



CLASSICAL SWINE FEVER

Overview of classical swine fever: learning from regional disease control strategies

Introduction

Classical swine fever (CSF) is considered to be one of the most important diseases of swine, affecting modern swine production systems as well as the livelihoods of small-scale pig holders. CSF has high economic and socio-economic impacts on production systems in Asia, Latin America and Europe. In the European Union (EU), CSF is among the diseases that have caused major socio-economic damage in recent decades. In 1993 and 1994, EUR 10.7 million was spent on outbreaks in Belgium and EUR 21.4 million in Germany, with a further EUR 130 million being spent for market support in 1994. In 1997, an epizootic outbreak centred in the Netherlands resulted in the compulsory slaughter and disposal of more than 10 million pigs, with costs estimated at more than EUR 1 billion. An estimation of the overall economic losses comes to several times these amounts.

Successful eradication of CSF has been achieved in many countries, including in North America, Australasia and parts of northern Europe, and many of these countries have maintained freedom in the absence of vaccination, i.e., with a fully susceptible swine population. Regional control programmes in South and Central America have demonstrated success in the progressive control and elimination of CSF in the past decade, with industry and the public sector sharing common objectives for disease control and eradication.

In developing countries, the economic impact of CSF has consequences for livelihoods in family production systems. Rough estimates for Latin America indicate that between 1997 and 2001 losses due to pig mortality were approximately USD 30 million in Mexico, based on official disease reports. In Chile, between 1983 and 1997, direct losses to morbidity and mortality were estimated at USD 2.5 million (FAO, 2003). This figure does not include the costs of vaccination or other control measures, so the real impact of CSF has been much higher. In addition, underreporting is believed to be high, particularly among small-scale pig holders, owing to the absence of appropriate compensation schemes. In Haiti, the estimated net benefits for a ten-year CSF vaccination programme ranged from USD 16.4 million to USD 32.0 million after the costs of the programme were deducted. Cost-benefit analysis indicates that there are very strong economic arguments in favour of an intensive, national CSF control programme in this country, where smallholders account for almost 90 percent of the pig population (FAO, 1997). Studies of smallholders in Honduras (McCauley, 1997) indicated that mortality attributable to CSF was 13.5 percent of total mortality on a pig holding, and the case fatality rate was between 40 and 70 percent. The same author concluded that control of CSF could reduce total mortality on a small-scale pig holding by 21 percent.

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French white pigs cross-bred with local Beninese variety for better meat and natural resistance to disease



The progressive control and eradication of CSF in Latin America and Europe are examples of the successful use of such tools as vaccination, effective disease surveillance systems and rapid reporting from farmers, good capacities at laboratories, early diagnosis, rapid elimination of infected herds, and control of animal movement. In some countries where CSF has been eradicated, including Chile, innovative follow-up schemes such as insurance policies were set up during the last phase of the programme, to cope with potential losses from any resurgence of the disease. However, despite intensive efforts at the national and regional levels in Central and South America, the complete eradication of CSF from some regions has proved to be elusive; CSF is still endemic in many countries, and spill-over is observed from these areas to free areas around the world. This phenomenon is most likely due to persistence of the virus in domestic pig populations in endemic settings, while wild boar and wild pig populations play a role in CSF transmission in some regions, such as in parts of Europe and the Balkans.

Dynamics of CSF

CSF occurs under natural conditions in domestic pigs and wild boars (*Sus scrofa*). Infected pigs can transmit CSF virus to other pigs by direct contact. Swill-feeding plays a major role in the introduction and spread of CSF virus into new areas. For example, outbreaks in Europe in 1997 were caused by virus strains originating in Asia and introduced via the illegal feeding of swill to pigs in Germany.

CSF remains widespread in several regions; in others, CSF status is unknown owing to lack of surveillance (Figure 1). CSF is widespread in Andean countries, the Caribbean, Asia and Eastern Europe. For example, in their reporting to the World Organisation for Animal Health (OIE) for 2010, 59 countries reported occurrences of the disease; 73 countries reported disease absence for 2010 – of these 12 had reported CSF in the previous two years (2008 to 2009); and 24 countries reported new cases of CSF.

