Communiqué

DEPARTMENT OF ANIMAL HUSBANDRY, UTTARAKHAND

GUIDELINES FOR PREPARING STANDARD OPERATING PROCEDURE TO BE ADOPTED IN CASE OF DISEASE OUTBREAKS

1.0 Introduction

The incidence of various farm animal diseases is being kept under control through the use of vaccination against them. These diseases can be further classified as those caused by viruses, bacteria, parasites (including haemprotozoans), fungi and other macro and micro-organisms.

The various diseases affecting farm animals can be broadly divided into zoonotic and non zoonotic. The former includes all those diseases that have the potential of not only affecting animals but the capacity to be transmitted to man. Of note is the incidence of Glanders in horses, mules and donkeys working in the mining operations in the Gola river basin and caused by a bacteria *Pseudomonas burkholderia* at Haldwani in the district of Nainital in 2003. A notifiable animal disease which is potentially life threatening for humans. Though this disease is bacterial in origin and treatment for it exists but the equine harbours the organism in its liver and spleen and continues to shed the viable bacteria into the environment throughout its life. Hence the affected and sero positive animal has to be euthanized to prevent the chances of the spread of the disease to humans.

Another pertinent example is that of the outbreak of Equine Influenza caused by the virus H3N8 that was suddenly reported on 8th May, 2009 in the district of Rudraprayag. In a matter of few days more than 5000 equines (mostly mules and horses) became infected with the virus. Even though this viral outbreak was not zoonotic in nature but the morbidity was as high as 90 percent. Besides the loss of valuable livestock the socio economic ramification of this incident were wide and far reaching as the outbreak occurred during the peak Char Dham yatra season. During this time of the year a large number of horses and mules gather from the surrounding villages and from the neighbouring districts of Nagina, Dhampur & Bijnor in Uttar Pradesh. These equids form the backbone of all transport for pilgrims as well as materials including ration and other provisions. The government was prompt in initiating a containment initiative and ordinance was issued for the restriction of all equines within the state as well as from outside the state. This led to the Char Dham yatra being adversely affected as neither could pilgrims be ferried nor could essential supplies be transported to Kedarnath. The yatra season is one of the most awaited events for the people of this region as it brings forth a plethora of opportunities for the local populace for supplementing their family income. With the issue of notification restricting the movement of equines the local population was up in arms and a probability of a law and order situation could have arisen had the state government not handled the matter sensitively. Further, the restriction on movement of equines made it very difficult for the units of the Indian Army, ITBP, SSB and other paramilitary forces to make provisions available to their men in the far and outlying posts at the Indian border with China where the only means of transport is the mule.

The continuous attempt by man to evolve new methods for the prevention, control and treatment of various diseases caused by these organisms is an ongoing process. This has led to the production and use of new molecules of pharmaceuticals, vaccines, immunoglobulins, neutraceuticals and the use of other new technologies including biological control methods. Concomitantly all the attempts to get the better of these disease causing agents have also caused the development of adoptive measures in their body so that they can circumvent all these attempts being made by man to kill them. One of the most dangerous developments in this sequence is the capacity acquired by some of these organisms to infect multiple hosts. Of note are the recent outbreaks of bird flu and swine flu

which have occurred across South East Asia in the last few years. As a result the numbers of all such diseases affecting animals and with the potential to infect humans have been on the increase. Keeping in view the above facts it is of paramount importance that an action plan must be in place to mitigate the effects of any such incidence of disease outbreak. The Government of India has already passed a central act for the prevention and control of animal diseases. The act is known as, "THE PREVENTION AND CONTROL OF INFECTIOUS AND CONTAGIOUS DISEASES IN ANIMALS ACT, 2009" The states are expected to adopt this central legislation and amend it to address specific needs if any of the respective state. The state of Uttarakhand at present is following the old disease prevention Acts that were in force in the parent state of Uttar Pradesh. As a first step towards developing an SOP it is imperative that the state should also adopt this central legislation in part or in full. Since whenever an outbreak of any animal disease occurs the first step in the chain normally is the implementation of the provisions of the animal disease prevention Act. Since India is a signatory to the protocols of the International Office des Epizootics (OIE) a United Nations body set for the monitoring of animal diseases, it is necessary that the animal diseases Act be adopted and implemented very soon.

Animal disease emergencies may occur when there are unexpected outbreaks of epidemic diseases or other animal health-related events which have the potential to cause serious socio-economic consequences for the state and the country.

These emergencies are frequently caused by outbreaks of trans-boundary animal diseases (TADs), which are of significant economic, trade and/or food security importance for states. Such diseases can spread easily and reach epidemic proportions. The control/management, including exclusion, of which requires cooperation among several agencies of the state & beyond.

The occurrence of one of these diseases may have disastrous consequences for the state when they:

- Compromise food security through serious loss of animal protein and/or loss of draught animal power for cropping.
- Cause major production losses for livestock products such as meat, milk and other dairy products, wool and other fibres and skins and hides.
- Cause losses of valuable livestock of high genetic potential. They may also restrict opportunities for upgrading the production potential of local livestock industries by making it difficult to import exotic high-producing breeds that are extremely susceptible to TADs.
- Add significantly to the cost of livestock production since costly disease control measures need to be applied.
- Seriously disrupt or inhibit trade in livestock, germplasm and livestock products, either within the state or the country. Their occurrence may thus cause major losses in domestic export income in significant livestock products producing states like Uttarakhand.
- Inhibit sustained investment in livestock production, thus trapping livestock producers in uneconomic, peasant-type agriculture.
- Cause public health consequences where diseases can be transmitted to humans (i.e. zoonoses).
- Cause environmental consequences when wildlife populations die out or cause further spread of disease.
- Cause unnecessary pain and suffering for many animals.

