1. Introduction

It was clear in 2001 that the FMD epidemic that developed in the UK and spread to France, Ireland and the Netherlands was not expected. Not that way, not in these countries, not that size. It was also a surprise as models had been developed, using sophisticated mathematical programmes and software explaining that control should be achieved more rapidly. Even more, training sessions had been organised over Europe since 1992 and the vaccination ban, where none of the studied scenario ever proposed such a situation. This means that we still have to improve our prediction tools, which may not be so easy.

This presentation will try to put together some of the information needed to face any FMD outbreak, and discuss some of the ways to use them.

2. A need for more information and data

Do we know today, in 2003, everything we need to understand the 2001 situation? Do we really know how the virus entered UK, France, Ireland and the Netherlands and how it spread? If data are still lacking, we may never be able to answer these major questions. For instance, most of the archives of 1981 Brittany outbreaks (previous outbreaks in France, 20 years ago) have been destroyed, as we realised recently when we looked for them. The real information may be missing for good. This is especially true if we are facing illegal movements of animals or of animal products. At the same time, reconstructing piece by piece a past outbreak is certainly useful, but we have to admit that it may be useless to anticipate the next outbreak only from it. As FMD epidemics are now very rare, each of them may be following its own route, different from any other. Parameters will be different each time. The idea linked to use an “average” outbreak, built from past episodes and experience, to estimate what may happen next time could be misleading. So, what are the possibilities left to anticipate and to predict? This also means that models need time to be run: new field data must be available to make any estimation of the parameters, as the parameters of a previous outbreak will not fit anymore in this new peculiar situation.

Surveys opinions have been used, as the CVOs opinions survey presented here at this session. We also remember the “experts” opinions survey of 2000, presented at the Bulgaria EUFMD research group meeting. The least probable countries at risk were British Islands, and the more probable origin of the virus was Near-East countries. Five months later the reality was quite different.

In any case, if we wish to predict, we do need information, data. These we can list. A better knowledge of FMD situations, outbreaks, around the world and of the virus strains circulating
is essential. Can we improve this information world wide? There are still too many missing
data for this first question. It would be useful for many countries, not only for ours.
Then the importance of animals and animal products trade is clearly a major topic. Trade
routes, their trends and evolution should be monitored. The improvement of roads, the
development of the world market, all are increasing the volume of goods circulating between
countries and the rapidity of their circulation. This is clearly in contradiction with better
sanitary measures and controls.

If we just take the example of our main airports, it proves to be difficult to check every hand
luggage to look for meat product for instance. When custom officers decide to control all the
passengers of a specific flight, the volume of seized food products is impressive, and this is
not really illegal trade. Who is in charge of these controls, who is looking for these products?
Veterinary services may not be the only concerned. Can we improve this monitoring
(quantities, origins, quality) and these controls at the European level? Any action decreasing
the risk of introducing the virus can be seen as decreasing the probability of a new outbreak.
Information of passengers may be one of the solutions, but certainly not the only one.

At this stage, it can be recalled than we are facing three different risk categories: the risk of
introduction of the virus, the risk of occurrence of a first (primary) outbreak if the introduced
virus reaches a sensitive animal, and the risk to turn this first outbreak into an epidemic. Each
step is linked to its own monitoring and surveillance systems. We have just seen the situation
of the introduction risk, as the virus is no more present in our countries, except in laboratories
confinement. We can just add that the causes of introducing the virus may be trade,
neighbourhood, accidental or criminal. The probability to find rapidly a first outbreak is
related to a good information and awareness within the field actors, like farmers, veterinarian
practitioners and also animal traders, may be less informed than the first two. Diagnostic
capacities are essential to recognise rapidly any clinical suspicion and a contingency plan
must be ready, and known.

Other useful information is linked to what is related to the index outbreak.
International trade is certainly important to monitor, but we realised in 2001, that intra-
national and intra-European live animal trade was also of major importance. Here we could
also improve our knowledge.

