



Five diseases, one vaccine - a boost for emerging livestock farmers in sub-Saharan Africa

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Key messages

- South African and Canadian scientists are developing two innovative, 'new generation' livestock vaccines that aim to be affordable, heat-stable and provide long-term protection.
- The first vaccine is targeted against five important viral diseases affecting sheep, goats and/or cattle using a single injection.
- A second vaccine, currently in an earlier stage of development, should for the first time, provide vaccination protection for pigs against African swine fever.
- The links between vaccine development and economic and social factors are being studied, to evaluate the economic impacts and ensure the relevance and uptake of the new vaccines by emerging (small-scale) farmers.

other products, they are a measure of wealth and social standing; they are used for barter, as lobola (bride price) at traditional weddings, and also as a 'bank', whereby animals can be sold to pay for emergency needs, such as funerals. Given the diverse uses of livestock and their socio-economic importance in farming communities, the loss of even a single animal has a significant and sometimes crippling effect on a family.

Unfortunately, the African continent is home to 12 of the 16 most devastating animal diseases globally and eight of these occur predominantly in sub-Saharan Africa. Many of these are viral diseases and have been described as a bane for agricultural development.

A highly effective way of controlling infectious diseases is through vaccination, as an integral part of primary animal healthcare. However, although commercial farmers generally make good use of livestock vaccines, emerging livestock farmers face major challenges in effective vaccine acquisition and use. In particular, there are low levels of awareness of the importance and correct use of vaccines, cost factors, accessibility, and the importance of a continuous cold-chain to maintain vaccine efficacy.

Context

Livestock are essential to the economic, nutritional and social wellbeing of African farmers. Besides providing food, clothing and

Single vaccine to control 5 animal diseases

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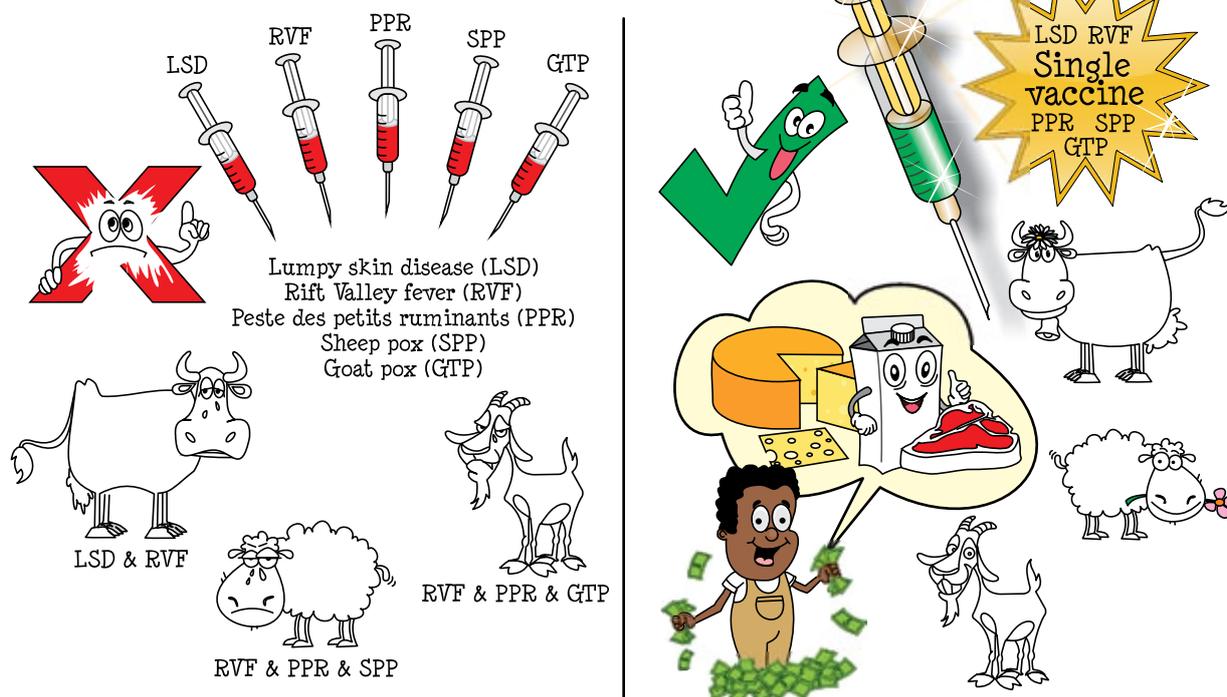