Most people tend to equate emergency animal diseases with exotic or foreign animal diseases, although this is not necessarily so. Unusual outbreaks of endemic diseases may also cause an emergency when there is, for instance, the appearance of a new antigenic type such as a significantly different FMD virus subtype in an endemic country or when there is a significant

change in the epidemiological pattern of the disease such as an unusually severe outbreak of anthrax. The emergence of previously unknown diseases may also cause an emergency, as in the case of bovine spongiform encephalopathy (BSE) in the United Kingdom in 1986, equine paramyxovirus disease (Hendra virus) in Australia in 1994 and Nipah virus disease of pigs and humans in peninsular Malaysia in 1999. There are other animal health emergencies that may be caused by non-disease events, for example a major chemical residue problem in livestock or a food safety problem such as haemorrhagic uraemic syndrome in humans caused by verotoxic strains of *E. coli* contaminating animal products.

While these guidelines will focus on the major trans-boundary animal diseases, the preparedness planning principles discussed can and should be applied equally to all types of disease and non-disease animal health emergencies described.

2.0 The Benefits Of Animal Disease Emergency Preparedness Planning

As can be seen from the foregoing, an animal disease emergency such as an outbreak of a transboundary animal disease can have serious socio-economic consequences which, in extreme cases, may affect the economy of the whole state. If a new disease can be recognized quickly while it is still localized and prompt action taken to contain and then progressively eliminate it, the chances of eradication of the disease are markedly enhanced. Conversely, eradication may be extremely difficult, costly and even impossible if the disease is not recognized and appropriate control action taken before it becomes widespread or established in wildlife.

The target should always be to eliminate progressively and finally eradicate a trans-boundary animal disease (and prove that national or zonal freedom has been regained) if epidemiological and other circumstances are favourable. The alternative approach of simply “living with the disease” through the institution of routine vaccination campaigns and/or other disease control measures will in the end prove far more costly and will be a permanent constraint to efficient livestock production systems. Furthermore, the continuing presence of a TAD in a country, even if losses are minimized by effective disease control programmes, will inhibit the opening of export trade opportunities for livestock and livestock products. Eradication of the disease *and* provision of scientific proof of freedom from the disease to a level of international acceptability will remove this constraint to international trade.

Contingency planning and other preparedness programmes for animal disease emergencies should be regarded as providing the key to mounting early effective action in the face of an emergency. In fact these should be recognized as some of the more important core functions of state animal health services.

3.0 The Principles Of Animal Disease Emergency Preparedness Planning

The two fundamental components of animal disease emergency preparedness planning are the development of capabilities for:

Early warning, and

Early reaction to disease epidemics and other animal health emergencies.

These require advance preparation of both generic and disease-specific written contingency plans and operating procedures, the testing of such plans and training of staff; the development of capabilities at national, provincial and local veterinary headquarters, including field and laboratory

services; development of mechanisms to involve other necessary government and private sector services and farming communities in the emergency response; development of the capacity to apply all the necessary resources to counter the disease or other animal health emergency in the most efficient way (including equipment, personnel and finances); and, finally, advance establishment of the appropriate legal and administrative structures to deal with an emergency.

3.1 Early Warning of Diseases

Early warning enables rapid detection of the introduction of, or sudden increase in, the incidence of any disease of livestock which has the potential of developing to epidemic proportions and/or causing serious socio-economic consequences or public health concerns. It embraces all initiatives, mainly based on disease surveillance, reporting and epidemiological analysis that would lead to improved awareness and knowledge of the distribution and behaviour of disease outbreaks (and of infection) and which allow forecasting of the source and evolution of the disease outbreaks and the monitoring of the effectiveness of disease control campaigns.

The success of a states's capability for rapid detection of the introduction or increased incidence of trans-boundary and potentially epidemic animal diseases depends on:

- Good farmer and public awareness programmes for high-threat epidemic livestock diseases that involve improving the Veterinary/farmer interface.
- Training of field Veterinary Officers and Veterinary auxiliary staff in the clinical and gross pathological recognition of serious epidemic livestock diseases; collection and transportation of diagnostic specimens; and the need for prompt action.
- Sustained active disease surveillance to supplement passive monitoring, based on close coordination between field and laboratory/epidemiology veterinary services, and use of techniques such as participatory questionnaires, serological surveys and abattoir monitoring to supplement field searching for clinical disease.
- Establishment of reliable livestock identification systems for enhancement of disease-tracing capabilities.
- Dependable emergency disease-reporting mechanisms to district, regional, state and/or national Animal Husbandry Offices.
- Implementation of an emergency disease information system.
- Enhancement of laboratory diagnostic capabilities for priority diseases within regional and state animal disease diagnostic laboratories.
- Development of strong linkages between regional and national laboratories and world reference laboratories, including the routine submission of specimens for specialized antigenic and genetic characterization of disease-causing agents.
- Strengthening of national epidemiological capabilities to support emergency preparedness and disease management strategies.
- Prompt and comprehensive international disease reporting to OIE and neighbouring countries, etc.
- Inclusion of early warning in contingency planning for livestock disease epidemics.

