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Livestock and their Health Products and Services

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Livestock and their Health Products and Services

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The contributions of livestock to food security and poverty alleviation are coming under increasing international scrutiny, particularly as livestock producers are also challenged to respond to global warming and the emergence of new diseases. Research is vital to increase efficiency of production, to understand the importance of livestock in agricultural systems and to protect animals and people through disease control programs. For animal health research one of the challenges is to balance public and private efforts and ensure that the demands for livestock and human health are met.

Lack of incentives for cooperation between the private and public sector has led to the neglect of some important livestock diseases (for example some tick-borne diseases) and of livestock diseases than can infect people (for example brucellosis) that remain prevalent in many poor countries in Asia and Africa.

New approaches are required to increase the effectiveness of private–public cooperation in

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developing new products including vaccines, drugs and diagnostics. Among these new approaches the Global Alliance for Livestock Veterinary Medicines (GALVMed) builds relationships at the outset of research and continually manages the partnership when results emerge, products are evaluated and opportunities arise.

A second approach is to improve the access of poor livestock keepers to the markets for their livestock which in turn provides access to animal health products and the technical support to use them effectively. Australia supports projects to increase market access for livestock products and animal health inputs in many Asian and African countries.

The combination of these approaches — improving the supply of appropriate product from industry, and enhancing access of poor farmers to markets — builds new pathways for research to deliver benefits to the poor.

Introduction and background

Livestock agriculture represents 33% of global agricultural gross domestic product and both production and consumption of meat are increasing rapidly in developing countries. In 1980 meat consumption in developed countries was five times that of developing countries. Now they are equal. By 2030 it is forecast that developing country consumption will be double that of developed countries (World Bank 2009).

Against this background, livestock production attracts attention in current debates on food security, global greenhouse gas emissions and as a source of diseases that can affect humans. The context of that attention is often negative while dismissing the essential contributions that livestock make by, for example, reducing the risks from droughts and diseases that affect crop pro-

duction, their ecological role in conversion of crop and industrial by-products, and the positive health effects of protein and micronutrient supply (Steinfeld *et al.* 2006; World Bank 2009).

Epidemics of livestock disease attract widespread attention when they affect trade, disrupt travel or offend public standards for animal welfare. In developing countries, global attention focuses on human losses and disruption of international travel and trade. However, these dramatic occurrences are insignificant compared to the cost of chronic and endemic diseases that are rarely fully quantified and are a recurring yearly loss. The main approaches at the disposal of livestock managers and veterinarians are effective quarantine and biosecurity, good husbandry and a sound understanding of the needs of productive, healthy stock. The vaccines and chemical drugs available through private and public supply chains are vital tools in such effective health management. This paper deals with the supply of animal vaccines and attempts to identify gaps in both product development and supply for livestock production in developing countries, and describes two new approaches to enable the private and public sectors to work together to fill these gaps.

Professional and sectoral barriers

In the early 1980s a typical meeting of agricultural researchers with livestock producers would often be characterised by arguments between the professions: breeders arguing with nutritionists arguing with veterinarians about which approach was most likely to increase productivity or prevent disease. The scientific fields of genetics, nutrition, vaccine and drug development were advancing so quickly that expectations of ‘silver bullets’ in each of these fields were high. Economists at such meetings would present partial budgets but lack good data on the costs of disease. Soil and water scientists, market analysts and retailers were mostly not part of the debate. Thirty years later and most such industry forums have animal scientists, economists, veterinarians, water and soil scientists, butchers and retailers all ‘on the road’ together, facing outwards towards the producers, consumers and taxpayers that support their research.

Even more recently there has been a further convergence, with the fields of environmental health, animal health and human health considered inseparable in what has been variously

described as the ‘One Health’, ‘Eco Health’ or ‘One World, One Health’ (Wildlife Conservation Society 2004; Anon. 2008). This further change has been driven by improved understanding of the links, for example, between viral diseases in livestock and humans, and in the realisation that there are common approaches, for example improved management and treatment of livestock waste, that have benefits for animals, humans and the environment. This new thinking is not, however, a different type of silver bullet and the barriers between disciplines, institutions and the public private sector in adopting this approach remain considerable.

