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African Swine Fever (ASF) recent developments - timely updates

Worrisome dynamics: Steady spread towards unaffected areas could have disastrous impact

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African swine fever (ASF) is now established beyond Africa, in the Caucasus and the Russian Federation, where it is having a particularly devastating impact on small-scale pig farmers, who are losing a valuable protein source and cash income. In the past, the virus was already detected outside Africa from the 1950s to the 1980s in Europe, the Caribbean and Brazil. The recent developments in Eastern Europe indicate that a further geographic expansion of ASF is likely to occur, requiring increased prevention and vigilance to protect swine populations and the associated business and livelihoods.

CONTENTS

1. CURRENT ASF DYNAMICS (2011/12)

Africa

ASF is considered endemic in most countries in sub-Saharan Africa. Nevertheless, ASF dynamics remain variable from one sub-region to another. Certainly, the upsurge of ASF in many areas is driven by the tremendous growth of the pig sector seen in Africa, with some countries more than doubling their pig populations in less than a decade (Figure 1; countries in red) and the increased movement of people and products.

Since most of this increase is taking place in smallholder or backyard husbandry systems with low levels of biosecurity, the sector growth comes along with disease prevention and control challenges. Eradication of ASF in Africa is very difficult with the currently available tools, i.e. there is no vaccine available, so prevention and control efforts should focus on the reduction of disease burden in domestic swine (through improved husbandry practices), and protection of areas not affected by the disease (through controlled trade and swine sector development programmes that stress awareness and prevention measures).

- *Western Africa*: ASF occurs sporadically in most countries of the region. Cape Verde experienced a further spread of the disease in early 2011. Togo reported outbreaks in the south of the country, a region that had not been affected before, with stamping out measures apparently limiting potential epidemic spread. Unlike in southern and eastern Africa, the role of wild suids in maintaining virus circulation is not clear.
- *Central Africa*: New developments are taking place in northern Cameroon, where the disease is spreading into new areas. Southern Chad reported its first outbreak in 2011. Interestingly, ASF genotypes IX and X, up to now restricted to eastern Africa, have spread into the region.
- *Eastern Africa*: Kenya, Tanzania and Uganda all have reported increased numbers of outbreaks. The role of increased peri-urban pig production is reflected in outbreaks surrounding the bigger cities like Kampala, Mombasa and Dar es Salaam.

QUICK FACTS

African swine fever: Caused by the ASF virus, it is the only member of the Asfarividae family. To date, there are 22 genotypes identified of this DNA virus. A virus infection of domestic pigs of all ages, without sex predilection, ASF can cause a variety of clinical signs, mostly those typical of a haemorrhagic fever with multiple organ involvement. Some genotypes provoke high mortality rates of up to 100% in domestic pigs. The virus in Africa naturally circulates among wild suids (e.g. warthogs, bushpigs and giant forest hogs) that do not show clinical signs. Feral pigs (escaped domestic species) or European wild boar (non-domesticated species) are equally susceptible to ASF, which makes disease control difficult if the infection becomes endemic in these populations. Humans are not susceptible to ASF infection.

In a suitable environment with high organic content, the ASF virus is stable over a wide range of temperatures and pH, which allows it to persist in the excretions of infected pigs, in pig carcasses and in pig meat products. Pigs become infected mainly through the oro-nasal route after contact with infected pigs or through feeding of virus-contaminated products (swill and garbage waste). In areas where competent species of *Ornithodoros* soft ticks exist, transmission via these vectors can be important for virus persistence. The immune response to ASF virus is not completely understood, with humoral response after infection not conferring full protection and little to no cross protection between genotypes. There are no vaccines available.

