KEYNOTE: THE GLOBAL CONTROL OF FMD; CHALLENGES AND OPPORTUNITIES

K. Sumption1 and J. Lubroth2

1Secretary, European Commission for the Control of Foot-and-Mouth Disease (EuFMD)
2Head, Emergency Prevention System-Livestock component, Animal Health Service, Food-and-Agriculture Organization of the UN, Rome, Italy.

SUMMARY

At global scale, FAO estimates that food production needs to rise by 50% by 2030 to meet targets for hunger reduction. Foot-and-mouth disease (FMD) is a “One world problem”, severely affecting livestock production efficiency where it is endemic, preventing free and safe movement in livestock, and requiring a high and continuous level of public and private investment to protect animals in affected and free regions. Long term FMD control should have benefits at every level, and contribute to global efficiency in food production. This paper summarises the challenges and opportunities for working at global to local scale to bring FMD under control and enable eradication, and has been prepared as part of the development process between FAO and the OIE (World Organisation for Animal Health) of a global approach to long term FMD control.

OBJECTIVES

The objective is to present a perspective on how efforts against FMD viruses in the principal ecological and livestock production systems at regional level might be organised, under a global co-ordinated programme. Constraints to control include limited access to quality vaccines, the lack of incentives to drive public and private investments in high burden countries, limited capacity to deliver public veterinary services, and risk of progress being undermined by lack of commitment. Opportunities include global services to assist each region and nation to adopt approaches tailored to their risk /epidemiological region, together with the driver of high livestock and commodity prices which could be used to create incentives for producers and countries to invest in protecting livestock and livestock marketing chains. Through regional approaches and global support services, the global community can expect that progress will be measured using verifiable data and indicators, and improved early warning of risks of reversions and epidemic incursions to free regions.

GLOBAL FMD CONTROL; CHALLENGES AND OPPORTUNITIES

FMD is an extremely infectious disease of cloven hooved livestock, caused by seven serotypes of FMD virus (O, A, C, Asia-1, SAT1, SAT2 and SAT3). Multiple antigenic types exist within each serotype, and vaccine selection for types A and SAT viruses must in particular be adapted to local epidemic strains to provide effective protection. Although very widely distributed, occurring in all continents (except Australasia), through national and regional co-ordinated control efforts, several large regions (north and central America, most of Europe (including the EU-27 and EFTA states), Australasia and parts of South America and southern Africa, and off shore islands of East Asia (plus Republic of Korea) are recognised as free of FMD. These co-ordinated efforts have required more than 50 years of effort, and remain at risk because the majority of Africa and the Eurasian livestock populations are not free of FMD. FMD is thus a classical “One world problem”, since all countries suffer economic consequences, be it though costs of maintaining freedom, or direct losses from disease and costs of preventive measures. These main “reservoirs” of FMD have seen little improvement in disease control over the past 30 years, and therefore “parallel worlds” currently exist, with on one side major investment in maintaining freedom, and on the other, high recurrent costs to maintain routine vaccination (minority of countries) and a relatively uncontrolled situation (the majority of endemic countries) where sweeping epidemics cause widespread losses.

FAO has been aware of these asymmetries in investment in FMD control and the impact of incursions of FMD into free areas; as a result it has championed the “One world” approach of
“tackling disease at source” through globally supported and regional co-ordinated efforts. To this end it signed an agreement with the OIE in 2004 (Global framework for the progressive control of transboundary animal diseases; GF-TADS), which has seen the establishment of governance structures, active regional committees and support units. It was agreed at the establishment of the GF-TADS agreement, and ratified at the first Global Steering Committee for GF-TADS, that a global initiative on FMD should be developed by FAO and OIE, with a view to launching the initiative after scientific and other consultations planned for 2009.

**Global distribution is characterized by regional reservoirs; a challenge and an opportunity**

The global burden of FMD virus infection is maintained by seven major reservoirs (pools) of infection; each pool has at least 3 serotypes of virus, and since virus circulation is mainly within these regional reservoirs, strains have evolved which are specific to the region and which often (in the case of type A and SAT viruses) require tailored vaccines. Progress in the last 50 years has probably not changed the prevalence of infection in 5 or 6 of the 7 major reservoirs. In the case of the western Eurasian “virus reservoir”, the area directly involved straddles the “traditional ethnic, political or economic boundaries”, involving countries in the European, Middle East and western and central Asian economic groupings. This has the effect that the problem is always too big for one region and responsibility is often seen to belong to a third party, and national investment to improve control is hindered by risk from neighbouring countries/zones.

The opportunity that can be seen is to address each regional virus reservoir with its own long term program: a “regional roadmap approach to FMD control”. On the basis of the 7 major reservoirs, 7 such regional programs are needed; three (Europe, South America and South-East Asia) are already underway. Continuation of the current programs is vital, as is developing the plans for the other four. This approach fits well with the joint FAO and OIE initiative on trans-boundary animal diseases (GF-TADS), which has Regional Steering committees.

