village-based veterinary stations, during their regular site visits. Pamphlets are also distributed, and radio and TV programmes have alerted the general public to the ASF situation.

The smallholder pig sector specializes in satisfying traditional consumer preference for fattier pigs by keeping the animals for longer periods until they reach about 150 kg. The smallholder sector includes backyard pigs and small commercial operations of up to a few hundred pigs, usually under low to non-existent biosecurity. Backyard holdings usually keep one to three pigs, mainly for home consumption, although an extra pig or two may be sold as a source of additional income. On the other hand, small commercial farms keep pigs as a main source of income.

Smallholder farmers usually buy piglets from commercial farms (Figure 7). Some commercial farms specialize in supplying piglets for fattening by backyard and, sometimes, small commercial holdings, but the latter usually keep their own sows. It is common for pig farms to provide their workers with piglets, which are raised in backyard conditions.

In eastern Ukraine, backyard pigs are generally kept enclosed at all times (free-roaming pigs are unusual in this part of the country) and are mainly fed on concentrate, occasionally complemented with kitchen waste. Swill feeding is legal, but the swill should first be heat-treated. Generally, the traditional backyard pig production cycle in Ukraine is strongly seasonal, with most animals purchased in February or March and slaughtered with the arrival of the cold season, usually just before the Orthodox Christmas (7 January). Second in importance is the traditional pig slaughter on Easter eve. Home slaughter of pigs is common, and people traditionally share/exchange fresh meat, sausages, etc. with their neighbours, friends and/or relatives. Traditionally pig fat is salted or frozen and consumed throughout the year. Home slaughter is legal in Ukraine, and although the presence of a veterinarian at the time of slaughter is not required by law, it is a legal requirement that live animals are inspected by a veterinarian prior to slaughter. Samples have to be taken to the nearest veterinary station to obtain the certificate that allows meat to be sold in (usually local) markets. Often, small commercial farmers and some backyard pig keepers operate as butchers, slaughtering on their own premises and selling the meat at their stands in local markets.

As an alternative to home slaughter, small commercial and backyard holdings may sell live pigs to intermediaries, who are usually also butchers (Figure 7). These intermediaries/butchers travel around, typically within their own districts, collecting pigs from different locations. They generally buy about five pigs a week (one per market day) from smallholders, but are often smallholders themselves, and also sell their own pigs. It is common practice for butchers to support the backyard owners they buy from by providing piglets or the money to buy them. Butchers slaughter the pigs on their premises or use small commercial abattoirs. Most specialize in one type of meat – pork – which they sell from their stands at local markets (Figure 7). Butchers only sell fresh meat and fat. Additional licences are required for selling processed meat, such as sausages and ham.

Markets are usually located in the larger towns of districts, and are managed by cooperatives, although private – usually smaller – markets also exist. Illegal markets are a problem and no estimates of the amounts of meat distributed through them are available. Mobile teams of police and staff from the veterinary and medical services aim to control and shut down these illegal markets. Considering only legal channels, most pork (about 70 percent) is sold through markets rather than supermarkets. Consumers perceive markets as selling products that are fresher and of better quality than those sold in supermarkets. Since the economic crisis, however, people are moving to the cheaper, often imported and frozen pork sold at supermarkets, or chicken meat, although fresh pork remains their preferred meat.

Carcasses at markets were required to be sold within two days, but because of the high temperatures of summer 2010, markets around Ukraine are now required to sell all meat within one day. There is at least one veterinarian per market (and up to five in larger markets), in charge of inspecting arriving vehicles, carcasses and documentation. Vehicles or carcasses that do not comply with regulations are not allowed to enter the market. Carcasses that do not comply with animal health and food hygiene regulations are isolated in separate sanitary refrigerators at market premises, and samples are sent for laboratory testing. Meat determined unsafe must be incinerated in the incinerator that each market is required to have. Market premises are cleaned and disinfected daily, and waste and leftovers (scraps, bones, fat, etc.) are disposed of in the market's incinerator.

JON SPAULL (FAO)

Piglets suckling a sow, Armenia

Wild boar and ASF risk

The overall density of boar is particularly low in Lugansk Oblast, averaging 0.03 to 0.05 head/km^2 (Figure 5). Wild boar are hunted in specified hunting areas, where their density is higher. There are eight hunting areas within 50 km of the border, each managed by at least one gamekeeper (each gamekeeper covering about 15 000 ha). Despite their low numbers, no additional wild boar are introduced to promote hunting activities or replace those hunted. Wild boar do not usually leave their natural habitats, as the land outside hunting areas cannot ecologically sustain them. Moreover, gamekeepers provide supplementary feed (including crop-planted fields) during the coldest part of the year, to discourage the animals from leaving the hunting grounds. Such wildlife management, which is widely practised in Ukraine, could facilitate the local spread of ASF in wild boar, as animals congregate around feeding sites. Of particular concern regarding ASF spread is the ecological corridor of the Severski Donetz River valley, which runs from the Russian Federation into Ukraine via Lugansk and Kharkov Oblasts. In June 2010, an ASF outbreak was reported within this corridor, in Rostov Oblast in the Russian Federation.

The hunting season starts in late autumn and lasts until the end of December. Hunting terms, conditions, limits and quotas (period, numbers, age, gender, etc.) are set annually by local hunting management bodies in agreement with veterinary services. Licences are issued for a specific area and a specific animal species, and include quotas; for example, in 2009, 79 hunting licences were sold and 78 animals were killed. Obtaining a hunting licence, registering a gun, planning hunting logistics, etc. are costly and time-consuming processes in Ukraine, so most wild boar hunters are from elite socio-economic groups in the region, who are unlikely to keep backyard pigs. Very few foreign tourists hunt in the area, and illegal hunting is also believed to be uncommon; for the last five or six years, nobody has been fined or arrested for illegal hunting.

Hunting (normally a chase hunt) usually takes place at weekends, with gamekeepers helping to organize the hunt. After a hunt, the killed animals are transported to a special site where the carcasses are prepared and butchered under the supervision of an officer from the veterinary services/forestry department, who certifies the meat's safety for consumption and takes samples that are tested for ASF and other diseases. Many veterinarians are hunters themselves, so hunts often include a veterinarian. Staff from the forestry department pack discarded animal parts into leak-proof plastic bags and dispose of them in concrete pits, which have survived from the communal farms of Soviet times. Sick or dead wild boar are reported to the veterinary authorities, who inspect and sample the carcasses and decide what measures to take.

Although the Russian Federation has recently simplified its procedures for wild boar hunting, abolishing restrictions on the time of year and the age, gender or number of hunted animals, Ukrainians do not hunt in the Russian Federation as it is still too complicated, time-consuming and expensive.

The current policy in the Russian Federation is to exterminate wild boar, but this is proving very difficult to achieve because of the species' huge reproductive potential. The pressure of extermination activities may cause wild boar to escape into Ukraine. Forest fires may have a similar effect. As a prevention measure, mobile teams of gamekeepers have been organized to prevent wild boar from crossing the border, by shooting them or through other means.

Discussion

Ukraine is very vulnerable to the introduction and spread of ASF

With its large number of pigs in smallholder traditional production systems, relatively high human population densities, intensive movements of people and pig products, and high density of commercial pig production units in the central part of the country, Ukraine is very vulnerable to the introduction and spread of ASF. The east of the country has the lowest backyard pig densities and this may act as a buffer, preventing the introduction of ASF, or at least slowing its spread (Figures 4 and 6). Unfortunately, the ongoing northwards spread of ASF in the Russian Federation is expanding, putting the bordering areas of Ukraine at risk of ASF introduction. If ASF is introduced into eastern Ukraine, it could spread across the country towards the west, where conditions become gradually more favourable for small-scale pig production and where, although far more rare than it used to, the free-ranging of backyard pigs persists, particularly when and where abundant fruits or acorns are available. ASF virus propagates effectively in this type of production system, as observed in recent years in the Caucasus region and the Russian Federation. Should ASF become established in western Ukraine it will be very difficult to control and prevent progressive spread further westwards into Poland, Slovakia, Hungary, Moldova and Romania, and northwards into Belarus, where backyard pig systems are widespread (Figures 2 and 4).

On the positive side, Ukraine's veterinary services are structured around a vertical chain of command from Kiev to the village level, which ensures the rapid implementation of measures. There is also a compensation plan in place, and awareness among all stakeholders is high, particularly in areas bordering ASF-affected Russian oblasts.

Although it is difficult to forecast the exact locations and routes of introduction and subsequent spread, a number of general risk factors can be considered for developing ASF preparedness strategies. An understanding of likely ASF risk scenarios is important for defining the actions to be taken to: i) prevent introduction; ii) initiate rapid response on detection; and iii) halt the spread of the disease.