3.2 Early Reaction to Disease Outbreaks

Early reaction means carrying out without delay the disease control activities needed to contain the outbreak and then to eliminate the disease and infection in the shortest possible time and in the most cost-effective way, or at least to return to the status quo and to provide objective, scientific evidence that one of these objectives has been attained.

For this to be achieved, the following elements need to be in place:

- Development of state emergency disease contigency plans, both generic and for specific identified high-risk diseases, which should be established, tested and refined through simulation exercises.
- Establishment of a state animal disease emergency planning committee.
- Establishment of a consultative committee on emergency animal diseases (or a state animal disease emergency task force) charged with the responsibility of implementing the state animal disease emergency plans.
- Installation of diagnostic capabilities for all high-threat diseases. These should be fully developed and tested in national and, where appropriate, provincial diagnostic laboratories and linkages established with world and regional reference laboratories.
- Ensured arrangements for involvement of the private sector (e.g. livestock farmers' organizations, veterinary practitioners, livestock traders, commercial farming companies, animal product processors, NGOs and exporters).
- Arrangement for epidemic livestock diseases to be included in state and/or national disaster plans so that the police, army and other services can be involved as and when necessary;
- Preparation of legislative and administrative frameworks to permit all necessary disease control actions to be implemented without delay.
- Arrangements whereby funding for disease control campaigns can be quickly provided.
- Ensuring that veterinary services are structured in such a way as to facilitate disease reporting and implementation of a state coordinated disease control/ eradication campaign without delay during an emergency;
- Provision of trained personnel and other necessary resources.
- Compensation arrangements whereby farmers or others can be paid fair and quick compensation for any animals or other property destroyed as part of a disease control campaign.
- Ensured access to quality-assured vaccines (containing the appropriate antigenic strain(s) for likely disease outbreaks) through a vaccine bank or from other sources;
- Harmonization of disease control programmes and cooperation with neighbouring states to ensure a regional approach;
- Determination of the available national and international agencies involved in epidemic disease control/containment, including RDDLs/IVRI/NRCE/FAO/EMPRES, which could provide early reaction assistance if needed and establishment of regular communication channels with such organizations.

4.0 A Coordinated State Approach to Animal Disease Emergency Preparedness Planning

4.1 Responsibility

4.1.1 Responsibility for Animal Disease Emergencies

The Director of the Animal Husbandry Department, should have overall technical responsibility with regard to preparedness for and management of animal health emergencies. The appropriate government minister would of course be ultimately responsible.

4.1.2 Responsibility for Animal Disease Emergencies with a Public Health Component

Outbreak of diseases can be further classified as endemic, epidemic and pandemic. An endemic outbreak is one which is restricted to a small area or location; an epidemic outbreak is one which is

spread over a larger area and involves several locations whereas a pandemic outbreak which spreads all over the state and crosses its borders as well as that of the nation.

Animal disease emergencies that have a significant public health component are a special case. These emergencies might occur, for example, in a major outbreak of a zoonotic disease such as Highly Pathogenic Avian Influenza, Swine Flu, Rift Valley fever, Japanese encephalitis, Venezuelan equine encephalitis or rabies. For these emergencies, negotiations should be carried out between the Ministry of Agriculture and the Ministry of Health (or their equivalents). Agreement should be reached in advance on a joint framework for preparing contingency plans and for other complementary preparedness programmes. Agreement should also be reached on the most efficient mechanisms for coordinating emergency responses, for implementing disease control and eradication programmes and for sharing responsibilities. Appropriate opportunities for sharing resources between the two agencies should also be explored so as to avoid unnecessary duplication. This might include a single diagnostic laboratory facility for the zoonosis(es) in question, or at least the sharing of diagnostic reagents and of expertise between government veterinary and medical laboratories, common cold-chain facilities for vaccines, joint field missions and joint public awareness and public relations campaigns.

Of critical importance is the development of coordinated and efficient mechanisms for the rapid exchange of emergency disease reports and other key epidemiological information between the two agencies. These arrangements should apply at local and regional levels as well as at the national headquarters of both ministries. This is vital in order to enable a rapid response to new disease incidents and extensions of the outbreak, whether they are first manifested in humans or animals.

4.2 Getting Started-Obtaining Support

In order to have emergency preparedness planning recognized as an important core function of State Animal Husbandry Department services, and to have adequate funding and other resources allocated to these activities, the Secretary, Animal Husbandry should enlist the support of all interested parties. These would include, *inter alia*, the Secretary's own minister and senior ministry officials, other government departments and agencies including state economic development planning authorities, farming communities and organizations, livestock marketing authorities, livestock traders, NGOs and exporters and livestock product processors. Of these, the most important target groups are the government and the farming community.

In presenting a strong case for support for emergency preparedness planning, the identified risks of the transboundary animal disease or other animal health emergency, and analysis of those risks, should be described together with the potential socio-economic consequences of an incursion or epidemic of the disease. This is discussed more fully in the risk assessment section. Additionally, the benefits that will result from more rapid containment and eradication of the disease outbreak through forward contingency planning and preparedness should be forcefully presented. The case should preferably be supplemented by a formal socio-economic cost-benefit analysis.