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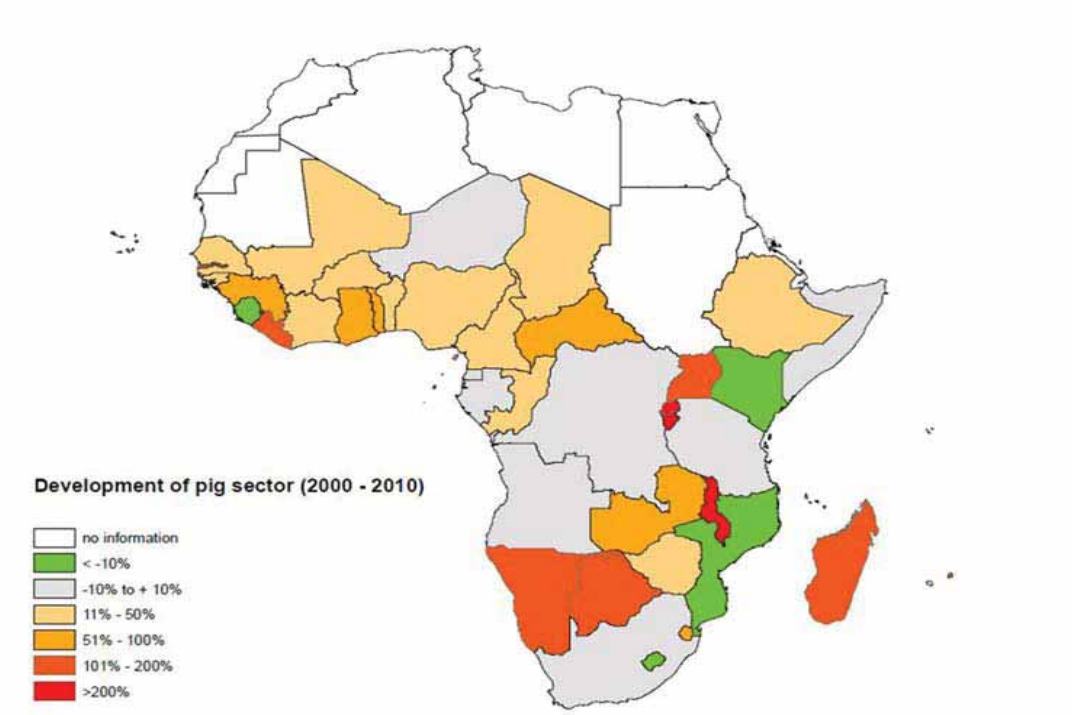
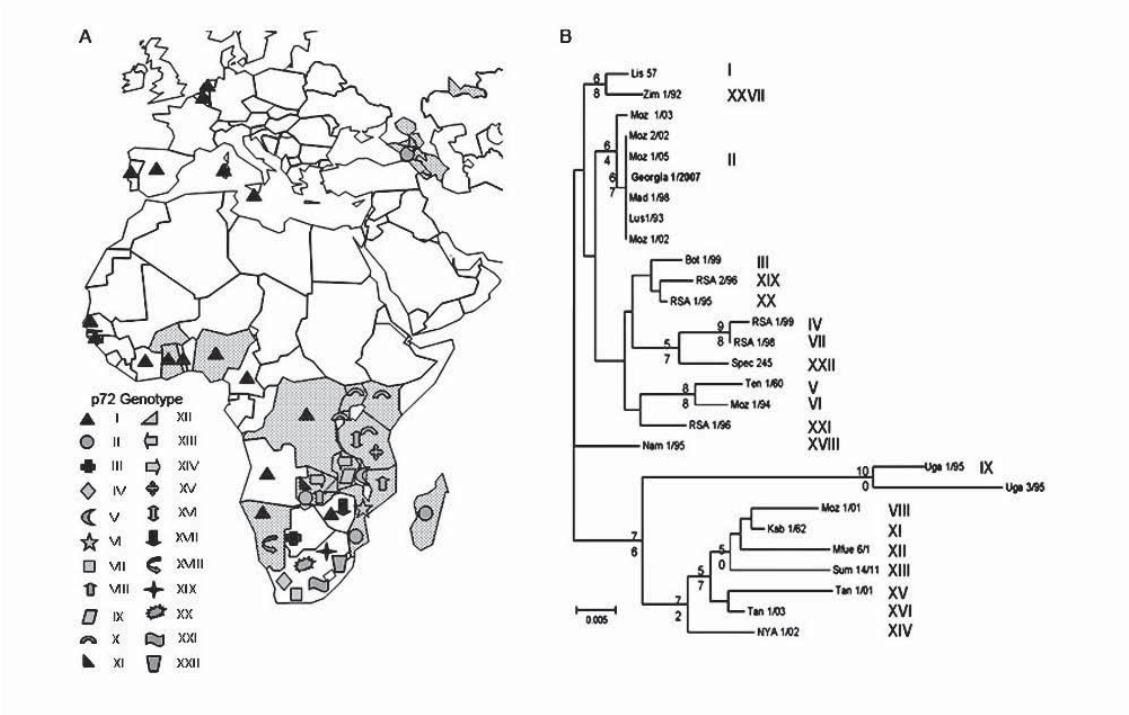
Figure 1. Development of the pig sector in Africa (2000-2010)



