Peste des petits ruminants (PPR)

An increasing threat to small ruminant production in Africa and Asia

Introduction
Sheep, goats, swine and poultry are the main farm animals owned by the poor in most developing countries. Goats, the “cattle of the poor”, and sheep are reared as sources of not only milk and meat for family consumption, but also of income that can easily be mobilized for paying household expenditures, particularly in lean times. In addition to this economic role, sheep and goats have significant sociocultural roles. They are used as gifts or sacrifices for traditional rituals and religious purposes, such as Eid for Muslims. Unfortunately, in many areas of Asia and Africa, small ruminant production – and therefore the livelihoods of poor farmers – is threatened by transboundary animal diseases (TADs) such as peste des petits ruminants (PPR).

A highly contagious TAD of wild and domestic small ruminants, PPR is caused by a morbillivirus similar to rinderpest virus (RPV). It is an infectious disease that spreads in endemic regions through nomadic herding and livestock trade, and it is on the list of economically important animal diseases to be notified to the World Organisation for Animal Health (OIE). The typical clinical form is acute PPR, which is characterized by high fever, depression and anorexia, followed by ocular and nasal discharge, erosive stomatitis, pneumonia and severe diarrhoea. High morbidity and mortality rates of up to 80 or 90 percent in affected herds make PPR an important killer disease for small ruminant populations. The direct economic losses caused by the disease are aggravated by the sanitary measures imposed by authorities to control animal movement and by trade restrictions on animal by-products. Not only does this severely affect rural economies, but it also reduces genetic resources and endangers breeding policies. Because of the negative economic impact on countries affected by PPR, the disease is one of the priorities of FAO’s Emergency Prevention System for Transboundary Animal and Plant Pests and Diseases (EMPRES) programme. In the early 2000s, an animal disease consultancy singled out PPR as an important animal disease to be taken into consideration in poverty alleviation policies (Perry et al., 2002).

For a long time, PPR was incorrectly considered to be a West African disease. However, with the advent of specific diagnostic tests that enable differentiation between PPR and similar diseases, the known geographical distribution expanded quickly between the late 1980s and the mid-1990s to cover all the countries in Africa between the Sahara and the Equator, the Near East and the Indian subcontinent. Since the beginning of 2000, PPR has emerged in other areas, probably because of the intensification of animal movements and because the disease is increasingly well known and diagnosed. Since 2007, an estimated 1 billion sheep and goats in Africa and Asia are at risk of PPR.
PPR: an emerging disease in Asia since 2000
From the Indian subcontinent, which was a known PPR endemic area in the late 1990s, the affected zone expanded westwards to reach Afghanistan and Tajikistan in 2002 to 2004 (Kwiatek et al., 2007). By 2007 the disease had progressed eastwards, with the first official recognition of PPR in China, in the Tibet area. The affected animals were goats, with apparent morbidity and mortality rates of 71 and 50 percent, respectively.

PPR: an emerging disease in central and north Africa since 2000
PPR's first appearance in Africa's equatorial zone was in Gabon in 1996. It was not until 2002 that PPR was recognized and diagnosed in neighbouring countries, the Congo and the Democratic Republic of the Congo. These countries are not important sheep- and goat-rearing zones, but the identification of PPR indicates that the disease had moved southwards, to threaten other countries, where it could cause significant losses.

After confirmation of the outbreaks, and to avoid further spread of the disease, FAO's Technical Cooperation Programme (TCP) project Assistance d’urgence pour le contrôle de la peste des petits ruminants (PPR) (Emergency Assistance for the Control of Peste des Petits Ruminants [PPR]) was implemented in the Congo from November 2006 to March 2008. Training was undertaken in PPR epidemiology, disease recognition and laboratory diagnostics. The national laboratory in Brazzaville received capacity strengthening in PPR sero-monitoring and testing of other TADs. A country-wide vaccination campaign was established, and more than 80 percent of the small ruminant population was vaccinated.

