1. **Introduction:**

Many authorities have published contingency plans for the control of foot-and-mouth disease (FMD) in the field, but much less material is available relating to such planning for the laboratory. This paper is concerned with the resources, responsibilities and actions that may be required at the laboratory to ensure preparedness for the threat, or the actual occurrence, of an outbreak or epidemic of FMD.

The paper takes cognisance of the experience of the FAO/OIE World Reference Laboratory for FMD (and other list A diseases) at Pirbright during the severe epidemic of 2001 in the United Kingdom. The epidemic occurred in a country long free of the disease, it was unexpected in its nature, particularly in the widespread infection of sheep and the extent of spread prior to its detection. It was also unprecedented in the number of samples submitted to the laboratory. Over 15,000 diagnostic samples were examined during the course of the epidemic and over 3,000,000 sera were tested, either in epidemiological investigations or in regaining the OIE status of “a country free from FMD without vaccination”.

A series of WRL checklists, included as Appendices I, II, III and IV, were designed for FMD, but may equally well find application, with appropriate modification, for other laboratories and other OIE list A diseases.

It is emphasised that contingency plans should be regularly practised and that the plans should be kept under continuous review in the light of both developing technology and the emerging epidemiological situation.

2. **Possible Responsibilities of the FMD Laboratory in an Outbreak of FMD**

When an outbreak of FMD occurs a National or regional laboratory may be called upon to service all or some of the following activities:

- Membership of the national specialist epidemiological team for FMD.
- Field investigation, especially of early foci and particularly in relation to the ageing of the lesions as essential information for the backward and forward tracing exercise.
- Diagnostic virology for field samples using ELISA, virus isolation and PCR.
• Serological surveillance on field samples using various types of ELISA and virus neutralisation tests for epidemiological purposes during the course of the disease and to provide evidence of freedom from infection when the disease has been controlled.
• Transfer of technology and reagents to other laboratories to increase the surveillance resource.
• Molecular epidemiology using nucleotide sequencing.
• Experimental investigation of the characteristics of the field strain in cattle, sheep and pigs.
• Predictive modelling of the airborne spread of disease, particularly in relation to pigs as a source of infection.
• Vaccine strain selection, emergency vaccine formulation and testing.
• Recording and rapid reporting of results to the State Veterinary Service and to international organisations.
• Proper sample retention and safe disposal.
• Provision of information and advice on all aspects of the disease and its control to the State Veterinary Service and other government organisations, the media and the general public.
• Maintenance of the activities of departments at the laboratory not directly concerned with FMD.

3. The Contingency Plan

3.1. Alert Levels

The plan should be devised to reflect different epidemiological situations and the levels of resource necessary to service them. An example of the criteria as currently used by the WRL to define different levels of activity is shown in the following table. Planning is based on four alert levels: A, B, C and D.

<table>
<thead>
<tr>
<th>ALERT LEVEL</th>
<th>CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No significant increase has been identified in the risk of introduction of foot-and-mouth disease into the United Kingdom.</td>
</tr>
<tr>
<td>B</td>
<td>An outbreak or epidemic of foot-and-mouth disease is confirmed in a member country of the European Union, other than in the United Kingdom.</td>
</tr>
<tr>
<td>C</td>
<td>An outbreak of foot-and-mouth disease is confirmed in the United Kingdom.</td>
</tr>
<tr>
<td>D</td>
<td>Foot-and-mouth disease attains, or is considered likely to attain, epidemic proportions in the United Kingdom.</td>
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</tbody>
</table>
Level A represents the routine activity of the laboratory in the absence of the imminent threat or actual occurrence of the disease. It is anticipated that the WRL would be able to cater for the various alert levels up to and including Alert Level C within the resources already available at the laboratory. Level D would require significant additional resource. This paper focuses particularly on the extreme case represented at Level D.

A key point is that most of the preparation and planning is done at alert level A.

3.2. Resources

In summary the resources required to service an outbreak at the different alert levels include the following:

Human Resources: Additional personnel may be required in the categories of scientific, technical, supervisory, data entry and animal attendant. The managerial and personnel functions may also need extra resource. Similarly support staff may need to be reinforced for the areas of secretarial work, laundry, engineering, library, catering, stores, transport and information/public relations. Existing staff can be augmented by transferring staff from other departments in the same laboratory, and/or by bringing in staff from other laboratories in the same country or from other countries. Wherever possible the extra staff will be experienced in the duties required of them. In extreme circumstances it may be necessary to introduce shift work and staff rota to provide sufficient numbers to cover attendance over 24 hours for 7 days a week. In this instance, adequate rest and holiday periods must be built into the programme.

3.3 Facilities

Additional laboratory space may be required for the receipt, recording, preparation, testing, storage and disposal of samples. This can be provided either by installing reserve accommodation for use in an emergency, by taking over other existing laboratories, or by transferring tests to other establishments, all with due attention to disease security. Additional temporary laboratory or office space may also be provided by the hire of portacabins and portable cold storage units.

3.4 Equipment and Materials

The planning will include the calculation of the number of staff and the amounts of test equipment and reagents (ELISA kits, antigens and antisera etc) considered necessary at each alert level. Particular attention should be paid to rate-limiting items of equipment, such as laminar flow units and centrifuges. Materials can be stockpiled at the laboratory, with due attention to expiry dates as applicable, or can be provided from external sources under pre-existing supply contracts. Provision should also be made for the supply of increased amounts of tissue cultures for virus isolation.