But what about convergence between the public and private sectors? Have there been changes in parallel to those described above? The question raised by the title of the conference, ‘how can private and public research work together to reduce poverty?’ ... is almost a non-sequitur. Most definitions of poverty would include the inability to buy the products of private research or at least not have access to them. By restricting the following discussion to livestock vaccines and poor livestock keepers (and not consumers), that is certainly the case. Poor livestock keepers have no money to buy vaccines, no place to buy them, little knowledge of why they are needed and no economic incentives to seek them out.

In the animal health domain there has also been a convergence of approaches, or at least shared understanding that both the private and public sectors are needed to deliver good animal health care. The recent report from the World Bank, ‘Minding the Stock’ (World Bank 2009) is in part a response to the FAO report whose somewhat apocalyptic title ‘Livestock’s Long Shadow’ (Steinfeld *et al.* 2006) betrayed its contents that included very positive recommendations and recognised the importance of livestock in the health of the global population and the global economy. ‘Minding the Stock’ dissects the necessities of private and public sector involvement along the long chain from vaccine discovery to providing technical and policy support required for vaccines to be effective and profitable. It also teases out the very complex private and public-good components of livestock production, livestock disease and disease control.

That report concludes that vaccination for livestock disease and for zoonotic disease (the livestock diseases that can and do infect)

humans) is a high priority for public-sector investment.

Building on that report, in this paper I will briefly describe two broad approaches to bringing the benefits of private-sector research on vaccines closer to the poor. One approach is to stimulate supply and the other to stimulate demand.

The problem

The problem of inadequate development, supply and effective use of vaccines for and by poor livestock keepers can be summarised with these examples:

- For some diseases effective vaccines have not been developed. There is no readily available vaccine for parasitic ticks or for the many diseases transmitted by ticks such as East Coast fever.
- Some vaccines are not a good biological fit: the wrong strains of organisms are used to produce vaccines that have limited efficacy in the field where different strains are causing disease. Many viral diseases such as Gumboro or Classical Swine fever fall into this category. In many cases good diagnostic capacity is required to match the vaccine to the disease organism and this has been well developed for FMD and, more recently, for influenza viruses.
- Some vaccines can't reach the user because of storage and transport requirements. The classic example of this is Newcastle Disease for which fully effective vaccines exist but the 'cold chains' to deliver them are not reliable.
- The packaging, pricing and means of delivery do not match smallholder skills, scale and available technical support. The concept of vaccination is embedded in the education systems of most developed countries from the earliest years. Where such schooling is absent, understanding of the specificity, application and benefits of vaccines is also missing.

Any list of the so-called 'neglected diseases' of importance to the poor is substantial. In some cases, as noted above, vaccines are available but can't be delivered, in others the research into vaccine development has simply failed to come up with an answer. The biological difficulties of

developing vaccines against animal diseases such as East Coast fever are as complex as those to develop a vaccine for human malaria; research which has attracted greater investment by several orders of magnitude. The priority list developed by GALVmed¹⁰ is: Newcastle Disease, African and Classical Swine fever, porcine cysticercosis, pox and Peste des Petits Ruminants in sheep and goats, and Rift Valley fever, contagious bovine pleuropneumonitis, haemorrhagic septicaemia, East Coast fever and trypanosomiasis in cattle.

More controversially, there may also be a conflict of interest within companies that, for example, sell chemicals that kill ticks and that produce reliable profits. Why bother with a vaccine that may be cheaper and more effective, but is less profitable?

The public-sector response

In the absence of key products, effective delivery pathways and genuine demand from end-users, how has the public sector responded? The response has been very mixed with a whole variety of initiatives which may, in some cases, have made matters worse. The example of the Queensland tick fever vaccine is a triumph of public-sector research and commitment to the industry. Since the pioneering publicly-funded research in the early twentieth century, millions of doses of whole-blood vaccine have been delivered to cattle producers in northern Australia: partly paid by the consumer and partly by the state government. But such successes are few and far between. The development of a thermostable vaccine against Newcastle Disease, again developed largely by Australian researchers, is just one of many examples where first class research has led to a potentially useful product that has been taken up in a few countries but largely ignored by the private sector in the countries of Africa and Asia where it is most needed¹¹.

