Effective control methods against peste des petits ruminants

Adapted vaccine and national mobilization

The vaccine developed by CIRAD and its partners against peste des petits ruminants (PPR) is the outcome of work undertaken as early as 1980. Today, it remains the most effective way of controlling this destructive disease. The mass campaign undertaken with the Moroccan production company, Biopharma, and the Moroccan veterinary services in 2008 helped to "save" the Eid celebrations–and the country in the long term–under appropriate economic conditions.

Goat affected by PPR with scabs at the corners of the lips. © H. Salami

Restraining of a goat with PPR by inhabitants of the village of Nguekhokh near Thiès, Senegal. © H. Salami

Peste des petits ruminants (PPR) is a highly contagious infectious disease of viral origin that affects small domestic and wild ruminants. To date, it is the most widely propagated disease in goats and sheep: it affects a billion animals in Africa, Asia and the Middle East.

An economically damaging global disease

PPR was described for the first time in Côte d'Ivoire in 1942. Several clinical cases were then declared, gradually, in other regions of West Africa. Its presence was then confirmed in Nigeria, Senegal and Ghana. It seemed that the epidemic was confined to the west of the continent, until a disease affecting goats occurred in Sudan in 1972. It was first diagnosed as rinderpest, but was later confirmed to be PPR.

It is only recently that the true extent of the disease has been determined, but it is still spreading in Africa, India and in other regions of West and South Asia.

A zone where PPR is rife, in Niayes. Village of Kassack, Senegal. © H. Salami

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Development by CIRAD of an effective vaccine

Vaccines and preparations for the Moroccan campaign. © Biopharma

PPR can cause considerable economic damage through the death rates it causes–between 20 and 80%. At the beginning of the 1980s, CIRAD took the initiative to develop an attenuated vaccine in conjunction with the Pirbright Institute for Animal Health (IAH, United Kingdom). The vaccine was obtained by the successive passage of the Nigeria 75-1 virus strain on cell cultures. Its effectiveness was established between 1989 and 1996 in large-scale trials involving over 98,000 animals during the development phase.

To date, this vaccine is the most effective way of controlling the disease. It provides at least three years of immunity, i.e. more than the average economic life span of small ruminants. It has now been used for twenty years and has proved its scope, its easy inoculation and its low large-scale production cost. In addition, improved freeze-drying methods have enhanced its stability in the production phase, and during its reconstitution under hot climatic conditions.

Biopharma bioreactor. © Biopharma

The Moroccan crisis confined within a few weeks

PPR was first reported in Morocco in July 2008. The Moroccan authorities then urgently requested CIRAD's support in preventing a social and economic crisis with the approaching Eid celebrations in December when 5 million sheep were due to be ritually slaughtered. CIRAD immediately sent the master seed strain of the PPR vaccine to a private national laboratory, Biopharma, in close collaboration with the Moroccan veterinary services.

Biopharma was able to produce 25 million doses of the vaccine in a few weeks. The Moroccan veterinary services then organized a mass vaccination campaign involving 20 million sheep before the celebration. At the same time, epidemiological investigations were carried out and a strain of the PPR virus was isolated in CIRAD's laboratories in Montpellier. After partial genome sequencing, it appeared that the incriminated virus came from lineage IV, of Asian origin. No infection was reported after the vaccination campaign, but further mass campaigns were organized in 2009 and 2010.

Expertise to be transferred

The cost price of producing the vaccine was judged to be of interest by the Moroccan State and much cheaper than procuring supplies on the international market which, moreover, would have been unable to supply the vaccines in the time available. The lead time time was considered acceptable by the veterinary services, which were effectively able to begin vaccinating the sheep less than two months after the infection was declared.

The Moroccan veterinary services, Biopharma and CIRAD propose to transfer their experience to countries affected by this disease.

Selection of sheep in their pen for samples to be analysed, village of Déali,near Dara, Senegal. © H. Salami

Partners

- **Austria:** FAO/IAEA, Joint division of nuclear techniques in food and agriculture
- **Morocco:** veterinary services, Biopharma
- **Portugal:** IBET, Instituto de Biologia Experimental e Tecnológica
- **United Kingdom:** IAH, Institute for Animal Health