4.3 State Animal Disease Emergency Planning Committee

A State Animal Disease Emergency Planning Committee (SADEPC) should be appointed to facilitate and coordinate emergency planning. This committee should be directly accountable to the Minister of Animal Husbandry and should be charged with the responsibility for developing and maintaining a high state of preparedness for animal disease emergencies. It should preferably be chaired by the Secretary, Animal Husbandry and should hold regular meetings to carry out the following functions:

- Commissioning of risk assessments on high-priority disease threats and subsequent identification of those diseases whose occurrence would constitute a state emergency.
- Appointment of drafting teams for the preparation, monitoring and approval of contingency plans and other documents.
- Liaison with, and involvement of, relevant persons and organizations outside the government animal health services who also have a role in animal health emergency preparedness planning. This would include, *inter alia*, the state veterinary association, livestock industry groups, the national disaster management authority and departments of panchayats, finance, health and forest (wildlife).
- Enhancement of the capabilities of emergency field and laboratory veterinary services, especially for specific high-priority livestock disease emergencies.
- Development of active disease surveillance and epidemiological analysis capabilities and of emergency reporting systems.
- Staff training and farmer awareness programmes.
- Assessment of resources needs and planning for their provision during animal health emergencies.
- Drafting of legislation and development of financial plans.
- Implementation of simulation exercises to test and modify animal health emergency plans and preparedness.
- Overall monitoring of the national state of preparedness for animal health emergencies.

SADEPC should comprise the CVO as chair, the national animal disease planning officer (see below) as secretary, director of field veterinary services/director of disease control (or equivalent), director of the national veterinary laboratory, head of the epidemiological unit, director of animal quarantine and directors of state or provincial veterinary services.

In addition to these senior animal health officials, representatives of other ministries that may have a substantial role in responding to animal health emergencies, such as health, wildlife services, economic planning and finance, should either be full members of the committee or should be coopted as required. It is also highly desirable to have members drawn from the private sector, such as representatives of major livestock farming and processing organizations.

4.4 State Animal Disease Emergency Planning Officer Or Unit

A State Animal Disease Emergency Planning Officer should be appointed. This officer should be a senior veterinary officer/joint director with training in epidemiology and wide field experience in the management of disease control programmes. If circumstances warrant it, a small unit of professionals should also be appointed.

The planning officer would be both the adviser to and the executive officer of the State Animal Disease Emergency Planning Committee, and would be actively involved in all SADEPC programmes itemized above.

4.4.1 Animal Disease Emergencies As A Component Of The State Disaster Plan

The state has well-developed disaster management plans. These allow essential government and non-government services and resources to be rapidly mobilized in response to a disaster. Such plans may also allow these essential services to be given special powers to act in the emergency. The national disaster plan is usually aimed at specific natural disasters of an emergency nature such as major fires, floods, hurricanes, earthquakes and volcanic eruptions.

A strong case hence exists for the official recognition of a disease emergency as a defined natural disaster situation which can be incorporated into the state disaster management plan. An epidemic of a transboundary animal disease, for example, has the same characteristics as other natural disasters: it is often a sudden and unexpected event, has the potential to cause major socio-economic consequences of state/national dimensions and even threaten food security, may endanger human life and requires a rapid state response.

There are several essential government services, other than the Ministry of Agriculture, which will be invaluable in an emergency. These include, *inter alia*:

- Defense forces (notably the army and air force) which can provide support for such activities as transportation of personnel and equipment to disease outbreak sites, particularly when these are inaccessible to normal vehicles; provision of food and shelter; protection of disease control staff in areas with security problems; and provision of communication facilities between national and local disease control headquarters and field operations.
- Police, for assistance in the application of necessary disease control measures such as enforcement of quarantine and livestock movement and protection of staff if necessary;
- Public works department, for provision of earth-moving and disinfectant-spraying equipment, and expertise in the disposal of slaughtered livestock in eradication campaigns;
- National or state emergency services for logistical support and communications.

Once approval has been given for the recognition of animal health emergencies within the state disaster plan, a set of standard operating procedures should be prepared and agreed with all cooperating agencies. The format of these documents will presumably be determined by pre-existing arrangements for the state disaster mitigation/management plan. They should set out in simple, unambiguous terms just how the state disaster plan is going to be activated in the case of an animal health emergency.

They should also describe what duties and functions the support agencies may be expected to perform under different circumstances.

Finally, they should establish the formal relationship between the various agencies and the chain of command. It should be emphasized that the Ministry of Agriculture (or equivalent ministry responsible for animal disease issues) is the lead combat authority during the emergency response.

5.0 Organization of Animal Husbandry Department During An Animal Disease Emergency Programme

5.1 The Need For A Command Structure Of Veterinary Services For Emergency Responses

Fighting a disease epidemic or combating other animal health emergencies is in many respects like fighting a war and requires the same level of discipline. It requires the same ability to make rapid decisions based on analysis of the best information that can be made available from all sources, to convert those decisions into clear orders which can be conveyed down the chain to those who are charged with the responsibility of carrying them out and to know that orders have been carried out and with what results. There must therefore be efficient mechanisms in place for the transmission of information and instructions from the national veterinary services headquarters to the front line of the disease eradication campaign in the field and laboratory and for feedback of information to headquarters.