The most alarming PPR event in 2008 occurred in Morocco. Two outbreaks, detected in mid-July 2008 in the centre of the country, were officially reported to OIE by the Moroccan veterinary services. Through surveillance activities, the disease was found to be widely spread beyond the index farms to most of the central and northern parts of Morocco. By mid-November 2008, a total of 257 outbreaks were recorded in 36 of Morocco’s 61 provinces. Apart from Egypt, which was first known to be affected by PPR in 1989, the Morocco outbreak is the first case of PPR in North Africa. This emerging situation is of great concern for neighbouring countries, especially Algeria and Spain, which historically have intense commercial interests in Morocco. In response to a request for assistance from Morocco’s Ministry of Agriculture, the Crisis Management Centre – Animal Health (CMC-AH) at FAO sent a team of experts to Morocco in August 2008 to help the government implement urgent measures to control the disease. In spite of low overall morbidity and mortality rates (11.9 and 5.5 percent respectively) the Moroccan veterinary services reacted very
quickly with an important vaccination campaign of small ruminants. In three months, about 20.6 million of the country's 25 million sheep and goats were vaccinated. This action rapidly controlled the disease. A TCP project was started in Morocco to help strengthen the country’s PPR surveillance and to monitor the vaccination campaign. At present, it is not known how the disease entered Morocco, but its spread within the country was made possible by intensive sheep movements in July and August in preparation for Islamic festivals that took place a few months later.

Gene sequence analysis has facilitated the classification of PPR virus (PPRV) strains into four lineages. Lineages I, II and III are found in West, West-Central and East Africa, respectively. Lineage IV is found in the Near East and Asia. The sequence data of the Moroccan PPRV strain nucleoprotein gene show that this is a PPRV IV strain; this marks the first time this lineage has been detected in Africa, where all four lineages are now present.

**PPR: an emerging disease in eastern Africa**

In eastern Africa, PPR is known to have been present in the Sudan and Ethiopia since the 1980s. Kenya and Uganda officially reported their first outbreaks in the Turkana/Karamoja ecosystem in 2007. Since then, the PPR virus has been confirmed...
in most pastoral areas in Kenya, Uganda and Somalia. It is now threatening northern parts of the United Republic of Tanzania, thus putting at risk the countries of the Southern African Development Community (SADC).

Kenya
The Kenyan authorities first suspected PPR in March 2006 in Loima and Oropoi Divisions of Turkana North District, Rift Valley Province. The PPR virus was isolated in August 2006 from samples from sheep and goats in two villages in Oropoi. The Kenyan authorities notified OIE of the country’s first PPR occurrence in January 2007, and quarantine measures were put in place in Turkana. Between August 2006 and March 2007, a total of ten outbreaks were reported in four divisions of Turkana, with an overall morbidity rate of 13 percent (68 percent for the first two outbreaks) and a case mortality rate of 73 percent; young goats were the most susceptible. Participatory disease surveillance conducted in January 2007 in North, South and Central Districts of Turkana revealed a PPR morbidity rate of 82 percent and case mortality of 64 percent in 20 affected areas. A second survey was carried out in July 2007, in Samburu, Baringo and East Pokot Districts. Communities described a new PPR-like disease that had started two years previously. The annual herd PPR prevalence rate was found to range from 7 to 13 percent, and the annual herd mortality rate from 5.5 to 7 percent.

By the end of 2007, the disease was confirmed in nine districts: North and South Turkana, Moyale, Samburu, Baringo, East and West Pokot, Marakwet and Wajir. By September 2008, PPR had infected ten additional districts: Marsabit, Mandera, West Laikipia, Ijara, North Pokot, Isiolo, Garissa, Kajiado, Narok and Tana River.