Ageing the lesions of the infected animals can give information of the time when the virus
arrived. The species concerned (pig versus ruminants) give a different probability of
spreading the disease, and the density of farms and kind of productions in the surrounding can
also change the picture. A possibility could be to give different ranks to the risk following the
estimated age of the oldest lesion, the species concerned, the place where the suspicion is
discovered and the density of animal farming in the area (Huurne & Windhorst 2003). Finding
a suspect animal in a farm is different from finding it on a market or in a slaughterhouse. The
fact that the area of concern is heavily exporting livestock or not, is another important item.
If a first blister is identified on the tongue of a cow in a dairy farm in a low density farming
area, the index case may really be the primary outbreak. Any predictive modelling can start
with this hypothesis. If the first clinical suspicion is already some days old and coming from a
pig on a market or in a slaughterhouse, this index case may not be the primary case and
another attitude should be more adapted. A predictive modelling could then start with more
than one outbreak.
Another very important parameter is time, as incertitude will decrease with time. It may be adapted, following the situation, to wait some days before taking decisions like emergency vaccination or to implement a broad preventive slaughtering (Mahul & Durand 2000, Durand et al. 2002, Wilpshaar et al. 2002). The earlier the modelling and the prediction are started, the higher is the risk of a misleading conclusion. The later, the less useful it becomes. This delay is necessary to estimate the parameters of the models.

Worse and less worse scenarios can be proposed as soon as the suspicion is known, fuelled with new data as soon as they are known, but always with an attitude of uncertainty.

3 – A good use of data

Behind modelling and prediction, there is also communication of the results. At the last EUFMD general session of April 2003 in Rome, a presentation of a risk analysis linked to the probability of a new FMD outbreak occurring in the UK in connection with illegal introduction of meat from the Middle-East was presented. From the scenario followed and the hypothesis used, the probability was estimated to be of one outbreak in 130 years with a confident interval limits between one outbreak every 41 year and one every 1,110 year, at a confidence level of 90%. Here, the main issue is to explain to CVOs and to decision makers how to deal with such a result. If this fails, all research funds for FMD could be reoriented towards other diseases as even 41 year is beyond any government duration.

This means that modelling cannot be seen just as a way to face lack of data. It is certainly something else, as presented last year (Moutou & Durand 2002). One of the best ways to use models is for training purposes and for comparison of different scenarios, once hypothesis have been accepted. Even if some of the assumptions prove later not to be true, the comparisons of different scenarios may be useful anyway.

4. Improving data quality

The question of increasing the knowledge on FMD and FMDV strains around the world has already been addressed, as well as the point concerning the control of what is entering in every country. In any country, other steps can also be improved, all of them being able to decrease the consequences of a virus introduction. However, we have to admit that contingency plans have only a little impact on the probability of introducing the virus, as this is mainly linked to commercial rules.

Diagnostic capacity is a sensitive item. If the clinical suspicion must be rapidly recognised, the virological and serological diagnostic capacities must be able to react rapidly and securely. Usually, a single national laboratory should be enough to face all samples sent for virological analysis and diagnosis. One of the new questions is linked to serology, as preventive vaccination could be used during next outbreaks. What is the capacity expected for any country? Should we propose a ratio linking national herd figures and the number of serological tests that could be performed by week? Is it better to have a single centralised laboratory or different local facilities? As the recovery of a FMD free status without vaccination will depend on serological tests, this question is important.

The discussion is going on in France for instance, with a first draft oriented toward the possibility of having 5 or 6 local laboratories dedicated to FMD serology. However, this is not yet decided and new questions arise. What should be the capacity in term of serological kits? Who shall be in charge of a reagents bank? Shall we foresee 10,000 or 80,000 serological
tests? How can we organise the training of the people of these laboratories? Are the biosecurity questions well coped? What do we know about good laboratory practices and quality control in this context? The questions are clearly not so simple.

5. Discussion

Recently for a new master in public health passed at Paris VI University, a FMD outbreak modelling was realised (Le Menac’h 2003). Following the hypothesis of 20 primary outbreaks spread at random over the whole territory, but only connected with ruminants farms, the model used here computed an average (from 200 different tries) epidemic of 9,551 infected premises lasting 348 days. We may expect that the software is a little too pessimistic.

Predicting or estimating the location and the size of next FMD epidemic is a real challenge and we may not have all the tools to achieve this properly. However, it is clear that we do know where to improve epidemiological surveillance so that the surprise, once it happens, should not be too big.

There is to improve our knowledge on FMD situations around the world, and specially the evolution of FMDV strains. Better information on animals and animal products trade routes is also essential. This should be done at an international level and at an intra-national level, as we learnt from 2001 epidemics. At the end, we need to get sure that all our farming (farmers, animal traders) and sanitary actors (veterinary practitioners, veterinary officers, customs officers) are aware of these challenges. The diagnostic capacities should also be adapted. Then, estimating next epidemic size could be easier, what could be the tool or the model used, and even if we wish no new epidemic at all.

6. References