Figure 1. Cartoon depicting potential benefits to farmers following use of the single vaccine

Emerging outcomes

A single vaccine for cattle, sheep and goats

Senior scientists at the Agricultural Research Council-Onderstepoort Veterinary Institute in South Africa have assembled an international research team to develop a new vaccine (Figure 1) giving protection against five important livestock diseases. The vaccine will protect cattle against Rift Valley fever (RVF) and lumpy skin disease (LSD), and sheep and goats against RVF, sheep pox (SPP), goat pox (GTP) and *peste des petits ruminants* (PPR). This vaccine will have low production costs (and therefore be affordable to emerging farmers), be heat-stable and should provide long-term protection, potentially only requiring a single injection.

The first stage of developing the vaccine is complete, with pilot studies under contained conditions indicating that the vaccine protects cattle against LSD, sheep against SPP and goats against GTP. Stage two is now in progress, under which the RVF and PPR protective components are being included. Studies on how to improve

immune responses and vaccine stability are also underway. Once the second stage is complete, it will be evaluated for immune responses and protection in cattle, sheep and goats.

Research is also targeting the development of a second vaccine, to protect pigs against African swine fever (ASF). This work is more challenging, as the protective components of the virus are still unknown. Despite this, good progress is being made.



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ARC employees conducting a field survey on livestock problems with an emerging farmer in Bultfontein, Free State Province

The South African-led research team has included scientists from the Canadian National Centre for Foreign Animal Diseases, the Vaccine and Infectious Disease Organization and the University of Alberta, as well as experts from Europe and Australia.

Integrated gender and socio-economic analysis in vaccine research

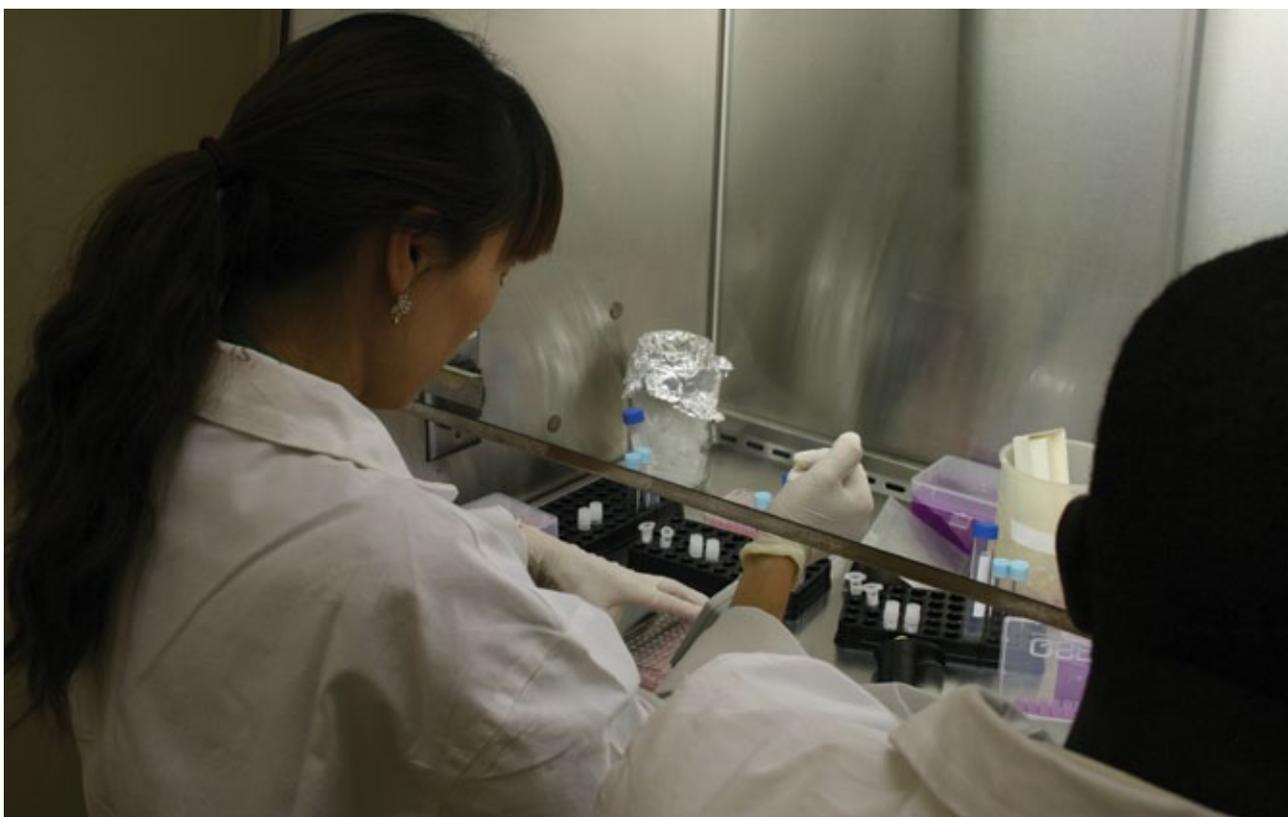
To ensure the relevance of the vaccines to emerging farmers, the project is using an integrative and gender responsive approach, linking vaccine development with education, economics and social science. This involves developing training courses for veterinary technicians, field officers and emerging farmers, engaging directly with farming communities, and disseminating livestock disease information via pamphlets and brochures. Linked to these activities are studies on gender roles in livestock farming, and the development of action plans to address gender inequalities. Studies are also being carried out on the economic impacts of livestock diseases on emerging and commercial farming communities, and the positive effects of vaccination. In addition, training courses are being developed for animal health technicians, to facilitate education of emerging farmers in