If ASF were introduced into Ukraine, the first premises infected would most likely be smallholder low-biosecurity farms or backyard holdings. Introduction would probably occur through informal movements of pig products from an infected region in the Russian Federation, with food scraps being fed to pigs. Border control is unable to prevent such small-scale entries of meat for personal consumption or the smuggling of larger quantities through the border with the Russian Federation. If ASF were not controlled swiftly, it is likely that the disease would spread and circulate locally within the smallholder sector, until it got into a holding from which animals or products were moved further distances. This spread and potential encroachment within Ukraine and the region would most likely follow informal village-level smallholder-based market chains for pork. Products from non-registered pigs, home-slaughtered for home consumption and distributed among friends, family and neighbours would play a major role, as would the unknown number of pigs sold through illegal markets. The activities of intermediaries/butchers could also be important in the spread of disease, as their businesses involve district-level movements of pigs from multiple origins.

Despite the risk of ASF introduction, spread and persistence via smallholdings, not enough is known about most aspects of village-level pig keeping, slaughtering and processing, and the consumption patterns and trade (formal and informal) of live pigs and pig products. Moreover, some of the characteristics of these backyard production systems may vary across the different regions of Ukraine. Knowledge of these systems is vital for quantifying the factors that may contribute to ASF risks within the country. It is clear that Ukraine's backyard subsistence and smallholder commercial pig production systems pose the highest risk of ASF, and should be the front line for efforts in the prevention, early warning and rapid containment of ASF.

In response to this, FAO is currently building a household/village-level ASF risk assessment/mitigation module to evaluate all aspects and actors at the village level in the region, including not only pig keepers, but also intermediaries, butchers, markets, consumers and hunters. Better understanding of the people and trade patterns involved in smallholder pig production will allow:

- identification of the risky behaviours and the points in market chains where the disease is more likely to be introduced and spread;
- design of interventions and mitigation measures to decrease these risks;
- design of training and better awareness strategies and messages about ways of preventing, detecting and responding to ASF, for veterinary and border inspection services and local communities.

FAO is currently building a household/village-level ASF risk assessment/mitigation module to evaluate all aspects and actors at the village level in the region

African swine fever prevention

ASF is in the immediate vicinity of Ukraine and progressively spreading northwards within the Russian Federation, towards Belarus and the Baltic countries. There is also a risk of the disease reaching East and Southeast Asia, home to most of the world's pig population, where ASF introduction would have very serious consequences. For countries at higher risk of incursion of the disease from this expanding epidemic focus, the current epidemiological situation highlights the need to take a range of preventive measures:

1) Awareness campaigns targeting all stakeholders, particularly rural communities and smallholders, on how to prevent ASF, how to recognize and report suspected ASF cases, and how the government would deal with a confirmed outbreak, particularly regarding compensation: Other stakeholders in the live pig and carcass chains (intermediaries, butchers and abattoir workers) and government services (field veterinary services, border inspection personnel and market meat inspectors) should also be made aware of the risks and prevention measures. Similarly, forest workers, gamekeepers, staff of protected natural areas, and wild boar hunters should be instructed to report any sick or dead wild boar they encounter.
2) Banning swill and food scrap feeding, particularly of pig products, although compliance at the household level is challenging: When swill is fed to pigs, it should be boiled for at least 30 minutes, and preferably for an hour, to kill food-borne pathogens.
3) Enhanced surveillance in small commercial and backyard pig holdings, in wild boar populations near infected and high-risk areas, such as harbours or airports, and in areas with high pig densities.
4) Increased control (inspection, quarantine) at border crossing points, to intercept the transport of live pigs, food items and other materials potentially containing infected pig meat or products: Intercepting small quantities intended for personal consumption will be particularly challenging. At the international trade level, the OIE Terrestrial Animal Health Code[1] provides guidelines for the safe importation of domestic and wild pigs, pork and pork products, pig semen, embryos, ova and other products incorporating pig tissues, such as pharmaceuticals. Where international agreements or unions have abolished border controls (such as in the Customs Union of the Russian Federation, Belarus and Kazakhstan), each signatory country must ensure and demonstrate the capacity to exclude trade in live animals or animal products from infected areas. Cross-border cooperation of countries' central and provincial-level veterinary services should be encouraged and promoted, to enable the exchange of information and the coordination of activities.
5) Containment of pigs in properly constructed pig pens to reduce their contact with feral pig populations or wild boar, particularly in areas and periods considered to be of high risk: Additional biosecurity measures are also necessary, such as the quarantine of newly bought animals, the control of visitors to pig farms, and the disinfection of equipment.

[1] www.oie.int/eng/normes/mcode/en_sommaire.htm.

The risk posed from disease spread by wild boar seems negligible. The introduction of ASF-infected wild boar into eastern Ukraine seems very unlikely, given the high lethality of the pathogen, the considerable fragmentation of suitable habitats, and the low density of wild boar populations. Even if such introduction occurred, it is unlikely that an ASF-infected wild boar would infect domestic pigs through direct animal-to-animal contact, as free-roaming pigs are uncommon in this part of Ukraine. Introduction through the feeding of infected (hunted) wild boar meat or products to pigs is also unlikely because of the strict regulations on hunting and the improbability of legal hunters keeping backyard pigs. Illegal hunting is rare, and Ukrainians do not hunt in the Russian Federation, where infected wild boar are known to exist.

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Swine Teschovirus encephalomyelitis in Haiti

Background

Swine Teschovirus encephalomyelitis (previously called Teschen disease) is an acute viral disease that affects swine of all ages and is characterized by non-suppurative inflammatory changes and neuronal degeneration in the central nervous system. The infectious agent that causes the disease, porcine Teschovirus-1 (PT-1), belongs to the family Picornaviridae, genus *Teschovirus*, previously called genus *Enterovirus*, and is one of 11 serotypes (PTV-1 to PTV-11) in the genus. These viruses have a single-stranded linear and non-segmented ribonucleic acid (RNA) genome and typically four structural proteins (VP1 to VP4) making up the virus capsid. Most PTV serotypes are ubiquitous and avirulent, but some strains of the PTV-1 serotype are more virulent and able to cause viraemia and subsequent swine Teschovirus encephalomyelitis. This disease was first described in what was then Czechoslovakia in 1929, in the city of Teschen. During the 1940s and 1950s it spread across Central and Eastern Europe. Virulent PTV-1 has been found in Uganda and Madagascar, causing important losses in the swine industry. Although clinical signs of the disease are now uncommon, there is serological evidence that other strains and serotypes with low virulence are circulating in swine populations.

JULIO PINTO (FAO)

Pigs affected by swine Teschovirus encephalomyelitis in Haiti

The virus multiplies in the intestinal tract and is shed in large quantities in the faeces. It is highly infectious; the ingestion of just a small amount of contaminated faeces can establish intestinal infection. Following infection the first clinical signs of the disease usually appear after an incubation period of ten to 20 days. Fever, anorexia, uncoordinated movements and locomotive disorders progress to tremors, nystagmus, opisthotonos, general deterioration and convulsions, ending with paralysis of the hindquarters, recumbency and death. The clinical expression of the disease varies. In Haiti, for example, a 40 to 60 percent morbidity rate and a 40 to 50 percent mortality rate have been observed. Survivors excrete the virus in faeces and urine for several weeks, and the main mode of transmission is the faecal-oral route from direct or indirect (e.g., contaminated food or water) environmental exposure to infectious faecal matter. Teschovirus infection causes a lasting immune response, but as it has been considered a rare disease for the past few decades, no commercial vaccine is regularly produced.

Swine Teschovirus encephalomyelitis is not a zoonotic disease and affects only swine species. Although the World Organisation for Animal Health (OIE) no longer considers it a reportable disease owing to its rarity, it is strongly recommended that it be reported immediately when a significant epidemiological event occurs, because it could be considered an emerging disease.

A tentative diagnosis can be made on the observed clinical signs, although a number of other conditions with similar clinical signs must be considered in the differential diagnosis; classical swine fever, Aujeszky's disease, Japanese encephalitis, lead or pesticide intoxication, water deprivation, diseases caused by porcine enterovirus type 8, bacterial meningoencephalitis or porcine reproductive and respiratory syndrome (PRRS). A laboratory diagnosis – through histological examination of the brain and spinal cord, virus isolation, reverse-transcription polymerase chain reaction (RT–PCR) tests and serological tests – is necessary to confirm the disease. In serological tests, cross-reaction may occur with other Teschovirus serotypes and the tests are not conclusive unless paired sera are taken (the first when clinical signs are first observed and the second three weeks later) to show a fourfold increase in the specific antibody titre. Teschoviruses are highly stable in the environment and, under favourable conditions, can remain infectious for up to five months. They are resistant to heat, lipid solvents and some disinfectants. However, they can be inactivated by sodium hypochlorite, 70 percent ethanol or an environment of $pH > 9.5$ or < 2.5. Viruses in manure can be inactivated by aeration, ionizing radiation or anaerobic digestion.