**Vaccination against FMD as major tool in regional control; challenges and opportunities**

FMD vaccination has been applied since 1938, and has been used in large national programs for nearly 50 years. Some large regions (e.g. western Europe, parts of South America), using policies of national full bovine population immunization have been able to discontinue vaccination and rely on sanitary measures and emergency response to maintain freedom. In other regions, premature cessation of vaccination has resulted in overwhelming epidemics and therefore return to preventive vaccination (certain countries of the Southern Cone of South America). Global use of FMD vaccination is asymmetric, with very high amount of the global total (of circa 2.3 billion doses per year) being used by only a few countries (China, Argentina, Brazil); with most regions at direct risk in the majority (endemic infection or incursions > once per 5 years), the gap between required immunity (usually considered >80% of the target population) to prevent virus circulation, and current coverage rates (mostly <5%) is enormous. Very little of these vaccination programs are externally funded; the majority are fully or partially state funded. In addition, where vaccination has been used for >10 years, the losses may be seen as acceptable by stakeholders; which reduces one of the drivers to progress to eradication. In the majority of African countries, and south Asia, vaccination coverage is very low; raising economic prosperity in Asia may create an improved tax base on which to plan long term control. Since India can provide a virus reservoir for the wider region, national plans to build up coverage towards national levels by 2015 or 2020 will be crucial to wider success.

A further problem is that vaccine quality varies enormously; too much vaccine that is used remains of inadequate quality to maintain a durable immunity (6-12 months). Delivery systems also often fail to vaccinate animals before they are first traded (as calves), exposing these animals to infection in transit or market place, and spreading infection through the marketing chain to new regions. Therefore even where vaccines are used, a combination of poor quality, timing and coverage result in gaps that allows infection to circulate. Confidence is therefore eroded, among veterinarians as well as stakeholders. Vaccine supply is definitely an issue, as the inactivated vaccine production cannot easily be scaled –up; however, the sector has shown it can respond over years to increasing demand.

What are the opportunities? First, the work of surveillance and laboratory networks (e.g. FAO/OIE FMD networks) should provide rapid access to selection of suitable vaccines for each virus pool; if no suitable vaccine exists, market studies should assist the private sector, or possibly international agencies, to decide on producing tailored vaccines. Second, the pharmaceutical sector has shown itself capable of responding to demand, but scale of demand may be limited for “niche vaccines”,
likely to be needed in parts of Africa. Third, the demand-side could be stimulated at the level of the livestock producer, if vaccination became a requirement for movement to market/trade (internal and regional trade). Fourth, through regional “roadmaps” countries could be expected to agree to vaccination coverages, which will be required for at least 3-5 years (and often much longer because of risk from neighbouring countries) to knock-down infection to manageable levels, generating additional demand. Fifth, a renewed effort in research is likely to bring vaccines to market with longer effect (reducing need for repeat vaccination) within the next 15 years. The impact of such new vaccines could be very positive in achieving the shelf life needed for use in remote areas, and the duration required to break transmission cycles, which could allow redirection of the limited vaccine resource to better effect.

**Without livestock producers support, can anything be achieved? Challenges and opportunity**

Success in FMD control in Europe and South America has occurred under conditions (including OIE and bilateral standards) where freedom from FMD at national, or zonal level, offered livestock trade opportunities. These economic drivers operated at the level of national strategic planning, and with strong support – or even leadership - from farmers associations. In most of the developing world, the prospect of achieving country-wide or zonal freedom is very distant, as the national livestock supply and demand conditions may favour import rather than export, or where export volumes could be produced, the required attainment of disease control cannot be achieved because of a weakness in civil society drivers (limited farm lobby) and/or in regulation (public sector unable to deliver policy, especially in movement control).

Given the above, significant debate on how to achieve incentives for investment in animal health is welcome and necessary, including the possibility of exporting commodities under conditions where the product, not the originating location, would be considered safe in terms of FMD risk. If such commodity treatment can be safe, the argument goes, then the FMD status of the wider region, or even the herd or animal is no longer important, enabling wider access to higher value trade. Linking animal movement control, at any level, to vaccination status could create an important driver for improving vaccination rates, and for overall success, since non-immune traded animals are often implicated in short and long distance spread. Where direct losses are usually small (e.g. under vaccination), such linkages could address gaps in vaccination coverage. Since vaccination status cannot be seen by the buyer, visual or other forms of rapid verification will be needed where regulatory controls are weak, as in most endemic countries.

If an animal product can be traded without need for vaccination guarantees, the driver for vaccination will rely mainly on fear of disease, which is unlikely to motivate owners to use vaccination at the required 80% to have the required impact on decreased local viral circulation. Under these circumstances the driver for national co-ordinated control may be weakened, and those countries that have already achieved free status may themselves consider that maintaining this status is not economically viable. One option that could both create opportunities without losing incentives towards wider control would seem to be to adopt policy of development of commodity based trade providing that the FMD vaccination status of the animal and herd is satisfactory (to the regional virus risk).