Source: FAOSTAT

Figure 2. Geographical distribution of ASF genotypes in Africa. (a) Map showing African swine fever (ASF) outbreaks between 2003 and 2008. Shading indicates a country within which an outbreak has occurred. Symbols represent ASF genotypes (determined by B646L (p72) sequencing) known to be in circulation within that country (Basto et al. 2003; Lubisi et al. 2005; Boshoff et al. 2007; Rowlands et al. 2008). (b) Phylogram depicting the B646L gene relationships of selected isolates representative of the 22 AFSV genotypes. Moz, Mozambique; Lis, Lisbon; Zim, Zimbabwe; Mad, Madagascar; Bot, Botswana; RSA, Republic of South Africa; Spec, Spencer; Ten, Tengani; Nam, Namibia; Uga, Uganda; Tan, Tanzania; Kab, Kabu. Scale bar indicates number of nucleotide substitutions per site (Rowlands et al. 2008)



Source: Costard et al. 2010 ::: Copyright © 2009, The Royal Society

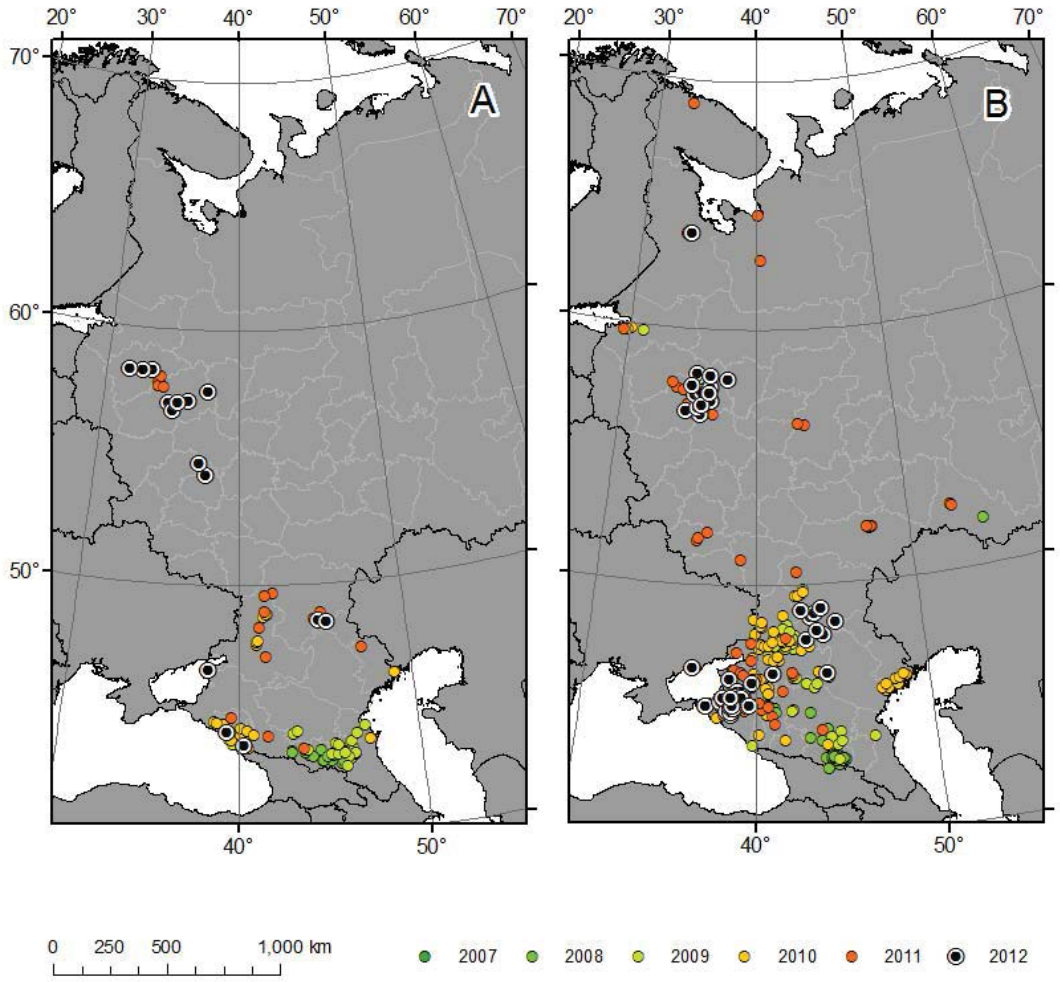
- *Southern Africa*: South Africa reported several outbreaks south of their ASF endemic zone, which is located in the northeast of the country. Outside this zone, the sylvatic cycle is believed to be absent leaving domestic pig/pork-to-pig transmission as the main route of transmission.