Figure 2 shows the spread of PPR in Kenya: more than two-thirds of the country is infected, including all arid and a few semi-arid districts. Between February 2007 and September 2008, about 2.5 million sheep and goats, including 1.7 million in Turkana districts, were vaccinated. A multi-funded campaign to vaccinate about 15 million small ruminants was carried out with funds from the Kenyan government’s Soaring Food Prices (SFP) initiative, the United Nations’ (UN’s) Central Emergency Response Fund (CERF), the United Nations Development Programme (UNDP) and FAO. This massive vaccination campaign covered both infected and at-risk districts. Reports from the Department of Veterinary Services indicate a decrease in new cases of the disease.
Figure 2: PPR in Kenya from 2006 to 2008

Source: Generated using information obtained during implementation of project TCP/RAF/3113(E) and data from Ministry of Agriculture, Animal Industries and Fisheries (MAAIF)
Uganda
The PPR outbreak in Uganda is thought to have started in May 2006 in Kaabong and then Kotido Districts of the Karamoja area. Suspected cases were reported in neighbouring Moroto District in January 2007. The Moroto outbreak of April 2007 was confirmed and notified to OIE in July 2007, and quarantine measures were put in place. In September 2008, the five districts of the Karamoja area (Kaabong, Kotido, Abim, Moroto and Nakapiripirit) and two other districts (Kitgum and Kapchorwa) were reported infected. Following suspicions that the disease could have made incursions into zones neighbouring the seven districts known to be infected, serological studies undertaken using ELISA by the regional TCP project RAF/3113 showed evidence of PPR in Amuria, Bukeeda, Bukwa, Katakwi, Lira, Pader and Sironko.

**Figure 3: PPR in Uganda in 2007 and 2008**

Source: Generated using information obtained during implementation of project TCP/RAF/3113(E) and data from Ministry of Agriculture, Animal Industries and Fisheries (MAAIF)
It is thought that a third of Uganda’s 8 million sheep and goats are at risk of PPR. There are no consistent consolidated data on mortality, but a rapid participatory assessment conducted by stakeholders in October 2007 in Karamoja indicated an estimated 200,000 to 400,000 deaths from PPR since the onset of the outbreak, affecting mainly goats. A multifunded vaccination campaign was initiated in December 2008 in the five districts of Karamoja, and 2.4 million doses of homologous vaccine were administered. The vaccination campaign should be completed by March 2009. Institutions and organizations involved include CERF, the Governments of Ireland and the Republic of Italy, and FAO. Other districts at high risk, including Mbale, Kapchorwa, Bukwa, Sironko, Kumi, Bukeeda, Amuria, Katakwi, Kabiramaido, Padel, Kitgum and Lira, have also been covered by the vaccination campaign (Figure 3). Vaccination is ongoing in affected and high-risk districts through local, national and international non-governmental organizations (NGOs), supervised by government veterinary services.

In summary, PPR is fast spreading to the south of East Africa from its initial epicentre in Karamoja, Uganda, and Turkana, Kenya. The United Republic of Tanzania is currently infected, threatening other SADC countries that are currently free from the disease. This calls for prudent management of the disease through effective risk assessment, risk-based surveillance, improved border control, public awareness, appropriate sanitary measures and vaccination to avoid further spread in the SADC region. Should the disease spread further south, the results would be disastrous for native small ruminant populations. This would affect both food security and small ruminant trade, and have serious socio-economic consequences on stakeholders’ livelihoods.

Conclusion

The importance of sheep and goats for farmers’ livelihoods varies according to the agropastoral system in which they are raised; these animals are the main assets for the poor. In most countries where the disease is endemic, PPR is the main infectious killer disease of small ruminants, and therefore the most important threat to the livelihoods of poor farmers. Because of its high mortality rate, PPR affects food security directly by reducing the availability of meat and milk for family consumption and of funds for purchasing other commodities and foods, for which prices are increasing. The overall consequence of PPR outbreaks will be increased vulnerabilities for communities that are already facing such challenges as agroclimatic changes and civil unrest. PPR prevention and control should be considered a public good.

References