Situation in the Republic of Haiti

In February 2009, swine in the lower Artibonite Valley sickened and showed clinical signs that could not be associated with other swine diseases commonly observed in Haiti. The Haitian veterinary services took both blood and tissue samples, which were sent for analysis to the Foreign Animal Disease Diagnostic Laboratory (FADDL)[1] at Plum Island, New York in March 2009. PTV-1 was identified as the cause of the disease. More than a year later, farmers are still reporting numerous cases with clinical signs of swine Teschovirus encephalomyelitis. In Haiti, there is no established commercial movement of swine among different areas. Animals are usually fattened at home, and only limited informal movements of animals occur among rural areas and between these areas and the main consumer centres in the capital Port-au-Prince and the southern region. However, small farmers buy swine at live-animal markets in the towns of their departments and take them home to fatten. This uncontrolled movement of pigs facilitates viral circulation as the virus spreads geographically through movement of infected pigs, or through movement of contaminated fomites such as transport vehicles, people or feed.

[1] FADDL, National Veterinary Service Laboratories, Animal and Plant Health Inspection Service, United States Department of Agriculture.

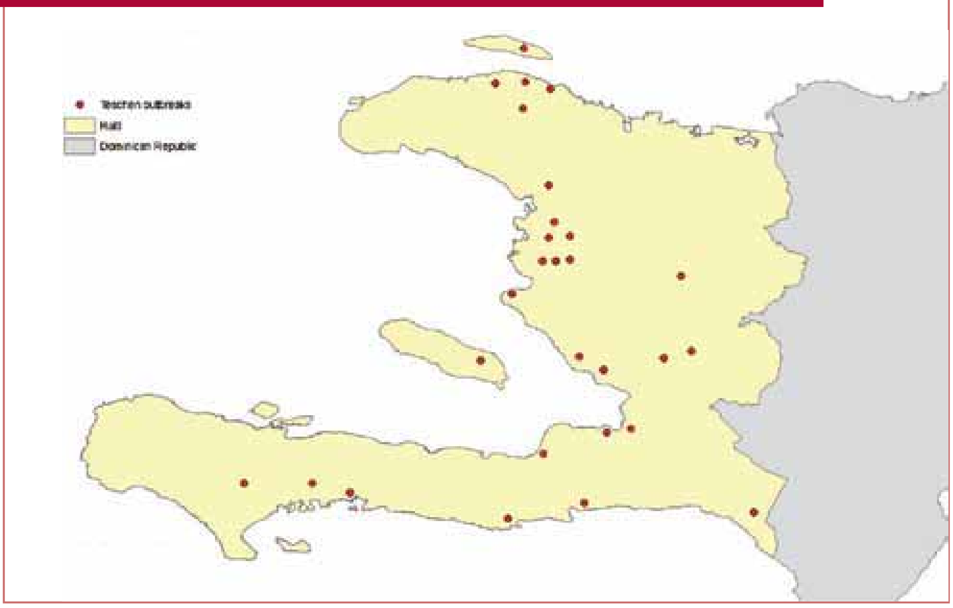
FAO's action

The appearance of PTV-1 in Haiti had a severe impact on swine production systems, and particularly on the food security and livelihood of smallholders in rural areas of the Artibonite Valley. Consequently, on 27 April 2009 the Minister of Agriculture, Natural Resources and Development requested technical assistance from the Food and Agriculture Organization of the United Nations (FAO)/OIE Crisis Management Centre – Animal Health (CMC-AH) to assess the situation and make recommendations for the prevention and control of the disease. CMC-AH deployed a mission of three experts between 3 and 14 June 2009.

The following recommendations were made:

- The veterinary services of Haiti should liaise with their counterparts in the Dominican Republic to develop a common control strategy for the island, because the disease was observed close to the border.
- To keep pig owners adequately informed, veterinary staff and community-based animal health workers in Haiti must be provided with as much information as possible about the disease, and the disease situation in country.
- Surveillance capacity at the central level must be strengthened for monitoring the evolution of the disease; the veterinary services should rely on their relationship with international reference laboratories to enable regular diagnostic testing.

Figure 1: Outbreaks of Teschovirus encephalomyelitis in swine in Haiti, as of December 2009



Vaccination was foreseen as the most efficient way of mitigating the impact of the disease, although it was recognized that neither funds nor a vaccine were available. In 2009 and 2010, FAO contacted several laboratories and vaccine companies to explore the possibility of producing a Teschovirus vaccine for Haiti. So far, this has not been possible, mainly owing to financial constraints.

JULIO PINTO (FAO)

Local animal health officer collecting epidemiological data

In April 2010, ten months after the first CMC-AH mission, a second international expert mission visited the same area to reassess the epidemiological situation and the severity of reported clinical cases of swine Teschovirus encephalomyelitis. Between 24 April and 1 May 2010, a team of ten experts from the United States Department of Agriculture (USDA), FAO, the Inter-American Institute for Cooperation in Agriculture (IICA), and the veterinary services of Haiti and the Dominican Republic (diagnostic laboratory, swine health, disease epidemiology and disease management) visited locations in and around the Artibonite Valley (Mirebalais, La Chapelle, Laincour and Port Saint Marc). The team met swine farmers who had had clinically affected swine in 2009, to gain understanding of disease impacts. A questionnaire-based survey collected information on animal health practices and husbandry systems. During farm visits, any swine showing clinical signs consistent with porcine Teschovirus encephalomyelitis were sampled. Healthy swine were also sampled to identify other viruses circulating in local swine populations. One hypothesis is that other viruses circulating in the Haitian swine population, such as PRRS and porcine circovirus (PCV), facilitate the expression of clinical signs associated with PTV-1 infection, through their immunosuppressive effect.

In the field, the most prominent clinical signs observed in sick swine were central nervous system disorders. Few internal lesions were observed at post-mortem examinations. Samples (109 serum and 109 blood samples) were collected from 111 sick and healthy swine; 63 individual tissue samples were collected during post-mortem examination of swine with clinical signs. This targeted sampling was performed to collect information on the prevalence of a number of swine disease agents. A complete analysis of sampling was to be completed by September 2010, and results will be used to fine-tune the recommendations made in June 2009, to limit spread of the disease.

In rural and urban areas, swine not only support household nutrition as a source of protein-rich food, but also serve as easily cashable savings. The porcine Teschovirus encephalomyelitis outbreak in Haiti has caused and continues to cause considerable social and financial impacts on poor households.

Conclusion

In addition to its efforts to support the rehabilitation and strengthening of the agricultural structure around Port-au-Prince and in departments where internally displaced persons have moved after the earthquake of January 2010, FAO contin-


JULIO PINTO (FAO)

Pig affected with Teschovirus (paralysis and postration)

ues to seek resources to provide Haiti with an effective vaccine for porcine Teschovirus encephalomyelitis, and to explore alternative solutions for controlling the disease. There are serious concerns that this strain of PTV-1 could be introduced into other Caribbean countries and Central and North America by movements of pigs, contaminated products, and people. The development and production of a commercially available vaccine against this disease are high priorities, and should be seen as an insurance policy for countries in the Caribbean and other regions that are at risk if porcine Teschovirus encephalomyelitis spreads.

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Foot-and-mouth disease

Foot-and-mouth disease outbreaks in Asia (January to September 2010)

Foot-and-mouth disease (FMD), an extremely infectious viral disease of cloven-hoofed animals, continued to have an impact in 2010 on many countries in Asia. The disease is endemic in a number of Asian countries, and has also recently entered and spread quickly in the Republic of Korea and Japan (where previous occurrences were in 2002 and 2000 respectively). It is noteworthy that Indonesia remains FMD-free without vaccination and that the Philippines requested its last control zone to be officially ratified as FMD-free without vaccination at the World Organisation for Animal Health (OIE) General Session in May 2011. This article provides an overview of the Asian situation regarding FMD in 2010, using data from OIE, the Food and Agriculture Organization of the United Nations (FAO) and the Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases Global Animal Disease Information System (EMPRES-i).