It is clear that for these things to happen quickly and efficiently in an emergency, the veterinary services for the state must be placed in a command structure or line-management system at least for the duration of the emergency response.

State Animal Husbandry Departments providing veterinary services are generally structured so as to optimize routine activities such as livestock health, animal breeding, endemic disease control, veterinary public health, quarantine, etc. Recently the state government has rationalized and restructured veterinary services in many ways, including:

- Regionalization, where the authority and responsibility for delivery of animal health services have been devolved to regions and districts that match new delegated political structures. This may result in the Additional Director/Joint Director/Chief Veterinary Officers and Senior Veterinary Officer in the region being answerable to an administrative or political superior, who may not fully appreciate the potential national socio-economic consequences of a major animal disease emergency.
- Rationalization and downsizing of government services, which have led to major retrenchments of professional and technical staff in the public sector, to the point where the remaining staff resources are inadequate to cope with the major demands of an unexpected animal disease emergency.
- Privatization of veterinary services which has led to the transfer to the private sector of many animal health programmes and functions that have traditionally been the responsibility of governments, including field veterinary services like prophylactic vaccinations for disease control.
- Separation of policy functions from operational functions, whereby those arms of government responsible for developing policy and for advising ministers on policy matters are administratively quite separate from those who are operationally responsible for managing major government programmes, including the Director of Animal Husbandry.
- Separation of veterinary laboratories from the field command. In many countries including India national veterinary laboratories have been transferred to research administrations, thus weakening links with the Department of Animal Husbandry and with field veterinary services.

These new structures are frequently not conducive to the mounting of an effective and timely response to an animal health emergency. The state should review their situation with a view to devising the most appropriate structures and lines of responsibilities that can be rapidly and seamlessly put in place when an emergency arises. This may include organizing one or more of the following well in advance of any emergency:

- An agreement that animal health emergencies will be handled at the state level and that the Director Animal Husbandry will assume overall responsibility for responding to the emergency and be directly answerable to the Secretary and Minister in this role.
- An agreement with regional or provincial authorities that their own veterinary staff will come under the line management of the Director of Animal Husbandry for an animal health emergency response programme. Arrangements also need to be put in place to ensure that regional field and laboratory veterinary services are fully involved in emergency preparedness planning and training activities and, in collaboration with state AHD headquarters, in providing early warning of emergencies including emergency disease reporting to state headquarters.
- Similar arrangements for all essential government veterinary services including the RDDLs to come within the command structure of the Director, AHD, if this not already the case, for the purposes of the emergency response.

- Pre-existing contractual agreements for private sector veterinary organizations, universities and other academic institutions, research institutes, etc. to provide essential services during an animal health emergency.
- Negotiation with the Indian/state veterinary association of terms and conditions for hiring practitioners and other private sector veterinarians as temporary government veterinary officers if needed.

5.2 Consultative Committee On Emergency Animal Diseases (Ccead)

States may find it useful to establish a CCEAD that can be convened as soon as there is a disease or other animal health emergency and that can meet regularly during the course of the emergency response. This would principally be a technical committee whose role would be to review epidemiological and other disease control information, make recommendations on the activation of agreed contingency plans, maintain an oversight over the campaign and advise the Director, AHD and the Secretary on future plans for the campaign and on implementation of those plans.

A suggested composition of the CCEAD might be:

- Director, AHD
- Additional Director, Head Quarter
- Additional Director, Garhwal
- Additional Director, Kumaun
- Joint Director, Disease Control & Epidemiology
- Joint Director, Disease Investigation Laboratories
- Senior representatives of farmer groups or organizations affected by the outbreak;
- Representatives of other key groups, e.g. national veterinary association, universities;
- Other technical experts as required (with observer status).

If the command structure recommended at the beginning above cannot be implemented for any reason, it becomes essential that a CCEAD be established so that there can be a consensus approach to the conduct of the emergency response campaign.

5.3 State Animal Disease Control Centre

The state should establish a permanent animal disease control centre/Unit. In the event of an outbreak of an emergency animal disease, this unit should be responsible to the Director, AHD for coordinating all emergency disease control measures in the country. The centre should be established in the Directorate of Animal Husbandry and work in close collaboration with it. The Director, AHD may delegate day-to-day responsibilities for implementing agreed policy to the head of the centre, who would normally be the Additional Director Head Quarter.

The responsibilities of the state animal disease control centre in the emergency response would include:

- Implementing the disease control policies decided by the Director, AHD.
- Directing and monitoring the operations of local animal disease control centres (see below);
- Maintenance of up-to-date lists of available personnel and other resources, and details of where further resources may be obtained.
- Deployment of staff and other resources to the local centres.
- Ordering and dispersing vaccines and other essential supplies.

- Monitoring the progress of the campaign and providing technical advice to the Director, AHD.
- Advising the Director, AHD on the definition and proclamation of the various disease control zones.
- Maintenance of up-to-date lists and contact details of risk enterprises, etc. (see Annexures).
- Liaison with other groups involved in the emergency response, including those that may be activated as part of the state disaster mitigation plan.
- Preparation of state disease reports and at the appropriate times.
- Management of farmer awareness and general publicity programmes, including press releases.
- General and financial administration, including the keeping of records.

The state animal disease control centre should be fully equipped with meeting rooms, a range of maps covering all parts of the country (preferably at 1:50 000), and all suitable communication equipment for liaison with local animal disease control centres, veterinary laboratories, etc., by telephone, radio, e-mail and facsimile, as appropriate. The centre should also be linked with the emergency disease information system.