Incentives for involvement in FMD control are also needed in currently free and low risk areas. Biosecurity measures cost and human behaviour is often to take risks if no negative consequence is perceived. Identifying incentives, that operate at level of the livestock trader, will be important to achieve their participation in FMD control, as the main lesson of the recent past is that capacity of countries to control animal movement is weak, and regulatory measures without popular support are unlikely to succeed. Incentives for trading safe (immune) animals could reduce the need for systems based on geographical or regulated animal separation.

**Stimulating regional efforts as part of global progress; challenges and opportunities**

Each of the seven major FMD virus reservoirs have within their regions countries with striking intra-regional variations in FMD control capacity, together with risk factors for transboundary spread, such as long distance animal movement patterns between animal breeding areas and terminal fattening/consumption areas, differentials in wealth and meat price, and long land borders with or without transboundary rangelands that mix animals from more than one country. Such conditions allow for periodic epidemics that may touch all countries in the region, which generally respond after the event by sanitary efforts and preventive vaccination programs. The flourishing transboundary animal movements, often informal/illegal, are a feature of many pathogen reservoirs, and cannot be wished away; could they present an critical point/opportunity for regional control? Development of regional roadmaps to FMD control could help to clarify
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Responsibilities and expectations among neighbours, to stimulate political will, to provide early warning of likely failure and to channel and co-ordinate the efforts of donors. To be appreciated, the regional efforts must also serve national interests; FAO and OIE can assist to provide the neutral forum, to assist the region to respond to new risks, including those of countries which fail to control epidemics, and to develop the regional monitoring effort and expertise.

The Roadmap concept is not new; Europe, through the EUFMD Commission, had a strategy for FMD control involving national pledges to maintain freedom through vaccination or through stamping-out; rapid progress was made in a decade in the 1960s, and possibly vaccination could have ceased earlier than it did (in 1992). The current EUFMD Strategic Plan involves risk reduction measures in areas in parts of west Asia/Middle East that pose a threat to European countries, assisting Turkey to progress towards FMD control. A West Eurasian Roadmap makes sense, since epidemics usually emerge within the region and spread to the margins of Central Asia, to the European borders and to parts of west Asia (as far as Syria/Jordan/Saudi Arabia and even to Egypt in 2007). To the east, there is a case for a South Asia regional Roadmap (SAARC cluster), as well as the current South East Asia (SEAFMD) 2020 Roadmap. China is so large, and with borders that touch Central Asia, East and South Asia, that they have a unique situation and there is a case for them contributing to all 3 Eurasian Roadmaps.

From virus typing, there is a case for Regional Roadmaps in West/Central Africa, East Africa, and Southern Africa (SADC region). The virus-type “watersheds” require mapping, and political boundaries will also influence the inclusion of countries in one or more Roadmaps. Only the SADC region currently has an FAO or OIE reference laboratory within its boundaries, and significant virus typing is required to build up the information base for selection of vaccines, for the time when significant investment will occur.

Monitoring progress and keeping ahead of the epidemic wave

Since building prevention and response capacity will be essential to progress, stimulating regional prevention and containment effort will be central. How can this be achieved? Regional donor funded projects can be catalytic, but almost all investment to the scale required will need to come from national funds, including private funds. It follows that regional programs will require national parties to argue consistently and effectively in their national and regional economic and political fora to maintain consensus and effort; and FAO and OIE to provide advocacy and supportive information to keep the will to proceed. Therefore monitoring of progress must go beyond the traditional analysis of outbreaks and FMD strains; it needs to follow the political commitment indicators (adoption and implementation of national action plans), objective and comparative indicators of success and effort, and apply greater effort to measure prevention (vaccination performance), capacity of veterinary services to perform key tasks, as well as indicators of impact on infection parameters.

At the global level, the use of comparative and objective indicators will be needed to monitor the progress of the regions. Some new information collect and analysis effort will be needed, which could be managed by FAO and OIE, adapting the current international information systems to the new requirements. Further, regional networks will be crucial to each Roadmap and regional effort; they should interface and be supported under a global information effort under GF-TADS, using the strengths of the FAO and OIE FMD reference laboratory network.

The global community could expect a yearly appraisal of global progress, based on evidence of commitment, effort and indicators made under the regional programs. At present the global community invests heavily in prevention measures but no one institution undertakes serious measures to determine global progress, and a Secretariat will be needed to produce the progress reports. Since no single organization has the capacity, competence or reach to change the situation on the ground, the overall responsibility to progress the global progress will need inputs of many partners, with suitable governance and advisory structures. If the global efficiency of livestock production is to rise, tools for combating the major transboundary diseases will need to be available and affordable for the majority of livestock at risk, which is not currently the case. Global, national and private sector partners will all need to contribute, and the time is right for setting out a global framework that is likely to speed up the benefits from regional and global control.

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