SHERRILYN WAINWRIGHT (FAO)

Murrah buffaloes at a smallholder farm, Nepal

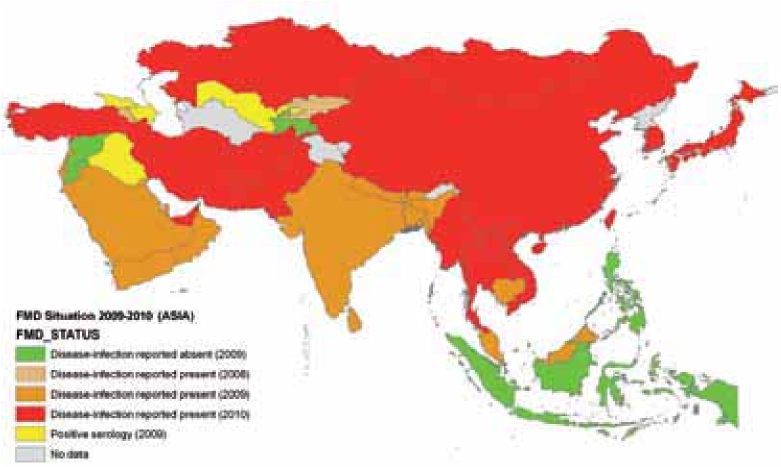
Figure 1 shows the distribution of FMD throughout Asia, by country, in 2010. As not all countries have yet reported their FMD status for 2010, the figure incorporates figures from 2009, including those for two countries – Iraq and the Kyrgyz Republic – that reported "with clinical disease" to OIE in 2008. Countries that did not report official information regarding the presence of FMD in 2009 or 2010 are shown in grey and include Turkmenistan, the Democratic People's Republic of Korea and three disputed land areas, Jammu and Kashmir, Arunachal Pradesh and Aksai Chin. The Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan, Turkmenistan, the Republic of Uzbekistan, Afghanistan, the Islamic Republic of Iran, Pakistan, Turkey, Thrace, the Syrian Arab Republic, Iraq, Armenia, the Republic of Azerbaijan and Georgia are engaged in the West EurAsia Roadmap for FMD Control to 2020. Positive serology for FMD was reported for Uzbekistan, Iraq, Georgia, Armenia and Azerbaijan at the roadmap meeting in 2009.

In East Asia and Asia, in 2010 so far, confirmed FMD outbreaks were reported in Taiwan Province of China, China, Hong Kong Special Administrative Region (SAR), Japan, Kazakhstan, Mongolia, the Republic of Korea and Viet Nam. FMD serotypes O and A were identified in these outbreaks, with serotype O predominating.

In the Republic of Korea, FMD virus (FMDV) type A (Asia topotype) was detected in Kyonggi-Do (Gyeonggi-Do) Province between January and March 2010, with outbreaks occurring in cattle and farmed deer.

In the People's Republic of China, outbreaks of FMDV A occurred in January 2010 (Xinjiang and Beijing Provinces). FMDV O was detected in pigs in Guangdong Province, China in February and March 2010, followed by occurrences in Gansu, Shanxi

Figure 1: FMD situation in Asia, 2009 to September 2010



Sources: OIE, FAO EMPRES-I, Global Administrative Unit Layers (GAUL).

and Jiangxi Provinces in March 2010. In February 2010, an outbreak due to FMDV O occurred in pigs on Penghu Island, Taiwan Province of China. The animals had been imported for slaughter from the Province's main island. FMDV O was isolated from samples received from pigs in China, Hong Kong SAR. These viruses belong to the Southeast Asia (SEA) topotype (Mya-98 lineage), which is currently circulating widely in Southeast Asia.

In April 2010, Japan experienced its first FMD outbreak since 2000. A total of 292 outbreaks (disease incidents) caused by FMD serotype O were reported in Miyazaki Prefecture on the island of Kyushu. Phylogenetic analysis identified the virus as Mya-98 lineage (SEA topotype), which was found to be closely related to viruses occurring in China, Hong Kong SAR, the Republic of Korea, the Union of Myanmar and Thailand. The Japanese Ministry of Agriculture and Forestry elected to use vaccination in a targeted high-livestock-density area, beginning on 22 May 2010, to control the continued spread of this outbreak. All vaccinated animals were culled, in addition to the 289 000 animals culled in response to the outbreak. The last positive outbreak farm was identified on 4 July 2010.

The isolates from FMD outbreaks reported by Mongolia in May 2010 were sequenced at the Federal Centre for Animal Health (FGI, previously the All-Russian Research Institute for Animal Health [ARRIAH]) and shown to belong to the Mya-98 lineage (SEA topotype). The gene sequence analysis suggested a different introduction from that of the outbreaks in China, Hong Kong SAR, the Republic of Korea and Japan, as the isolates were more closely related to the viruses from Thailand and Malaysia of 2009.

Viruses from the PanAsia-2 lineage (ME-SA topotype) were identified from an outbreak that occurred in June 2010 in cattle in Kazakhstan (sequences were provided by FGI).

In South and East Asia, the O-PanAsia-2 lineage continues to dominate; where serotype A is present, it is predominantly the A-Iran-05 lineage. In 2010, FMD outbreaks have been reported in Afghanistan (RT-PCR positive, but not serotyped), the Islamic Republic of Iran (both serotypes O and A identified) and Pakistan (both serotypes O and A identified). In March and April 2010, an outbreak of FMDV serotype O occurred in a gazelle in a wildlife park in Abu Dhabi, the United Arab Emirates. Analysis of virus structural protein 1 (VP1) gene sequences showed that the virus belonged to the PanAsia-2 lineage (ME-SA topotype), and was closely related to viruses of the Islamic Republic of Iran and Pakistan.

SHERRILYN WAINWRIGHT (FAO)

Free-ranging backyard piglets, Nepal

The FMD serotype O is also the most common FMD serotype noted in recorded outbreaks and surveillance samples in the Southeast Asia FMD countries.

The accumulated outbreak information suggests that there is continued movement of viruses across international borders in Asia, and highlights the continued threat posed by FMD as a transboundary disease in this region. Livestock movements (both formal and informal) play an important role in the epidemiology of FMD worldwide. Livestock trade is dynamic and may show marked seasonal variations across Asia, but it is predominantly driven by demand for meat and the price differentials this generates for livestock and livestock products. Of great concern has been the incursion of FMD into the Republic of Korea and Japan, countries with strict quarantine regulations governing animal imports and, in the case of Japan, separated from mainland Asia by a sea barrier. Both countries continue to investigate the possible route of introduction and to review their risk management procedures. In both instances introduction could have involved some contaminated fomite, again demonstrating the highly infectious nature of FMD virus. The occurrence of FMD in Mongolia also suggests a regional spread – in this case, most likely to have been through livestock movements. A complete picture of the strains circulating in the region is difficult to obtain as there is under-reporting in endemic countries and a large number of samples taken from FMD outbreaks are either not typed or unsuitable for typing. Increased coordination and sharing of data on FMD surveillance among countries in the various Asian agro-ecological zones are urgently required to identify transboundary transmission routes and ensure that suitable vaccines are available for protection against the disease.

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Murrah buffaloes at a smallholder farm, Nepal

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Workshops

H5N1 Highly Pathogenic Avian Influenza and Wild Birds: Reviewing the Global Issue and Assessing Future Priorities, 15 to 16 March 2010, FAO Headquarters, Rome, Italy

In March 2010, an international workshop was convened by the Scientific Task Force on Avian Influenza and Wild Birds and hosted by the Food and Agriculture Organization of the United Nations (FAO) in Rome. The task force was established in August 2005 by the United Nations Environment Programme (UNEP) Convention on Migratory Species (CMS), in close cooperation with the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), following concerns about the role of migratory birds as potential vectors of highly pathogenic avian influenza (HPAI) virus subtype H5N1 of Asian lineage. The task force is currently co-convened by UNEP/CMS and FAO, with the Wildfowl and Wetlands Trust (United Kingdom) providing coordination and Web site maintenance.[1]

The task force provides a liaison mechanism among international organizations and multilateral environmental agreements (MEAs) engaged in activities related to the spread and impact of H5N1 HPAI. It comprises representatives and observers from 15 international organizations and MEAs, including four United Nations agencies.

The task force was established in response to a need to incorporate more complete information on wild birds into understanding of H5N1 HPAI and its dissemination around the world. Its activities have been crucial in developing collaboration and joint multidisciplinary work programmes and advancing a science-based understanding of wild birds' role in the epidemiology of H5N1 HPAI. Since its establishment, there have been achievements in many areas, and considerable progress in developing understanding of the factors associated with the spread and epidemiology of H5N1 HPAI.