5.4 Local Animal Disease Control Centres

During an emergency, one or more local animal disease control centres should be set up within easy reach of the infected zones of the disease outbreak. Ideally they should be sited so that teams are able to travel to and from any site for surveillance or any other disease control activities on the same day. Where distances are not great, these local centres could be established on a permanent basis in a regional or district veterinary or agricultural office. Otherwise, possible locations for temporary local disease control centres (e.g.local government offices, schools, etc.) should be identified and agreed in advance.

The local animal disease control centre should be fully equipped with offices, meeting rooms, maps, communication equipment to contact both with field personnel and the State Animal Disease Control Centre, vehicles and fully stocked central stores. Central cold-storage facilities for vaccines should also be located at or within easy access of the centre. The centre should have simple equipment that will allow it to process and dispatch diagnostic specimens, including serum samples.

Each local animal disease control centre should be under the control of an experienced senior field veterinary officer. This officer should be given the responsibility for directing the emergency disease control and eradication programme within the area, under the general supervision of the national animal disease control centre and the Additional Director, Headquarter. All staff allocated to a centre for the period of the disease emergency should be under the command of this field veterinary officer for the duration of their attachment. The officer in charge of the centre should be given the authority to:

- Designate a farm, herd or community as infected premises, when necessary, after consultation with, and with the agreement of, the national animal disease centre.
- Quarantine infected and dangerous contact premises.
- Send surveillance teams to all places where there are susceptible livestock.
- Deploy the necessary staff to infected premises to arrange valuation, slaughter and safe disposal of animals, cleaning and disinfection.
- Advise on the delineation of infected, surveillance and control zones and on the measures to be taken in them.
- Impose livestock movement restrictions.

- Suspend the operations of, or place zoosanitary restrictions on, livestock markets, abattoirs and other risk enterprises.
- Organize and implement vaccination programmes.
- Carry out insect vector control programmes, if necessary.
- Liaise with police and other authorities over the maintenance of disease control restrictions.
- Liaise with local wildlife authorities.
- Carry out publicity campaigns.

5.4.1 Zoning is an integral part of disease control and eradication campaigns

The local animal disease control centre should be allocated sufficient staff to carry out these functions properly. Each major area of field activity should be under the control of an experienced veterinary officer. The centre should also have a veterinary epidemiologist, who can provide specialized advice to the officer in charge and take care of disease reporting and the emergency disease information system. Depending on the type of disease control strategy chosen, there will be a need for disease surveillance teams, vaccination teams, quarantine and livestock movement control staff, valuers, infected premises teams (livestock slaughter, disposal, cleaning and disinfection), administrative staff (stores and general administration) and a public relations/education officer.

5.5 Difficult Or Marginalized Areas

The above situation is particularly true for the state of Uttarakhand. The State is faced with the situations in the hills where they have to deal with an outbreak of an epidemic livestock disease in areas that are difficult for geographical reasons or because they are relatively inaccessible or because they practise nomadism or transhumance. Such areas frequently have little contact with outside government officials. The conventional approaches recommended above will need to be considerably modified in these circumstances. Only staff experienced in the local conditions and who can gain the confidence of local communities should be used.

Sometimes the main outside contacts of such communities will be through agricultural and other specialists employed by non-governmental organizations (NGOs). NGOs and their staff should be regarded as a valuable resource for assistance in implementing animal health programmes in difficult areas, including epidemic livestock disease control campaigns. Negotiations should therefore be carried out with appropriate NGOs to obtain their collaboration in this area. The necessary training and resources should then be supplied to their staff.

Community animal health workers are another valuable resource. Their help should be enlisted and they should be suitably trained and equipped.

[NB: Strategies for dealing with disease outbreaks in difficult areas are discussed later in this report.]

6.0 Risk Analysis As A Component Of Animal Disease Emergency Preparedness Planning

Risk analysis is something that we all do intuitively in our everyday life as well as in our professional work. Only recently has it developed into a more formal discipline and is increasingly used in many fields of endeavour. In animal health it has perhaps been most widely applied in quarantine. Quarantine risk analyses are used in reaching decisions as to the most appropriate health conditions for imported animals and animal products and strategies for quarantine operations.

Risk analysis is a tool that can also be used to good advantage for animal disease emergency preparedness planning. In this context, it is most readily applied to preparedness planning for exotic diseases (or exotic strains of endemic disease agents) and it will be described here for this purpose. There is no reason, however, why it cannot be applied in other animal health emergency planning.

6.1 Principles Of Risk Analysis

Risk analysis comprises three components: risk assessment, risk management and risk communication.

6.1.1 Risk Assessment For Emergency Animal Diseases

In this component the risks of an event occurring or of taking a particular course of action are first identified and described. The likelihood of these risks occurring is then estimated, their potential consequences evaluated and the assessment of the risk modified accordingly. For example, an exotic disease with a high risk of entry to a country but only a low risk of establishment or minimal potential socio-economic consequences would only obtain a low overall score on a risk assessment.

Risks can be assessed in a quantified, semi-quantified or qualitative way. It is inherently extremely difficult to quantify or actually put probability numbers to risks in many biological systems because of the lack of historical precedents and serious gaps in available biological data. It is recommended that qualitative risk assessments be used for exotic diseases. The risks can be described as “extreme”, “high”, “medium” or “low”, or by a simple scoring system, for example, 1-5 for the level of risk and 1-5 for the level of potential consequences.