¹⁰<http://www.galvmed.org>

¹¹ The master seed for this vaccine is maintained by the University of Queensland with support from ACIAR and has been distributed to 11 countries for research and development.

One public-sector response has been to subsidise vaccine manufacture, subsidies which in many cases cannot be sustained and have resulted in the production of low-quality vaccines. National policy sometimes insists that these vaccines are used in preference to imported higher-quality products. National pride, independence and the genuine and imagined fear of exploitation from commercial companies are complicating factors.

Other responses include the subsidisation of vaccine purchase, making the products cheaper or even free, and the support for the delivery of vaccines in vaccination programs, ‘campaigns’ as part of a ‘war against disease’ in which the end-user, the poor livestock keeper, has only a hazy notion of the specific disease agents and the nature of vaccines. Publicly-funded research on vaccines often makes great progress until it hits the brick wall of commercialisation. There is limited support for such research on animal diseases that mostly affect the poor (Perry *et al.* 2002) and that have limited potential in conventional markets. Since some individual benefits would accrue for these diseases, a mixed private–public-good approach is justified. Examples of such diseases might include the Peste de Petit Ruminants and African Swine fever. A more extensive list is provided by the International Livestock Research Institute (ILRI)¹², which has a leading role in identifying research required to control these diseases.

New approach 1: New products from new partnerships

In recent years there has been an intensive effort to design new ways to deliver new livestock vaccines and other veterinary drugs and diagnostics. The Global Alliance for Livestock Veterinary Medicines (GALVmed) is a not-for-profit global alliance of public, private and government partners that has partly modelled itself on the Global Alliance for Vaccines and Immunisation which has similar aims for human medicine. In essence these alliances take the approach that working together, alliance members achieve objectives that no single agency or group could achieve (Fig. 1).

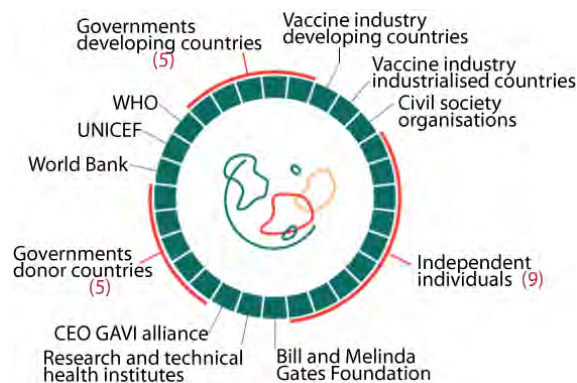


Figure 1. New alliances to create and supply new and accessible vaccines. This graphic is used by the Global Alliance for Vaccination and Immunisation (GAVI) to demonstrate the complexity of public and private stakeholder engagement.

The principle of ‘mutual benefit’ is paramount. GALVmed seeks to:

- accelerate access to existing underused vaccines
- strengthen health and immunisation systems in countries
- introduce innovative new immunisation technology, including vaccines.

Implicit in these objectives is that creating and supplying a vaccine is not the same as having an effective vaccination program. Good vaccines need to be delivered in good condition, administered by adequately trained people to livestock which have an immune system in good enough shape to respond.

One of the lessons from the GALVmed experience is that each disease requires a different approach and that these processes in themselves have required substantial research and evaluation. Each disease has its own biology, creates distinct production problems and has a unique set of institutions responsible for prevention and control.

Some lessons that have emerged from the GALVmed experience and from other public–private partnerships in agricultural research include that success depends on:

- having a champion with passion for a particular product or disease
- the need to build on earlier relationships, creating social capital among individuals and

¹²<http://www.ilri.org>

institutions with a view to long-term partnership

- the law has no place bringing partners to the table but a poor legal framework can undermine the partnership
- the partnership needs to be adaptable and flexible. As understanding grows the game changes, and by its nature research and marketing requires many changes along the way.

New approach 2: Incentives and market access

These new alliances (GALVmed and GAVI) are focused on the supply side of the equation. But what about demand? What constitutes genuine demand, that is willingness to pay among large numbers of smallholders who traditionally have operated low-input or no-input systems? Based on experience across many countries there is very little demand even, for example, for the simplest deworming treatment that on the basis of good trials and a scientific perspective, provides large benefits for minimum cost.