livestock diseases and primary (preventative) animal healthcare. Training course and information materials developed within the project will be modified for use outside South Africa, and translated into indigenous languages as necessary.

Broadening partnerships

An important outcome of the project is the building of partnerships beyond the usual scope of vaccine development. The project team has expanded to include social scientists from the South African Human Sciences Research Council (HSRC), in order to conduct a gender and socio-economic analysis of livestock farming practices. The results of this analysis may be used to advise policymakers on ways to address gender inequalities; this will be in collaboration with gender experts from Canada, Kenya and South Africa.

Central to the analysis is the idea that empowering women farmers, through access to markets, production resources and information, can increase agricultural output and reduce poverty and inequality. Key concepts that will be examined include: the gendered division of labor among emerging farmers; access to and



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Scientists involved in a training workshop held at ARC



Emerging farmers discussing an information pamphlet developed within the project

control of resources and benefits; participation and decision-making; and gendered needs of farmers. The findings will lay the foundation for further research on gender-sensitive innovation in livestock farming systems. A second study will evaluate the economic impacts of two diseases (LSD and RVF) on the South African economy and emerging farmers.

Conclusion

Livestock are an important source of income, social status, food security and stability to African nations. While vaccination has proven to be highly effective in preventing disease outbreaks, and has even led to the eradication of one livestock disease (rinderpest), most losses within Africa's livestock sector continue to result from disease. The availability and effective use of vaccines remain a challenge to emerging farmers. In this context, new approaches to vaccine development - coupled with education and addressing gender inequalities - may be an important step to controlling Africa's major livestock diseases, and alleviating poverty.

The researchers believe that the vaccines will have the potential to control six important African livestock diseases. But, in order for them to be effectively used by emerging farmers, education in livestock care and vaccine use is

critical and has been initiated. Ultimately the result of this project is seen as being greater food and economic security through improved animal health as it relates to the increased availability of food and other products from animals, such as milk, cheeses, meat, wool, hides, yoghurt and 'maas' (soured/fermented milk). The vaccines should be low-cost, easy to administer, stable and provide long-term protection.

References

- IDRC. Vaccines to Combat Livestock Diseases in Sub-Saharan Africa. <http://bit.ly/Ou09uA>.

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