Eastern Europe / Caucasus

Since its introduction to the Caucasus in 2007, ASF has had severe effects on the swine production in the region. Despite the absence of reports since 2008, the disease is still believed to be present in Georgia, while Armenia reported its last ASF outbreaks in 2011. Within the Russian Federation, 2011 was a year of wide geographic spread in the western part of the country, with outbreaks reported from the south, where the disease is now considered endemic, to the Arctic Circle (see Figure 3). In 2012, after several years on high alert, an ASF outbreak was reported on 30 July in Komyshuvatka, Ukraine, on the coast of the Black Sea and some 150 km from the Russian border. The outbreak affected five backyard pigs and the virus was presumably introduced through contaminated food (swill) fed to pigs that had been brought by people coming for holidays from the Russian Federation. Quarantine restrictions were introduced in the outbreak area and depopulation, destruction of animals and disinfection of the premises took place, without any secondary outbreak being detected during the following weeks thus far. Of epidemiological significance are the repeated occurrence of ASF outbreaks that represent long-distance jumps in the Russian Federation (and most recently in Ukraine), often followed by secondary outbreaks, thus indicating local transmission (see Figure 3). In the Russian Federation, the military supply system has been involved in these jumps. Within the Russian Federation, the main route of spread is apparently through the pork marketing chain that brings cheap, inexpensive and contaminated pork and pork products from infected areas. Subsequent swill feeding and improper disposal of carcasses exposes susceptible pig populations. The fact that ASFV remains infective over weeks up to months in tissues and pork products allows its persistence in the environment and in refrigerated and frozen meat and meat products.

The role of wild boar (*Sus scrofa ferus*) in ASF spread and maintenance, although unclear, seems to depend mostly on their population density and the potential interaction with low-biosecurity pig production (free-ranging and scavenging pigs in particular), disposed carcasses of infected animals or food waste containing pork products. In the Russian Federation, wild boar have frequently been found to be infected (see Figure 3), and authorities have subsequently supported increased hunting.

Figure 3. Outbreaks of African swine fever (ASF) in the Russian Federation and Ukraine in wild boar (A) and domestic pigs (B), as of mid-August 2012 (Outbreaks in Georgia, Armenia and Azerbaijan not shown



Source: EMPRES-i, OIE WAHIS

2. DISEASE IMPACT

With the exception of the above-mentioned regions and Sardinia (Italy), where the disease remains endemic, the rest of the world is currently free of ASF. With the increase in outbreaks in many African countries and the recent developments in Eastern Europe and the Caucasus, ASF has received over the past five years increased attention from governments and international organizations alike, because of the threat of further international spread of the disease. If ASF were to be detected in a country or economic community that currently participates in the international pork market as an exporter, the financial losses would increase exponentially. Countries at risk have therefore invested in prevention and early detection, such as a number of simulation exercises in Eastern Europe, preparing contingency plans and increased surveillance efforts. Capacity development efforts have been conducted for veterinary services and their laboratories in European and Asian countries by FAO and other agencies.