3.5. Training

Planning includes the regular training and re-training of existing staff in the FMD department and from WRL laboratories which are not normally directly concerned with the routine testing of FMD samples. It may also be extended to staff from other
organisations. Individual training records are also maintained. The training includes the rehearsal of the plans at least once a year or when there is an imminent threat of the incursion of disease.

3.6. Management

It may be necessary to provide additional management structure, such as Internal and External Management Committees dedicated to work on the emergency. The internal committee concentrates on the day-to-day organisation of the laboratory work while the external committee is concerned with management issues and liaison with the external organisations involved in the control of the disease, including the State Veterinary Service and any outside laboratories which may be carrying out surveillance testing. Senior laboratory personnel are common to both committees.

3.7. Data Handling and Communications

The recording of incoming sample details, the results of tests and re-tests and the prompt transmission of such information to the State Veterinary Service are essential for efficient control in the field. These are most effectively achieved via the use of electronic information technology. Thus computers, data bases, secure lines of communication and trained personnel should be available in advance and arrangements made for their rapid reinforcement in an emergency.

Regular status reports and briefings are arranged for laboratory staff during the implementation of the plans.

3.8. Documentation

The plans should be defined in a formal, written document, setting out for each alert level the actions required, the persons responsible for implementation and the resources entailed. Details of Job Descriptions, Standard Operating Procedures and Desk Instructions also form part of the plan.

3.9. Revision of the Plans

The plans should be regularly revised in the light of changes in legislation, in resource availability and in new technology and also as appropriate to the emerging epidemiological situation. A key point is the auditing of the plans. This must be done on a formal basis, ideally by professional and possibly external auditors in order to identify weaknesses and ensure that remedial actions are taken.

Acknowledgement: I thank Dr David Paton of the WRL, Pirbright, for his review of the manuscript.

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Appendix I: Check List for Alert Level A

**STATUS:** *No additional threat of the introduction of FMD into the UK is recognised*

**ACTIONS:** Annual review of Response Plans and amendment as necessary

**REVIEW PREPAREDNESS IN RESPECT OF:**
- Legal Aspects
- Financial Aspects
- Facilities
- Equipment
- Reagents
- Scientific and Technical Staff
- New Technology
- The International FMD Vaccine Bank
- Information Technology / Computing / Data Bases
- Quality Assurance / Good Laboratory Practice / ISO 9000/2001 Compliance
- Disease Security/General Security
- Media Liaison/Communications

**REVIEW PREPAREDNESS IN RESPECT OF SUPPORT STAFF AND SERVICES:**
- Secretarial / Switchboard Duties
- Library
- Laundry
- Catering
- Transport
- Engineering
- Stores
- Gatehouse
- Animal Supplies
- Farm Management
- Cleaning Staff
- Living Accommodation

**FOLLOW UP:** Liaise with external organisations as necessary
## Appendix II : Check List for Alert Level B

### STATUS:
An outbreak or epidemic of foot-and-mouth disease is confirmed in a member country of the European Union, other than in the United Kingdom.

### ACTIONS:
As listed for Alert Level A (Appendix I) plus the following:

- The Internal Management Co-ordination Committee is activated
- The Response Plan is reviewed
- Preliminary enquiries are made as to the availability of reserve staff
- The requirement for the postponement of leave or other absence for key staff is considered

### FOLLOW UP:
Liaise with external organisations as necessary
Appendix III : Check List for Alert Level C

STATUS: An outbreak of foot-and-mouth disease is confirmed in the United Kingdom

ACTIONS: as listed for Alert Levels A and B (Appendices I and II) plus the following:-

The Internal Management Co-ordination Committee meets regularly
The decision is taken whether or not to appoint an Emergency Co-ordination Manager
Decisions are taken on the possible formation of internal and external sub committees
The External Management Co-ordination Committee is activated
The Response Plan is kept under review
Reserve staff are placed on standby or activated as necessary
The decision is taken whether or not to postpone leave or other absence for all staff
Emergency Positions are activated (Sample Manager, Liaison Officer etc)
Rosters are activated to provide 24 hour, 7 days a week cover
Decisions are taken on the need to postpone/curtail statutory duties and research programmes.
Supply contracts are activated
Service Contracts are activated
Policy is reviewed for field sample retention and storage

FOLLOW UP: Liaise with external organisations as necessary
Appendix IV : Check List for Alert Level D

STATUS: *Foot-and-mouth disease attains, or is considered likely to attain, epidemic proportions in the United Kingdom.*

ACTIONS: as listed for Alert Levels A, B and C (Appendices I, II and III) plus the following:-

The Emergency Co-ordination Manager position is activated.
Additional arrangements are activated for the supply of tissue cultures.
Reinforcements are arranged from the IAH, wherever possible using pre-established lists of reserve personnel.
Reinforcements are arranged from DEFRA, wherever possible using pre-established lists of reserve personnel.
Reinforcements are arranged from VLA, wherever possible using pre-established lists of reserve personnel.
Reinforcements are arranged of retired staff, wherever possible using pre-established lists of reserve personnel.
Additional Human Resources are brought into play.
External serology testing laboratories are supplied with reagents.
Arrangements are made for external quality control on the laboratories undertaking serological testing.

FOLLOW UP:
Provisions are made for the safe storage and efficient retrieval and analysis of records from the epidemic. Similarly for samples received during the epidemic.
The effectiveness of the Response Plan is reviewed and modified as necessary.