As described above, risk assessment consists of identifying the risks, assessing the likelihood of their occurrence and modifying them by an evaluation of their potential consequences.

Risk exotic diseases (or disease agent strains) should be identified by keeping a close watch on the international livestock disease situation. This should be a routine function of the central epidemiological unit.

Having identified and listed the exotic disease threats, the next step is to assess the seriousness of the threat of entry of each disease to the country/state and identify the routes and mechanisms by which it may enter. Questions to be raised include:

- What is the current geographical distribution and incidence of the disease around the world?
- Is the distribution fairly static or has there been a recent history of spread to new countries, regions or continents?
- How close is the disease? Is it present in neighbouring countries/states? If so, where are the nearest outbreaks to shared borders?
- Is there a past history of introduction of the disease to the country/state? Is it possible that it is still present in undetected endemic pockets of infection or in wildlife?
- How is the disease spread? What are the relative roles of live animals, genetic material, meat, dairy and other animals products, insect vectors, migrating birds and animals in transmitting the etiological agent?
- Are there significant imports of potential risk animal species or materials for the various exotic diseases? Do they come from endemic regions? How secure are import quarantine procedures?
- Are there smuggling, unofficial livestock movements, transhumance or nomadic practices which would constitute a risk for entry of exotic diseases?

The next step is to evaluate how serious the socio-economic consequences might be if there is an incursion of the disease. Questions to be raised include:

- Is the disease likely to become established in the state? Are there susceptible animal host populations and insect vector species (for arboviruses)? Are there any epidemiological factors that will either inhibit or facilitate the spread of the disease?
- Will it be difficult to recognize the disease quickly in different parts of the state?
- How large are the populations of susceptible livestock in the state? How important are such livestock industries to the state economy? What is their importance in satisfying nutritional and community needs?
- How serious will production losses be from the disease? Will food security be threatened?
- What effect would the presence of the disease in the state have on the export trade of animals and animal products? What effect will it have on internal trade?
- Will the disease cause human illness or deaths?
- Will the disease cause environmental consequences such as decimation of wildlife? Are there likely to be wildlife reservoirs of infection established?
- How difficult and costly will the disease be to control and eradicate? Can it be eradicated?

By addressing these questions and issues it will be possible to build up a risk profile of the various exotic or strategic diseases. Furthermore, an idea of the magnitude of the risk presented by each disease may be judged in qualitative if not quantitative terms. Most important, it will be possible to prioritize diseases for risk. It will also be possible to ascertain where the pressure points may be for entry of the diseases and how veterinary services and animal disease preparedness planning may need to be strengthened.

6.1.2 The Value Of Risk Assessments For Animal Disease Emergency Preparedness Planning

The type of risk assessment that has been described will be of value for:

- Determining those emergency diseases for which there is the greatest need and urgency to prepare specific contingency plans. It is recommended that contingency plans be prepared for at least the three diseases considered to be of the highest priority for the state.
- Determining where and how quarantine procedures and border controls need to be strengthened.
- Determining how laboratory diagnostic capabilities need to be strengthened.
- Planning training courses for veterinary staff and farmer awareness and publicity campaigns.
- Determining needs for vaccine banks or preparedness.
- Determining how and where active disease surveillance needs to be strengthened.

6.1.3 Risk Management

This is the process of identifying, documenting and implementing measures to reduce risks and their consequences. Risks can never be completely eliminated. The aim is to adopt procedures to reduce the level of risk to an acceptable level.

In essence, this manual provides the risk management framework for emergency animal diseases.

6.2 Risk communication

This is the process of exchange of information and opinions on risk between risk analysts and stakeholders. Stakeholders in this context include all those who could be affected by the

consequences of risks, that is, everyone from farmers to politicians. It is important that risk assessment and risk management strategies be fully discussed with stakeholders, so that they feel comfortable that no unnecessary risks are being taken and that risk management costs are a worthwhile insurance.

To ensure ownership of decisions, risk analysts and decision-makers should consult with stakeholders throughout the whole process of risk analysis so that the risk management strategies address their concerns, and decisions are well understood and broadly supported.

6.3 Who Should Carry Out The Risk Analyses?

The risk assessment component is best carried out by the central epidemiological unit in the Animal Husbandry Directorate as part of the national early warning system for transboundary animal diseases (TADs) and other emergency diseases. Risk management and risk communication are tasks for everyone, but these should be coordinated by the Director, AHD.

It should be remembered that risks do not stay static. They will change with such factors as evolution and spread of epidemic livestock diseases internationally, emergence of new diseases and changing international trading patterns for the country. Risk analysis should therefore not be seen as a one-off activity. It should be repeated and updated regularly.

7.0 Early warning contingency planning

Early warning is the rapid detection of the introduction of, or sudden increase in, any disease of livestock which has the potential of developing to epidemic proportions and/or causing serious socio-economic consequences or public health concerns. It embraces all initiatives and is mainly based on disease surveillance, reporting and epidemiological analysis. These lead to improved awareness and knowledge of the distribution and behaviour of disease outbreaks and infection, allow forecasting of the source and evolution of the disease outbreaks and the monitoring of the effectiveness of disease control campaigns.