The continuing presence and further spread of ASF has hampered pig sector development in sub-Saharan Africa, leaving it well below its full potential. A similar situation has been observed in the Caucasus and Eastern European countries. In the Russian Federation, from 2007 to the mid-August 2012, over 0.6 million animals have died or been culled due to ASF. The overall losses for this period, including indirect ones, are estimated to be around 30 billion Rouble or approx. 1 billion USD (http://www.fsvps.ru/fsvps/news/5123.html).

With ASF mainly affecting the backyard sector, the disease affects the most vulnerable stakeholders of the pig sector, who receive little or no support during the recovery phase, e.g. compensation. Thus, ongoing outbreaks in Africa, Eastern Europe and the Caucasus are constantly threatening the livelihoods and household food security of large numbers of people.

3. EPIDEMIOLOGICAL OUTLOOK

Given the current epidemiological situation, there is little doubt that ASF will continue its geographic expansion in the years to come, as proven by the recent developments in Ukraine. For Europe, this means countries lying along the western border of the Russian Federation should be on highest alert. In addition to preventing ASF expansion into new unaffected areas and reducing the ASF burden on domestic pig populations in southern and eastern Africa, additional attention should be given to new genotypes becoming established outside the sylvatic transmission cycle.

The upsurge of ASF and the continuing failure of conventional prevention and control measures to counter its further spread underlines the urgent need for a shift of focus of the current approaches. FAO recognizes the need to address the small-scale commercial and backyard sectors specifically as key to making progress in controlling ASF through improved communication, awareness, access to extension services at community level and ensuring that small holders receive compensation packages. There is also a pressing need to better understand wild boar population dynamics and their movement patterns, as well as the distribution and competence of soft ticks in the Caucasus, for which further study and resources are needed.

Concerns have also been raised regarding the level of preparedness for a potential introduction into the areas of high pig density in China and Southeast Asia. China alone is home to approximately 50 percent of the world's pig population. Not only can this happen as a result of an eastward spread from the Russian Federation, but special attention must be given to the increased trade-related movement of people and products between this region and the African continent.

4. RESPONSE AND ACTION

EMPRES is currently developing a methodology to empower local communities (pig keepers, butchers, middlemen, etc.) to better prevent and respond to ASF in a sustainable and realistic manner, in particular when veterinary services have serious constraints to support farmers at the local level. The development of the strategies is based on the collection of quantifiable and detailed information on the different aspects of the pig sector (socioeconomics, husbandry, market chains, awareness level, etc). This work evolved from the experiences of FAO's emergency response projects to the ASF outbreaks in Georgia and Armenia, which focused on early detection and control, capacity building for veterinary services and laboratory diagnosis and filling knowledge gaps on risk factors such as soft tick distribution.

At regional level, FAO is seeking consensus with member countries and partner organizations in Africa on a joint prevention and control strategy for ASF for Africa in collaboration with the African Union's Interafrican Bureau for Animal Resources (AU-IBAR) and the International Livestock Research Institute (ILRI). For such purpose, meetings have been held in N'Djamena, Chad, for Central African countries (2011), and Mombasa, Kenya (2012), for eastern African countries. A meeting covering western African countries is also scheduled for late 2012 in Accra, Ghana.

FAO has also established a database in EMPRES-i (EMPRES Global Animal Disease Information System, http://empres-i.fao.org) on host densities (wild boar and the different pig production systems in Eurasia), and disease outbreaks information reported by national authorities. This data will facilitate situation analyses and risk modelling for ASF spread and persistence.