In particular, the task force's work regarding management of risk factors for the disease has resulted in technical guidelines published by FAO, the World Organisation for Animal Health (OIE), the FAO-OIE Network of Reference Laboratories, Epidemiology Centres and Groups of Experts on Avian Influenza (OFFLU) and others. In addition, advice to policy-makers has been endorsed by several MEAs, including – in 2008 – the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, CMS and AEWA.

Regarding wild bird conservation, it is significant that both public and political perceptions have moved from often automatically blaming wild birds for every outbreak of H5N1 HPAI, to more balanced positions that recognize the poultry sector (especially in East Asia) as the primary reservoir of this virus, with regular spill-over of virus into wild bird populations, onwards transmission and some spill-back. Such changed awareness better reflects current scientific understanding.

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[1] www.aiweb.info.

This third technical workshop reviewed what has been achieved in addressing the spread of H5N1 HPAI, in terms both of the task force's original objectives and of obligations under relevant MEAs, and determined the task force's future role and direction. It built on outcomes of task force meetings held in 2006[2] and 2007,[3] each of which helped develop a common international understanding of the direct and indirect implications of this disease for bird conservation and broader disease control. The third meeting reviewed current activity related to avian influenza (AI) surveillance; the most recent research related to the epidemiology of H5N1 HPAI; and the known direct and indirect impacts of H5N1 HPAI on the conservation of water birds and their wetland habitats. It strongly recommended a new strategy for improving understanding and communicating sound advice to policy-makers, governments and wildlife resource managers in light of the evolving situation.

Contributor: Scott Newman (FAO)

Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases Wildlife Unit Wildlife Capture Training in Africa: FAO and the African Union – Interafrican Bureau for Animal Resources team up to increase capacity in wildlife disease surveillance across Africa

FAO, the Kenya Wildlife Service (KWS) and the African Union – Interafrican Bureau for Animal Resources (AU-IBAR) conducted a training workshop on wildlife capture for disease surveillance, from 11 to 16 April 2010. The training was held at the Morendat Training and Conference Centre in Naivasha, Kenya and was attended by 24 wildlife biologists and veterinarians from 12 African countries.

Wildlife veterinarians focus on the management of diseases carried by wild animals, particularly those that are a threat to conservation of a species or that have an impact on livestock and human health. These diseases include rinderpest, Rift Valley fever, rabies and Brucellosis. As the human populations of African nations increase, more and more people and their domestic animals are moving into areas inhabited by wildlife, leading to the destruction of wildlife habitat and disturbing the natural ecology. Increasing interactions among wild animals, domestic stock and people provide opportunities for disease agents to move among these different populations. Other factors outside the control of national governments, such as climate change, also play a role in changing vector (mosquito and tick) distribution and disease occurrence, creating opportunities for

Dr Tracy McCracken of the Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) Wildlife Unit supervises the collection of ticks for disease studies

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[2] www.aiweb.info/documents/nairobi_conclusions_recommendations.pdf.

[3] www.aiweb.info/documents/aviemore_ai_workshop_conclusions_and_recommendations.pdf.

TRACY MCCRACKEN (FAO)

KWS biologists and veterinarians examine a sedated zebra during the training

TRACY MCCRACKEN (FAO)

Collection of a blood sample for serological disease surveys

diseases to spread to new areas and hosts. The monitoring of wildlife disease is important not only from a conservation perspective, but also for the protection of agricultural livelihoods and human health.

The participating wildlife specialists spent two days in the classroom learning animal capture techniques, followed by additional days working in the field alongside KWS veterinarians, capturing live animals to collect samples for disease monitoring activities. These specialists will return to their respective countries with increased knowledge of how to search for diseases carried by wild animals in their regions. The training workshop helped increase the capacity for wildlife disease monitoring throughout Africa, improving conservation efforts and protecting both livestock and human health.

After the positive feedback from all those involved in the training, FAO and AU-IBAR are continuing their collaboration to support an additional four workshops on wildlife capture and disease surveillance, to be conducted in Central, East, West and Southern Africa with the participation of veterinarians from 47 African nations. This first workshop was organized by FAO and KWS, with the contribution of the European Union (EU) (OSRO/RAF/802/EC).

Contributor: Tracy McCracken (FAO)

Meetings

Moving towards One Health

Human population pressures and enhanced mobility of people, climate change, food and agricultural dynamics, and progressive encroachment into forest and game reserves are among the more frequently cited factors that are believed to drive emerging infectious disease events worldwide. The One Health approach has been devised to address the multiple factors that interact in the emergence of infectious diseases and to step up the fight against existing disease burdens. The approach can best be defined as a global, collaborative, cross-sectoral, multidisciplinary mechanism to address threats and reduce risks of detrimental infectious diseases at the animal-human-ecosystem interface.

International Ministerial Conference on Animal and Pandemic Influenza 2010, Hanoi, Viet Nam

The 2010 International Ministerial Conference on Animal and Pandemic Influenza (IMCAPI) was held in Hanoi, Viet Nam in April 2010. This was the 6th IMCAPI meeting and part of the series of conferences organized by the international community to review global, regional and country activities in preventing, detecting and managing H5N1 avian influenza epizootics and a potential human pandemic.

The meeting focused on: i) status of and response to H5N1 highly pathogenic avian influenza (HPAI); ii) status of and response to pandemic H1N1 (2009), and lessons learned; and iii) the One Health initiative regarding infectious diseases at the animal-human-ecosystem interfaces.

There have been significant achievements in the control of H5N1 HPAI, with reductions in the numbers of H5N1 HPAI outbreaks in poultry and of the countries affected. At IMCAPI, it was generally recognized that the gains achieved in implementing avian influenza control need to be applied to other emerging infectious diseases using the One Health approach.

Systems must be strengthened and capacities built for surveillance, early detection and response to known or novel pathogens, without losing focus on the ongoing H5N1 HPAI crisis, its associated global risks to poultry and human health, and the impact on livelihoods. There is a clear need for better understanding of the drivers and risks for emerging infectious diseases, and for stronger forecasting capabilities for early detection and prevention to mitigate disease impacts. It was noted that risks were best assessed according to the following classifications: geopolitical situation, animal hosts (high-risk host species), microbes (target groupings of microbes), and populations (human vulnerability). To introduce risk-based control strategies and make timely and targeted interventions, further studies are needed on the factors that trigger the emergence and spread of infectious diseases, such as as demographics, group vulnerability, ecosystem imbalances, climate change, trade, and food-related demands.

The meeting highlighted the need for political commitment and leadership, transparent policies and strategies, appropriate legislation, and institutional support at the national and sub-national levels. The policy inter-sector dialogue on emerging infectious diseases must continue, with the ultimate objective of reducing poverty, supporting the most vulnerable and marginalized groups in society and promoting people's well-being.

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Joint Scientific Consultation on Influenza and Other Emerging Zoonotic Diseases at the Human-Animal Interface, Verona, Italy

From 27 to 29 April 2010, the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO), in collaboration with the *Istituto Zooprofilattico Sperimentale delle Venezie* (IZSVe), gathered a group of experts in Verona, Italy to participate in the Second FAO-OIE-WHO Joint Scientific Consultation on Influenza and Other Emerging Zoonotic Diseases at the Human-Animal Interface. The theme of this second consultation was Past Experiences, New Paradigms and Future Threats. Overarching goals and objectives focused on examining emerging zoonoses, including influenzas, and identifying commonalities at the human-animal interface.[1] The first consultation, also held in Verona, in October 2008, had been the first opportunity for a group of influenza experts from the animal and public health sectors to gather and offer advice on purely scientific aspects of the pandemic threat posed by H5N1 and other influenzas.[2]

The goal of the second consultation was to explore existing knowledge as the technical basis for developing or modifying policies and strategies to improve preparation for and response to the next emerging zoonotic event. A critical objective was to review the virological and epidemiological factors that are particularly relevant to the human-animal interface, which may have influenced the emergence of known "high public health impact" zoonoses, basing discussion on influenzas, viral haemorrhagic fevers, human and simian immunodeficiency virus infections and other examples.

The meeting brought together scientific experts in multiple disciplines working in the public or animal health field in five continents: epidemiologists, virologists, wild life specialists, clinicians and anthropologists. At the session on influenza it was observed that despite huge accomplishments in research over recent years, influenza viruses continue to be unpredictable, especially in terms of pathogenicity and infectivity in humans and animals. H5N1 stimulated the creation of preparedness plans and strategies, the development of infrastructure, and the improvement of surveillance capacity. Experts called for a broader approach to the study of disease

[1] Information on the consultation (agenda, list of participants, presentations, summary and final report) is available at the Verona 2010 conference page at www.fao.org/avianflu/en/conferences/verona_2010.html.