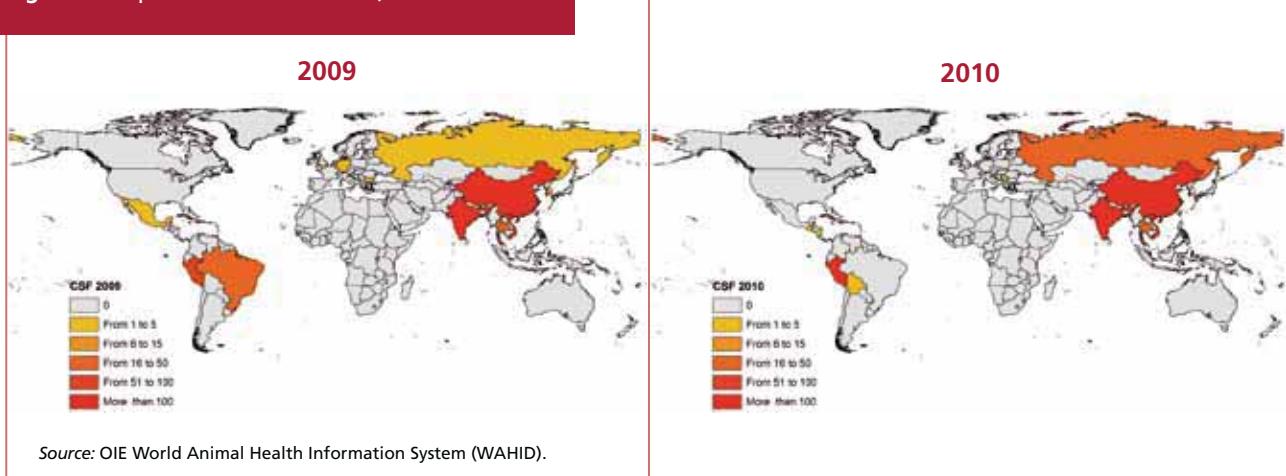
However, the true incidence of CSF is underestimated in some endemic regions due to the weakness of the veterinary services and shortage of resources for CSF surveillance, diagnosis and control activities.

In Latin America, for example, epidemiological and ecological characteristics of the regional distribution of CSF include continuing trends in the demand for pork and pork products, and increased investments in swine, which have low production costs so can compete advantageously in international markets. The cost price of pork in Brazil is 25 percent lower than it is in Western Europe and 10 percent lower than in Canada and the United States of America. Feeding of swill in family production systems is another factor that supports CSF transmission and spread in endemic settings. Family production systems, which are predominant in developing countries, constitute a favourable environment for disease transmission and virus maintenance and perpetuation. The main challenge is the difficulties veterinary services face in implementing appropriate CSF control and eradication measures in backyard systems (Vargas Terán, Calcagno and Lubroth, 2004).

A young girl on a family farm feeding the pig, chickens and turkeys in Santa María de Fantasma in Nicaragua



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Figure 1: Reported CSF outbreaks, 2009 to 2010

In general, CSF prevention and control is based on the application of biosecurity measures and prophylactic vaccination. However, in some countries where CSF is still endemic, progress towards control and eradication is very slow and is strongly influenced by economic and social factors. In these endemic settings, the role of backyard pigs in the epidemiology of CSF seems to be crucial but is not fully understood. There is therefore a strong need for increasing knowledge about CSF and intervention strategies in these systems. Although large-scale commercial farms have successfully controlled and eradicated CSF in countries with a high proportion of family production systems, there are still substantial challenges to addressing CSF eradication and keeping commercial and integrated systems free in the presence of family production systems, where disease transmission can be sustained. CSF persists in endemic areas because of such factors as lack of capacity among veterinary services, absence of robust diagnostic capacity and effective surveillance, lack of quality control and registration of vaccines and vaccinations, lack of adequate compensation schemes to encourage early reporting by farmers and private veterinarians, and lack of a regional strategy for CSF elimination. In endemic areas, CSF seriously affects small production units, livelihoods and food security, particularly in rural communities; CSF therefore not only has implications for international trade, but is also a food security threat.

CSF is still present in some countries in the Andean and Amazon regions, but progress has been achieved in parts of Brazil and Colombia. Uruguay, Chile, south Brazil and Argentina are free of CSF, and an intensive control programme is being developed for areas of the Andean region where CSF is still endemic. Central America has made important advances in the eradication of CSF, with only sporadic outbreak occurrence. Mexico was declared free of CSF in 2009, while three Caribbean countries are still considered CSF endemic – the Dominican Republic, Haiti and Cuba.

Some countries in the EU have reported CSF in wild boars: Germany, France, Slovakia, Hungary, Bulgaria and Romania. The disease has also been reported in countries of Eastern Europe.



Many countries in Asia report regular outbreaks of CSF to OIE. CSF is considered to be endemic in China, which has almost half of the world's total pig population, and southeast Asia. Most CSF control in endemic countries is carried out by the private sector, with few initiatives promoted by official veterinary services. In Africa, the CSF situation is uncertain, with South Africa and Madagascar reporting outbreaks; further surveillance efforts are needed to differentiate between areas where there is no circulation of the virus and those where the disease could be circulating without being reported.