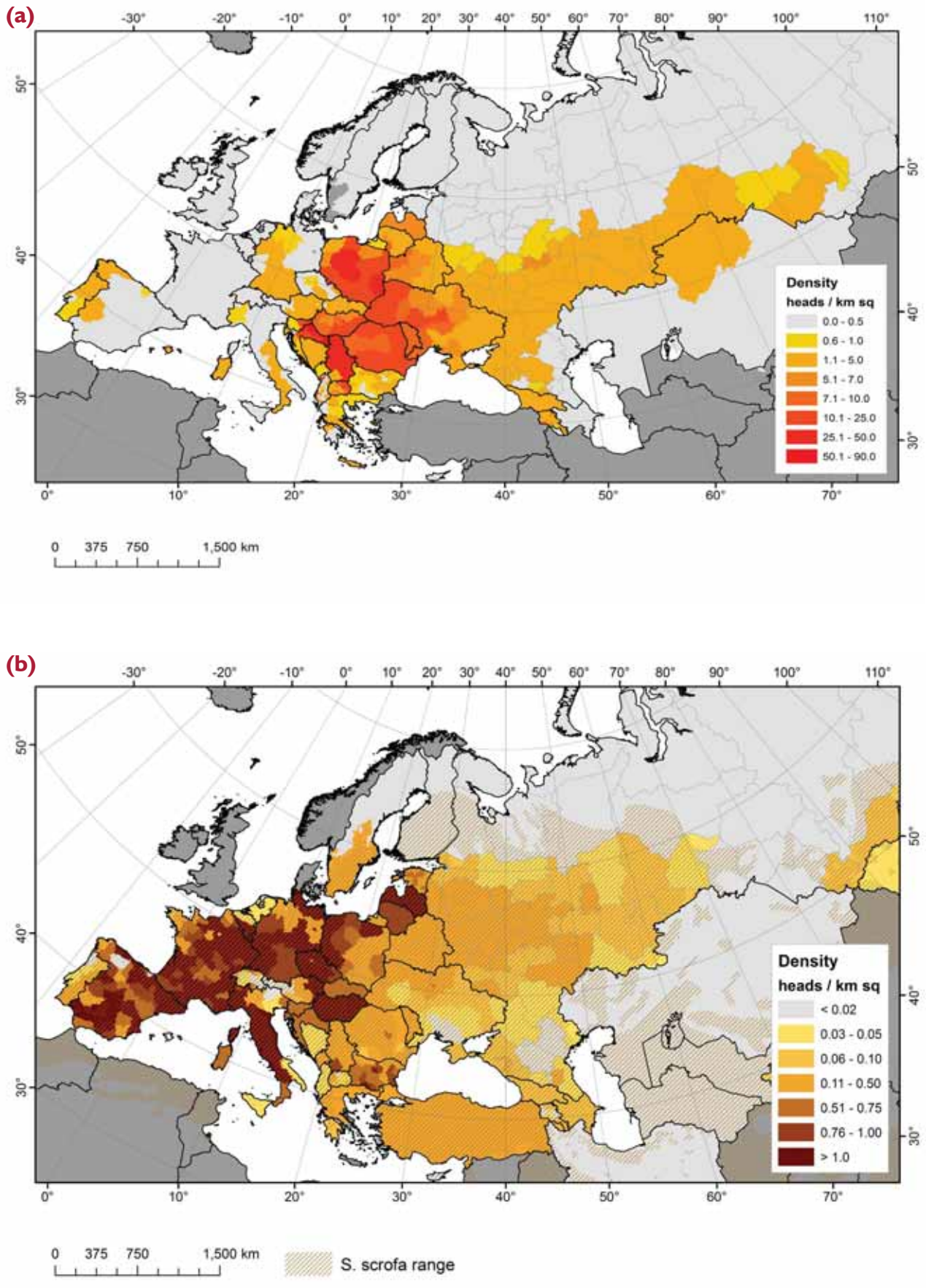
At global level, FAO is in the early stages of shaping a *Global Alliance on ASF*, a multi-stakeholder initiative comprising not only the international organizations and their member countries, but also including research groups and the private sector to join forces against ASF and assure better coordination of activities.

The FAO/International Atomic Energy Agency (IAEA) Joint Division has taken steps to strengthen the diagnostic capacity of veterinary laboratories in European Member States for the quick identification of ASF for early reaction through human capacity building and transfer of technologies, including training courses at the IAEA Laboratory at Seibersdorf in Austria for scientists from East Europe (May 2012; Sponsored by the IAEA Technical Cooperation Department) and Lanavet in Garoua, Cameroon (July-August 2012; Sponsored by USAID funds through the tripartite FAO/OIE/WHO Identify Project and the African Renaissance Funds (South Africa) project run by the IAEA).