[2] www.fao.org/avianflu/en/conferences/verona_2008.html.

emergence, beyond laboratory experiments and virological factors, to include factors such as livestock changes, social trends, animal production systems, application of ecological components to traditional epidemiology, and transmissibility in different settings (e.g., clinical, veterinary).

Scientific presentations in the following sessions were grouped into three categories: endemic zoonotic diseases (West Nile fever, Rift Valley fever, Crimean-Congo haemorrhagic fever); sporadic zoonotic diseases (Nipah and Hendra viruses, Ebola, Marburg viruses and hantaviruses); and animal-origin agents that have emerged into high public health impact zoonoses (human and simian immunodeficiency viruses [HIV/SIV], severe acute respiratory syndrome [SARS]). The overarching theme for the discussion sessions was assessing aspects of specific viral disease scenarios that could be used to examine disease emergence in general. Technologically advanced tools and strategies (mathematical, predictive and epidemiological modelling; computer simulations) should be utilized broadly. Regarding endemic diseases, it is important to identify human behaviours that facilitate dissemination and to have a good understanding of pathogen movement dynamics.

The following general points were highlighted:

- In the context of disease emergence and the human-animal interface, there are commonalities in the way in which the various diseases discussed at the consultation are studied, detected, prevented and controlled.
- There is need for greater use of expertise on wildlife and ecosystems, in addition to human and domestic animal health. This implies collaborating with ecologists and wildlife scientists when addressing zoonotic disease emergence.
- There is critical need for trust among partners; building trust is not a new concept, but there was consensus that continuous development and nurturing of trust were a fundamental requirement for working effectively at the interface and for jointly moving forward to address the interests and needs of all partners.
- Trans-disciplinary collaboration should be ensured, multiple stakeholders engaged, behaviour change promoted and developing countries actively involved.
- There is still great need to develop capacity in early detection, diagnostics, rapid interventions and response, including more sustainable, efficient and useful surveillance systems.

The following specific points were highlighted:

- Current surveillance systems need major improvements. Existing systems often suffer from poor or delayed detection capacity, lack of complete and timely reporting, lack of sustainability, failure of animal and human health systems to work together, and weak or non-existent surveillance of at-risk populations (e.g., wildlife). Targeted surveillance efforts using a mixture of pathogen-based and non-pathogen-based variables are needed to identify the drivers of disease emergence.
- There are substantial data and databases in various locations and on various topics, but protocols and systems for data sharing (including solutions to policy,

privacy and ownership issues) need to be in place to link these valuable information sources and optimize their usefulness.

- Better laboratory diagnostic tests and systems for early detection of emerging diseases are needed. The quality of all elements along the continuum from field to laboratory (collection, transport, testing and banking) has to be enhanced and maintained. Field diagnostics should be improved by applying technologies to field settings (e.g., pen-side/bedside).
- Research should be carried out to improve understanding of the sociological, cultural and anthropological elements affecting behaviours and risk perception, in order to propose and communicate more effective and practicable measures for changing risky behaviours.
- Further study of human behaviour, attitudes, needs and practices would be useful for targeting or marketing behaviour change messages. Partnerships with corporations for product marketing could assist in promoting the right message and understanding methods for the wide diffusion of messages to a diverse public.
- Understanding ecosystems is one of the most critical components of the successful detection, prevention and control of emerging zoonotic diseases. Baseline data must be collected on all components of ecosystems (e.g., human demographic and economic data, livestock densities, wildlife species, ecotypes and climatic data, vector populations, and pathogens). To achieve a better understanding of ecosystems, direct and indirect indicators that measure ecosystem changes should be mapped, and ways of minimizing the risks linked to ecosystem changes, such as the pressures of increasing human populations and their need for food and shelter, need to be identified.
- A clearer understanding of wildlife trade and its potential impact on disease emergence is needed, for example predicting disease emergence in new locations and estimating the risk to naïve species based on the introduction of traded wildlife species. The economic value of healthy ecosystems should also be analysed (e.g., estimations of the costs and benefits of static and changing ecosystems).
- A multidisciplinary approach is important for involving social scientists, ecologists and economists as key partners, and incorporating their respective disciplines into the work of international agencies, national authorities and other organizations; developing integrated, joint or aligned curricula to institutionalize multidisciplinary approaches; cross-training to ensure that partners share a common understanding of the nature and importance of all disciplines and sectors; supporting the continued availability of expertise in important disciplines for which fewer new scientists are being trained (e.g., taxonomy, entomology); and fostering an environment of trust that enriches the quality of collaborative work.

The consultation concluded with many key institutions and individuals committing to further research and study and implementation of the concepts discussed. Outcomes of the consultation were brought to the policy-making Stone Mountain meeting (see following article).

Contributor: Gwenaelle Dauphin (FAO)

Operationalizing One Health: A Policy Perspective – Taking Stock and Shaping an Implementation Roadmap, Atlanta, Georgia, United States of America

From 4 to 6 May 2010, the United States Centers for Disease Control and Prevention (CDC), in collaboration with OIE, FAO and WHO, hosted a further expert consultation to advance the development of One Health. This meeting brought together a select group of leaders, including specialists from national Ministries of Health and of Agriculture, the European Commission, the United Nations, the World Bank and other diverse institutions from the academic, policy and economic sectors, who contributed their expertise and experience to the discussion. The 54 participants reviewed progress to date in terms of leading practices related to One Health, and identified key policy decisions and financial commitments necessary to support sustainability and expansion.

The purpose of the meeting was to build on the recommendations and conclusions from the Winnipeg expert consultation to: i) identify changes in animal and public health policies and practice that demonstrate implementation of One Health; ii) draw on examples of successes to develop strategies and action plans that governments and the health community can use to fund and implement One Health approaches in their countries; and iii) build on the success and lessons learned from the response to HPAI pandemic H1N1 2009 and other emerging zoonotic diseases, to operationalize One Health.

The opening sessions of the meeting focused on the economic and practical benefits of applying a One Health approach, and presented successful examples of One Health implementation at the national level and within other sectors (professional, non-governmental organization [NGO], international and academic). A specific goal of the meeting was to develop sustainable intersectoral collaboration at the international, regional, national and sub-national levels by identifying concrete opportunities for implementing One Health strategies and recognizing key barriers and possible options for overcoming these barriers. The following points were identified and agreed on for a common vision of One Health:

- ***Culture change*** – appreciation of the importance of the connections among humans, animals and ecosystems.
- ***Increased visibility*** – evidence-based recognition of the value added of operationalizing the One Health approach in preventing, detecting and controlling diseases that have an impact on both humans and animals.
- ***Designated funding*** – to support interdisciplinary collaborative programmes.
- ***Improved coordination*** – intersectoral collaboration in surveillance, communications, outbreak response and sample sharing.

Seven workgroups were formed to develop and implement key activities for continuing development of the One Health approach at the human-animal-wildlife-ecosystem interface. Each group was asked to develop One Health plans and partnerships. The workgroups will convene and continue their development processes via teleconferences, to finalize their action plans and carry out activities.

Contributor: James Zingeser (FAO)

Launch meeting of the Integrated Regional Project for the Progressive Control of Foot-and-Mouth Disease in the Andean Region

The Integrated Regional Project for the Progressive Control of Foot-and-Mouth Disease (FMD) in the Andean Region was launched in Lima, Peru on 18 February 2010, with the participation of Peru's Minister of Agriculture, the Environment Officer of the Spanish Agency for International Cooperation (AECID) in Peru, the Executive Director of the Peruvian Agency for International Cooperation (APCI), the General Secretary of the Andean Community, OIE's Regional Representative for the Americas, the Agricultural Health and Food Safety Director of the Inter-American Institute for Cooperation on Agriculture (IICA), the Head of the Vesicular Infection Unit at the Pan-American Foot-and-Mouth Disease Center (PAFMDC, previously PANAFTOSA), the Agricultural Attaché of the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) in Peru, and the FAO Representative in Peru.

FAO

Launch meeting in Lima, Peru

During the meeting, Dr Julio Pinto, Animal Health Officer at FAO Headquarters, presented FAO's global strategy for the progressive control of FMD, with Dr Tito Diaz presenting FAO's regional priorities for Latin America. The three-year integrated regional project, which is funded by Spain (contributing US$5 million) and Italy (US$1.75 million) was introduced by the Regional Coordinator, Dr Ana Riviere Cinnamond.

The project design is based on achieving five main outputs:

Output 1: strengthened coordination and harmonization of norms throughout the region.

Output 2: strengthened management capacities for official veterinary services.

Output 3: strengthened technical capacities for national FMD prevention, control and eradication programmes.