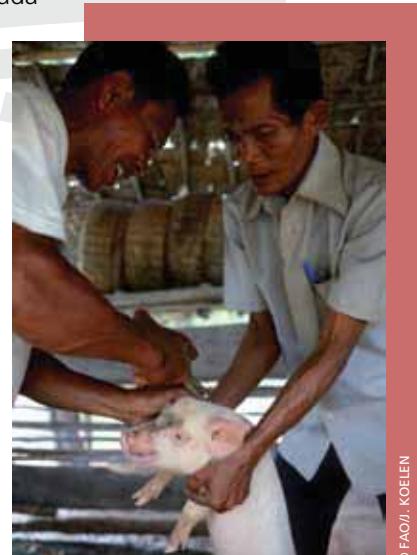
CSF control: experience from regional approaches

Based on experience from regional strategies for CSF control in the Americas, common strategies can help to harmonize control efforts, both technically and financially. Common strategies support the coordination of CSF control in endemic countries and the progressive increase in zones and countries that are free from the disease. Inspired by regional experience in the control and eradication of foot-and-mouth disease (FMD) and New World screwworm (Vargas-Terán, Calcagno and Lubroth, 2004), a plan for tackling CSF has been developed. The plan includes a control phase, followed by an eradication phase and a final disease-free phase.

However, although CSF has been eradicated in some regions, new approaches to its control may be needed in remaining infected regions where it persists. There are no official reports of the disease in Africa, except for in South Africa and Madagascar, where African swine fever (ASF) is also reported. This lack of reporting from African countries indicates that more CSF surveillance efforts should be implemented and differential diagnosis with ASF carried out routinely.

One challenge for CSF is that the virus can be maintained in domestic pig and wild boar (*Sus scrofa*) populations, creating the risk of transmission between species. In countries with significant wild boar populations, increased efforts are being made to improve the prevention of and response to CSF cases in wildlife, together with other measures to decrease the risks of transmission between domestic pigs and wild boars. In some wild boar populations in Europe, the CSF virus is maintained because dense populations and high fertility result in large numbers of susceptible offspring, which can maintain virus circulation.

The OIE Terrestrial Animal Health Code (Chapter 15.2) establishes the conditions and requirements for declaring disease freedom in a country, in domestic pig and/or wild boar populations. Controlling and eradicating CSF is particularly challenging in developing countries that are affected by both CSF and ASF. The two diseases have very similar clinical signs, and surveillance based on clinical signs cannot differentiate between them. In the Russian Federation, Eastern Europe and parts of Africa – where differential diagnosis is inaccurate and based solely on clinical signs and laboratory testing is not routine for every suspected outbreak – the incidence of CSF disease is under- or overestimated. A new OIE procedure for official recognition of disease freedom is expected to be in operation in 2013.



Vaccination against classical swine fever in pigs

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Advantages for CSF control and eradication

Some characteristics of CSF make it a very interesting target for effective control and eradication at the regional level:

- In all countries where CSF occurs, the public and private sectors have included it as a priority livestock disease for control and eradication.
- CSF virus is genetically stable and has not incurred significant changes and mutations. This stability supports the wide use of live attenuated vaccines for CSF as a very safe way of providing excellent immune protection, when vaccination schemes are correctly applied. Vaccination is a tool for controlling CSF in endemic areas, and can also be used as a response measure in an emergency situation.
- CSF control in family production systems brings benefits for the food security and increased quality of food for rural and urban populations.
- Global pork production increased from 24.7 million tonnes in 1961 to 86.6 million tonnes in 2002, with the global trade of pig meat increasing by 9.9 percent a year since 1992. This expansion of the pig industry represents serious challenges for biosecurity and swine health and for ensuring the quality of pork products, food safety and the effective control of swine diseases. Most CSF control in Western Europe, the Americas and Asia is in emerging economies where there is rapid expansion of the pig industry accompanied by a continuing important presence of and contribution from small-scale pig holders.
- Following the request of member countries, OIE has resolved to include CSF in the diseases with official recognition status. This procedure is planned to be implemented in 2013. Official recognition of CSF-free status will encourage countries to embark on the progressive control and eradication of CSF and creates strong incentives for the Food and Agriculture Organization of the United Nations (FAO) to expand its technical assistance to regional strategies and national control/eradication programmes.
- Regions such as Latin America have positive experience of the progressive control and eradication of CSF in different production systems. CSF control is well advanced along the progressive control pathway in countries where economic and social factors have been addressed, including the establishment of good public-private partnerships. For example, the Continental Eradication Plan for the Americas is committed to declaring freedom from CSF in the Americas by 2020. However, in other regions and countries, such as China and Africa, the CSF situation remains uncertain, so more surveillance and research are needed to support control and eradication. In Europe, CSF has been eliminated from domestic pig populations, but remains a challenge because of the difficulty of controlling the disease in wild boars.
- Lessons learned from the emergence of highly virulent swine diseases – such as porcine reproductive and respiratory syndrome (PRRS) in southeast Asia and China since 2007, or porcine teschovirus in Haiti in 2009 – clearly show that control of pig pathogens represents a major challenge that calls for a more balanced approach to swine disease control, particularly in China, which contains almost half of the world's 1 billion swine population (450 million pigs) (FAOSTAT, 2009).



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