In Laos, one of the poorest countries in Asia with a heavy dependence on smallholder livestock production, there has been a long-term program of applied research that has, among many benefits, created independent entrepreneurs¹³ who purchase vaccines and other products wholesale and sell retail to smallholders who pay the full price for materials and services.

How has this transition to a private sector approach worked? The essential precondition has been the transformation of smallholder production from purely subsistence and asset-accumulation to a source of regular income. In this example the transformation was generated by identifying the appropriate entry point with smallholders: the saving of labour by growing forage, which in turn has improved the quantity and quality of cattle being sold to market. These smallholders now see a strong relationship between animal health investments, including deworming and vaccination, and improved prices for their cattle, and are now part of an expanding smallholder-based cattle sector.

¹³ Small-scale Agro-enterprise Development in the Uplands of Lao PDR and Vietnam (SADU) is a project funded by the Swiss Agency for Development Cooperation and implemented in Laos by the International Centre for Tropical Agriculture (CIAT) and the Lao Government.

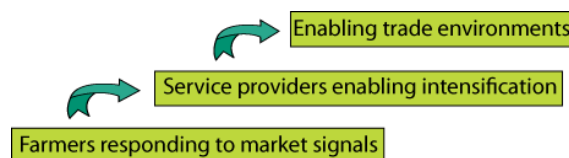


Figure 2. Bringing poor livestock keepers closer to markets: creating incentives and demand. Animal health service providers in Laos have built small businesses based on strengthened links between producers and livestock markets that in turn have created incentives for producers to invest in vaccination and create a business opportunity for animal health services.

The sequence is shown in the simple diagram (Fig. 2) which describes the response to market signals that generates capacity to pay for animal health services that in turn improves cattle health and has a spillover effect to other species. While driven by investment in cattle production, wider benefits accrue by the vaccination of poultry and pigs against other viral diseases.

These steps may seem obvious in retrospect (and therefore tempting to replicate in other systems) but were impossible to predict. The key was to seek understanding of the smallholder livelihood system as a whole and to work in a participatory fashion with farmers, the commercial sector and all public and private stakeholders.

Conclusion

These two new approaches have the capacity to bring new and better vaccines with the reach and affordability of poor livestock keepers. Bringing the private and public sectors more closely together requires improved supply of, and genuine demand for, appropriate vaccines. The scales are different, the domains are different, the skills required by participants are different, but both are essential.

In conclusion I would like to personalise these approaches by giving two examples. Both are hypothetical, but all researchers working in animal health in developing countries would be able to provide real examples. The first is of a young Asian researcher embarking on a career to develop vaccines for diseases in her own country only to see its production and use thwarted by lack of commercial interest or (in the view of the scientists in some cases) commercial sabotage. She is not looking for sympathy: she can feed her family,

but there is an element of tragedy in that wasted talent and effort.

The second example is the young mother with malnourished children in East Africa, Laos or Cambodia whose community may be affected by HIV/AIDS, who plans to rely on selling eggs and chickens to feed her family but who, unless she can access the right vaccine, will regularly lose half her flock to Newcastle Disease. That tragedy is real. It is incumbent on all of us working in the public and private sector to break down the barriers that allow such tragedies to occur.

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References

- Anon. 2008. *Contributing to One World, One Health: A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface*. Consultation Document, OIE, FAO, WHO, UNICEF, World Bank and UN Influenza System.
- Perry, B.D., Randolph, T.F., McDermott, J.J., Sones, K.R. and Thornton, P.K. 2002. *Investing in Animal Health Research to Alleviate Poverty*. ILRI, Nairobi.
- Steinfeld, H., Gerber, P., Wassenaar, T.D., Castel, V., Rosales, M. and de Haan, C. 2006. *Livestock's Long Shadow*. Food and Agriculture Organization/LEAD, Rome.
- Wildlife Conservation Society 2004. Building interdisciplinary bridges to health in a globalized world. In: *One World One Health Conference Summary*. The Rockefeller University, New York, NY.
- World Bank 2009. *Minding the Stock: Bringing Public Policy to Bear on Livestock Sector Development*. Report No. 44010-GLB.