5. RECOMMENDATIONS FOR THE PREVENTION AND CONTROL OF ASF AND OTHER INFECTIOUS DISEASES OF SWINE

No vaccines or drugs are available to prevent or treat ASF infection. Therefore, it is particularly important that ASF-free areas are maintained free through strict prevention and control measures.

Figure 4. Densities of (a) pigs in low biosecurity holdings and (b) wild boar in Eurasia



Prevention Import quarantine policy: The OIE Terrestrial Animal Health Code (2012 edition, Sections 2 and 5; http://www.oie.int/international-standard-setting/terrestrial-code/access-online/) provides guidelines for the safe importation of domestic and wild pigs, pork and pork products, pig semen, embryos and ova and other products incorporating pig tissues, such as pharmaceuticals. Attention should be paid to providing adequate regulatory and quarantine services to intercept foodstuffs and other risk materials.

Zoning: If the disease is endemic in only part of a country and it is possible to establish diseased and disease-free zones and enforce tight controls on the movement of pigs and products between zones, then zoning is an important component towards progressive elimination or eradication efforts.

Stamping out and disposal : All infected and in-contact pigs must be humanely slaughtered. Culling or "stamping out" is often rejected by pig owners when there is no compensation programme in place, and this may contribute to dissemination of the disease through uncontrolled or illegal movement of diseased animals. The carcasses of destroyed pigs must be disposed of in a safe manner after stamping out is completed. Carcasses must be burnt or buried deeply, on-site if possible. This may prevent consumption by feral pigs, scavenging animals, or carcasses dragged away from the disposal site. The disposal of very large numbers of pigs in a short time presents environmental and logistic problems. More information on on-site slaughter and disposal procedures is available in the FAO Manual on procedures for disease eradication by stamping out (http://www.fao.org/DOCREP/004/Y0660E/Y0660E00.HTM).

Compensation: Compensation is key to encourage early reporting. The lack of adequate compensation for culled animals (in terms of timing and quantity), may lead to outbreaks not being reported, and to emergency slaughter by farmers either for their own consumption, for sale at local markets, or inappropriate disposal of the carcasses in areas accessible to other domestic, feral or wild swine.

Cleaning and disinfection: The cleaning of organic matter from sheds, equipment, vehicles, etc. is an important step before disinfection. Vehicles and personnel (shoes, clothing and equipment) should be disinfected on entering and leaving farms. The proven disinfectants are detergents, hypochlorites, alkalis and glutaraldehyde. It is important to ensure that the use of disinfectants meets regulatory requirements, as some of these disinfectants may have residual effects or prove damaging to the environment.

Tick control: Elimination of Ornithodorus ticks from old pigsties is a complex challenge, because of tick longevity and endurance. Ticks can resist for long periods without feeding, hidden in cracks that are not reached by acaricides. It is recommended not to house pigs in infested buildings, to isolate the pigsties and even destroy and rebuild these in another location.

Sentinel animals and restocking: Depopulated premises should not be restocked for at least 40 days following cleaning and disinfection. Seronegative sentinel swine should be closely monitored for at least six weeks (clinically and serologically) to detect any re-infection.

Wildlife control: If ASF were to be established in the feral pig or wild boar population it would be much more difficult to eliminate. Accordingly, the strategy should be to minimize contact between feral pigs and domestic pigs, preferably through double fencing of piggeries, elimination or reduction of the numbers of feral pigs in areas where domestic pigs are held, and immediate disposal of carcasses, entrails or other discarded body parts to prevent consumption by feral pigs or other scavengers. If, despite the methods above, the disease were to become endemic in wild boar, there is controversy about the best ways to control it. Hunting pressure may be counterproductive, since it may increase the size of the home-range and force long distance movements. Besides, hunting management does not always reduce the population of wild boar. Supplementary feeding, while maintaining wild boar within a known, well-defined area and limiting dispersal, will increase the opportunity for close contact and disease transmission. Where hunting is regulated, hunters and hunting clubs can be important collaborators of the veterinary services in the surveillance efforts.

6. FURTHER READING

About pigs on FAO's Animal Production and Health. http://www.fao.org/ag/againfo/themes/en/pigs/home.html

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