Output 4: strengthened communication capacities and improved dissemination of animal health information.

Output 5: real-time online technical and operational management, monitoring and evaluation (M&E).

M&E mechanisms are a major feature of the project. As part of the FAO/AECID Trust Fund, the project is monitored through AECID's online interactive M&E platform, which tracks project implementation and budget expenditure in real time. This tool supports the organization of activities and the implementation of tight schedules according to the needs of each beneficiary country: Bolivia, Colombia, Ecuador, Peru and Venezuela. To date, design of the project's logical framework has focused on local needs associated with output 3, which is closely related to the epidemiological situation at the national level. In addition, training in Geographic Information Systems (GIS) has been provided in Bolivia, and PAFMDC experts have participated in a bipartite meeting of Peru and Ecuador and a tripartite meeting of Bolivia, Chile and Peru.

The first meeting of the project's Extended Core Action Team was planned to be held in Santiago from 3 to 5 August 2010, with the participation of all the project's national coordinators and expert consultants. Further information is available at the integrated regional project's Web page on the Web site of FAO's Regional Office for Latin America and the Caribbean.[3]

Contributor: Ana Riviere (FAO)

[3] www.rlc.fao.org/en/.

News

Walter Plowright CMG, FRS, FRCVS, DVSc veterinary surgeon and research scientist (1923 to 2010)

Walter Plowright receiving the World Food Prize in 1999

Walter Plowright is best known and will be remembered for his seminal work on rinderpest in Kenya during the 1950s and 1960s. This not only improved understanding of the epidemiology of wildlife-cattle rinderpest interactions, but also led to the development of an attenuated tissue culture-grown vaccine. He conducted this research at the East African Veterinary Research Organization's (EAVRO's) Muguga Laboratory, working with a team of specialists in various veterinary disciplines who went on to become distinguished scientists for their own work on a broad spectrum of African livestock diseases. This was an exciting time to be a veterinary virologist as it was in the very early days of the discipline, when techniques of *in vitro* virus cultivation were first becoming available. A good vaccine in the form of the goat-adapted rinderpest vaccine had been widely available for decades and had made a significant impact on the circulation of rinderpest virus, despite its drawbacks. However, it was adoption of the new culture techniques that enabled the development of a novel vaccine.

Dr Plowright conceived that the tissue-culture rinderpest vaccine (TCRV, generally referred to as the "Plowright vaccine") would be cheaper, easier to manufacture, easier to scale up and, above all, easier to standardize to a high level of product safety. Through extensive laboratory and field trials, he demonstrated that the attenuated vaccine was not only highly efficacious but was also completely safe in all classes of cattle, conferring long-lasting immunity, which was subsequently demonstrated to be life-long. Its availability ushered in a new era of rinderpest control, which saw the progressive reduction of the disease in Africa and Asia as a result of the vaccine's near-universal adoption. Only with the perfecting of TCRV could internationally coordinated campaigns be considered, and campaigns such as Joint Project 15 and the Pan-African Rinderpest Campaign were mounted from the 1960s.

It is impossible to conceive how the current status of putative global disease freedom could have been reached without Plowright's vaccine and its derivatives with improved thermostability, formulated in the 1980s. Many millions of doses were used in national and international campaigns until the 1990s, when improved epidemiological understanding and reduced disease incidence and distribution made it possible to replace mass vaccination with focused vaccination, still using Plowright's vaccine, targeted to eliminate the residual reservoirs of infection.

Dr Plowright was born at Holbeach in the county of Lincolnshire in the United Kingdom in 1923, and was educated at grammar schools in Moulton and Spalding. Having decided early in his life that he wanted to be a veterinary surgeon, he studied veterinary medicine and surgery at the Royal Veterinary College (RVC) in London during the Second World War, graduating as a Member of the Royal College of Veterinary Surgeons in 1944. On graduation, he was immediately commissioned into the Royal Army Veterinary Corps and posted to Kenya. After completing his military service in 1948, he returned temporarily to the United Kingdom to lecture at RVC. However, his love of Africa soon lured him back, and in 1950 he returned to Kenya to work for the Colonial Veterinary Service at the Veterinary Research Laboratory at Kabete for three years, before being transferred to the Nigerian Federal Veterinary Laboratory in Vom. His appointment in 1956 as head of the Pathology Department at the Muguga Laboratory took him back to Kenya at a time when Gordon Scott (1924 to 2004), also destined to become an eminent virologist, was its very able Director.

This was a time when rinderpest was continuously ravaging African cattle herds and wild populations of buffaloes, antelopes and giraffes, with devastating effects on the livelihoods of livestock-dependent farmers. Rinderpest was a major constraint to agricultural production and development, and was the major preoccupation of the Colonial Veterinary Service in Africa. It was at Muguga over a period of 15 years that Dr Plowright's work laid the foundation for the eventual global eradication of rinderpest.

Kenyan independence saw the demise of the Colonial Veterinary Service, and in 1964 Dr Plowright moved to work for the Animal Virus Research Institute at Pirbright in Surrey, the United Kingdom, although fortunately he was able to continue his links with EAVRO, to which he was seconded until 1971. Although rinderpest ranked high in his professional portfolio, he also made significant contributions to the understanding and control of other African livestock diseases, including malignant catarrhal fever and African swine fever.

Returning to the United Kingdom, he resumed his academic career at RVC as Professor of Microbiology and Parasitology, while continuing to conduct original research and supervising the doctoral studies of a number of veterinary virologists who went on to make significant contributions to veterinary science and are well-known today. His final full-time post, from 1978 to 1981, was as head of the Department of Microbiology at the Institute for Research on Animal Diseases, in Compton, Berkshire, the United Kingdom. After his formal retirement, Dr Plowright's expertise continued to be in demand as a consultant and visiting lecturer and professor. In 1998, he gave the keynote address at the FAO Technical Consultation on the Global Rinderpest Eradication Programme (GREP) in Rome, demonstrating clearly that despite the nearly 30 years that had past since he last worked directly with rinderpest virus, he could still give a fascinating and up-to-date account of the science of rinderpest behaviour from a perspective covering virtually a century. In 2001, he made a valued contribution to the Royal Society's report on infectious diseases in cattle following that year's outbreak of foot-and-mouth disease in the United Kingdom. Sadly, increasing health problems limited his mobility in recent years and prevented him from accepting other invitations.

Dr Plowright received numerous honours for his work, including being made a Commander of the Most Distinguished Order of Saint Michael and Saint George (CMG), a fellow of the Royal Society and a fellow of the Royal College of Veterinary Surgeons, and receiving the European Society of Veterinary Virology's Medal for contributions in the morbillivirus field. In 1984, he became the first recipient of the King Baudouin (of Belgium) International Development Prize, and he received South Africa's Theiler Memorial Trust Award in 1994. Arguably the crowning accolade came in 1999 when, after nomination by the Food and Agriculture Organization of the United Nations (FAO), he became a World Food Prize Laureate, an award for contributions to advancing human development by increasing the quality, quantity or availability of food in the world.

Although his work can be looked at from a variety of perspectives, all of Dr Plowright's considerable contributions to veterinary virology stemmed from his deep appreciation of the way in which cell culturing techniques can be developed to yield a more fundamental understanding of the nature of viruses of veterinary importance. It is to the great benefit of humanity that, in a period running from the late 1950s to the early 1970s, he chose to express his creativity by working on a variety of tropical animal diseases and was supported by the Government of the United Kingdom in doing so.

With his death, the world has lost one of its most eminent veterinary virologists and authorities on rinderpest. The imminent formal announcement by FAO and the World Organisation for Animal Health (OIE) that rinderpest has been eradicated from the world will be a fitting and lasting memorial to this remarkable scientist. After smallpox, rinderpest is only the second disease in history to be eradicated through human efforts, and Dr Plowright's pioneering work made an invaluable contribution to that achievement.

He is survived by his wife, Dorothy, who supported him loyally for much of his African and subsequent career.

Peter Roeder
March 2010

Meetings and publications

Meetings and events

- World Influenza Congress – Europe 2010, Amsterdam, Netherlands 7 to 9 December 2010
- First OIE Global Conference on Veterinary Legislation, Paris, France, 7 to 9 December 2010
- Ordinary meeting of the Advisory Committee of the World Animal Health and Welfare Fund, Paris, France, 14 December 2010
- North American Veterinary Conference (NAVC) 2011, Orlando, Florida, United States of America, 15 to 19 January 2011 (http://tnavc.org/)
- Official Opening Ceremony of the World Veterinary Year, Versailles, France, 24 January 2011
- International Meeting on Emerging Diseases and Surveillance (IMED), Vienna, Austria, 4 to 7 February 2011 (http://imed.isid.org/)
- 1st International One Health Congress, Victoria, Australia, 14 to 16 February 2011 (http://www.onehealth2011.com/)
- OIE Global Conference on Wildlife Animal Health and Biodiversity, Paris, France, 23 to 25 February 2011
- The Pathogenesis of Influenza: virus-host interactions, Kowloon, China, Hong Kong Special Administrative Region, 23 to 28 February 2011 (www.keystone-symposia.org/meetings/viewmeetings.cfm?meetingid=1127)
- XIII International Symposium on Respiratory Viral Infections, Cairo, Egypt, 12 to 15 March 2011
- 39th General Session of the EUFMD Commission, FAO Headquarters, Rome, Italy, 27 to 29 April 2011
- World Conference on Veterinary Education, Lyon, France, 12 to 16 May 2011 (http://www.wcve2011.org/)

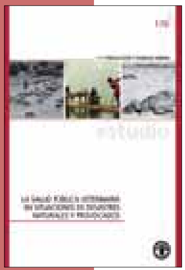
FAO Animal Production and Health publications

FAO Animal Production and Health Manual No. 4: *Wild bird highly pathogenic avian influenza surveillance – sample collection from healthy, sick and dead birds* (in English, French, Russian, Indonesian and Bangla) (available at www.fao.org/docrep/010/a0960e/a0960e00.htm).

FAO Animal Production and Health Manual No. 5: *Wild birds and avian influenza – an introduction to applied field-research and disease sampling technique* (in English, French, Spanish, Russian, Arabic, Chinese and Bangla) (available at www.fao.org/docrep/010/a1521e/a1521e00.htm).

FAO Animal Production and Health Manual No. 7: *The AVE systems of geographic information for assistance in epidemiological surveillance* (in English and Spanish) (available at www.fao.org/docrep/012/i0943e/i0943e00.htm).

FAO Animal Production and Health Manual No. 8: *Preparation of African swine fever contingency plans* (in English and Armenian) (available at www.fao.org/docrep/012/i1196e/i1196e00.htm).



FAO Animal Production and Health Proceedings No. 10: Brucella melitensis *in Eurasia and the Middle East* (available at www.fao.org/docrep/012/i1402e/i1402e00.htm).

FAO Animal Production and Health Paper No. 170: *La salud pública veterinaria en situaciones de desastres naturales y provocados* (available at www.fao.org/docrep/012/i1737s/i1737s00.pdf).

Global Programme for the Prevention and Control of Highly Pathogenic Avian Influenza Third Report *(October 2008 to 2009)* (available at www.fao.org/docrep/012/i1497e/i1497e00.htm).

Contributions from FAO Reference Centres

FAO/OIE World Reference Laboratory for FMD, Pirbright, United Kingdom

Report from FAO World Reference Laboratory for FMD, January to June 2010

Country/Territory	No. of samples	Virus isolation in cell culture/ELISA[1]								RT-PCR[4] for FMD (where appropriate)	
		FMD[2] virus serotypes									
		O	A	C	SAT 1	SAT 2	SAT 3	Asia 1	NVD[3]	Positive	Negative
Afghanistan*	95	43	17	-	-	-	-	-	-	85	10
China (Hong Kong SAR)	23	16			-				7	22	1
Ecuador	9	9	-	-	-	-	-	-	-	9	-
Eritrea	89		7		-				82	36	53
Ethiopia	32	5			-	13			14	27	5
Iran (Islamic Republic of)*	142	59	3	-	-	-	-	-	3	74	3
Myanmar	4	4	-	-	-	-	-	-	-	4	-
Lao People's Democratic Republic	4	3	1	-	-	-	-	-	-	4	-
Nigeria	50	2	3		-				45	17	33
Kenya*	85	1	-	-	19	1	-	-	46	30	44
Republic of Korea	4	1	1	-	-	-	-	-	2	4	-
Pakistan	24	18	3	-	-	-	-	-	-	24	-
Qatar	17	-	-	-	-		-	-	17	-	17
Senegal	29	-	-	-	-	1	-	-	28	5	24
Tanzania (United Republic of)	82	3	8			1			70	39	43
Thailand	21	13	7						1	21	
Turkey	8	8	-	-	-	-	-	-	-	8	-
Turkey	20	6	12						2	20	
United Arab Emirates	7	4	-	-	-	-	-	-	3	4	3
Viet Nam	16	1	15							16	
Total	761	196	77		19	16			320	449	236

[1] FMD virus serotype identified following virus isolation in cell culture and antigen detection enzyme linked immunosorbent assay (ELISA).
[2] Foot-and-mouth disease.
[3] No FMD or vesicular stomatitis virus detected.
[4] Reverse transcription polymerase chain reaction for FMD viral genome.
* Analysis of some samples was not complete at the time of the report.
All samples from Afghanistan were supplied in ribonucleic acid (RNA) later for PCR analysis, and serotypes were defined by sequencing.
Eight type O samples from Turkey were submitted for full-length genome sequencing.

FAO/OIE Reference Laboratory for Rinderpest and Peste des Petits Ruminants, Montpellier, France

Report from FAO Regional Reference Laboratory for PPR, International Cooperation Centre of Agricultural Research for Development (CIRAD), Montpellier, France, January to June 2010

Country	Species	Sample	Number of tests	Number of PPRV positives/doubtful	Test	Nature of the test Confirmatory or tentative
PPRV[1] with differential diagnosis with RPV[2]						
Brazil	Cattle	Serum	129	0	C-ELISA	Confirmatory
Djibouti	Caprine/camel	Serum	16	8	C-ELISA	Confirmatory
Senegal	Caprine	PCR products	24	16	RT-PCR[3]/Sequencing	Confirmatory Sequencing pending
Cameroon	Caprine	Serum	34	2/4	C-ELISA	Confirmatory
Vaccine contaminants						
Jordan	-	PPR Vaccine	2		Quality Control[4]	Pass

[1] Peste des petits ruminants virus.
[2] Rinderpest virus (all samples remained negative).
[3] Reverse transcriptase-polymerase chain reaction.
[4] Sterility test + PCR (RPV, PPRV, mycoplasma)

Stop the press

Since the last EMPRES Transboundary Animal Diseases Bulletin issue (No. 35) there have been reports of more transboundary animal diseases (TADs) across the world.

Foot-and-mouth disease (FMD) serotype O was reported in the Russian Federation (August 2010), Mongolia (August to November 2010) and China (June to October 2010), including Taiwan Province of China (August 2010). FMD serotype Asia 1 was reported in Viet Nam (June 2010). Most notably FMD serotype A was reported in western Myanmar (November 2010), the first report of serotype A in the country since 1978. FMD serotype SAT 1 was reported in Namibia (April 2010). FMD serotype SAT 2 was reported in Botswana and Zimbabwe (July 2010), along the international border between the national parks of Hwange in Zimbabwe and Chobe in Botswana; and Mozambique (September to November 2010). FMD was reported in South Africa (August 2010), but information about the serotype of this outbreak is not yet available internationally.

African swine fever (ASF) continued to be reported in pigs and wild boar in the south of the Russian Federation (July to October 2010), and in domestic pigs, feral pigs and wild boar in Armenia. The disease was also reported in Georgia in domestic pigs. Most of the outbreaks in the Russian Federation were concentrated along the north coast of the Black Sea and the border with Ukraine. ASF was also reported in pigs in Chad (October 2010). This was the first occurrence in Chad; the movement of animals from northern Cameroon, where the disease was newly introduced early in 2010, was suspected to be the source.

H5N1 highly pathogenic avian influenza (H5N1 HPAI): A flare-up during October/November 2010 in poultry in Viet Nam and the report of a human avian influenza infection in China, Hong Kong Special Administrative Region (SAR) suggest that a new HPAI "season" may have started. These events may therefore mark the beginning of increased virus activity for the period end-2010 to early 2011.

Peste des petits ruminants (PPR) occurred during 2010 in the United Republic of Tanzania placing the Southern African Development Community (SADC) Region at direct risk.

Event: In October 2010, the Global Rinderpest Eradication Symposium was held at FAO Headquarters, Rome, Italy, followed by Director-General Dr Jacques Diouf's declaration of ceasing eradication activities. FAO launched the Global Rinderpest Eradication Programme (GREP) in May 1994 and worked with all counterparts to push forward the worldwide eradication of this disease and the infection; the last known rinderpest outbreak was reported in 2001 (Kenya). This represents a remarkable achievement for veterinary science, evidence of the commitment of numerous countries, and a victory for the international community.

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