7.1 Disease Surveillance

Disease surveillance should be an integral and key component of all government veterinary services. This is important for early warning of diseases, planning and monitoring of disease control programmes, provision of sound animal health advice to farmers, certification of export livestock and livestock products and international reporting and proof of freedom from diseases. It is particularly important for animal disease emergency preparedness.

7.1.2 Passive Disease Surveillance

Passive disease surveillance is the routine gathering of information on disease incidents from sources such as requests for assistance from farmers, reports from field veterinary officers and livestock officers, submission of diagnostic specimens to laboratories and the results of laboratory investigations. Routine disease reports may also come from other sources such as abattoirs and livestock markets.

It is important that passive surveillance systems be strengthened and that the disease information they yield be effectively captured and analysed. However, it should be recognized that complete reliance on passive surveillance usually leads to significant underreporting of diseases. It is essential

that passive surveillance be supplemented by a strong system of active disease surveillance, particularly for emergency animal diseases.

7.1.3 Active Disease Surveillance

Active disease surveillance requires purposeful and comprehensive searching for evidence of disease in animal populations or for verification that such populations are free of specific diseases. Active disease surveillance programmes may be of a catch-all nature to detect any significant disease occurrences, targeted against specific high-threat diseases or designed to monitor the progress of individual disease control or eradication campaigns.

The components of successful active disease surveillance programmes are:

- Close integration between the activities of field and laboratory veterinary services.
- Regular visits to farming communities for farmer interviews about diseases, provision of animal health advice, clinical examination of livestock and, when appropriate, postmortem examinations and collection of diagnostic specimens including serum samples. Emphasis should be given to critical areas identified by disease risk analyses and other epidemiological assessments.
- Participatory rural appraisal programmes for epidemiological evaluation of specific diseases.
- Utilization of disease information from all potential sources in the public and private sector, including veterinary inspections at abattoirs, private veterinary practitioners and veterinarians in commercial livestock industry positions.
- Gathering of ancillary information to support prioritization and decision-making on animal health programmes, e.g.livestock production and socio-economic data.
- Periodic targeted serological surveys in animal populations. These may be used either to detect the spread of infection or to prove freedom from infection. They are also occasionally used to monitor the effectiveness of vaccination campaigns. Serological surveys should be carefully designed to yield statistically valid information on the disease status of animal populations. There is often an inherent difficulty in interpreting the results of serological surveys where both vaccination and natural infection are occurring, but this may be overcome to some extent by selecting appropriate serological tests.

Epidemic livestock diseases are frequently spread by the movement of infected animals. In active disease surveillance of such diseases, emphasis must be given to situations where animals and people are on the move. This includes livestock markets, livestock trading routes, border areas and situations such as nomadism, transhumance and refugee movements from wars and civil strife.

Livestock markets and other congregations of animals are a very important potential source for the rapid spread of epidemic diseases. They should be a major focus for disease surveillance and should be carefully controlled during disease outbreaks

Wildlife disease surveillance must not be overlooked. Wildlife may provide a reservoir of infection for some diseases, but may also act as a sensitive indicator of diseases that are not clinically apparent in adjacent livestock populations. The latter has occurred recently with African Lineage 2 rinderpest virus in East Africa. Close cooperation is required between veterinary and wildlife authorities. As direct examination of wildlife by capture techniques or slaughter is expensive and often difficult to organize, where possible sera and other diagnostic specimens should be collected when such wildlife surveys are carried out.

8.0 Emergency Disease Reporting And Information Systems

8.1 Emergency Disease Reporting

The state has a disease reporting mechanisms that is primarily designed for routine endemic disease occurrences. These mechanisms often suffer from one or more serious deficiencies, including overlong reporting chains from local to district to provincial and finally to national offices, with the consequent risk of inordinate delays and distortion of information at each level; and collection and transmission of information that is based on poor epidemiological surveillance or diagnostic methods or is inadequate for good disease control decision-making.

For these reasons, special emergency disease reporting mechanisms for potentially serious disease outbreaks or incidents must be put in place as an essential component of preparedness plans. These should allow critical epidemiological information to be transmitted to national veterinary headquarters rapidly and efficiently, preferably on the same day. This may be done by telephone, facsimile, e-mail, radio, or courier-whichever is the most appropriate for the circumstances and the location. Local and regional veterinary offices should in any case be provided with the necessary communications equipment and field and laboratory staff should have a list of contacts and alternatives so that emergency disease reports may be received and acted upon quickly at their destinations.

In the case of an emergency report on a disease outbreak or incident, the basic information that needs to be conveyed is:

- The disease or diseases suspected.
- The exact geographical location of the disease outbreak(s).
- The names and addresses of affected farms or villages.
- Livestock species affected.
- Approximate numbers of sick and dead animals.
- Brief description of clinical signs and lesions observed.
- Date(s) when the disease was first noticed at the initial outbreak site and any subsequent sites.
- Details of any recent movements of susceptible animals to or from the outbreak farm or village.
- Any other key epidemiological information, such as disease in wild or feral animals and abnormal insect activity.
- Initial disease control actions taken.

All transboundary and other emergency animal diseases should be made compulsorily notifiable within the country.

8.2 Emergency disease information system

The state should have a fully operational disease information system so that there can be a two-way flow of information between Directorate of AHD, government veterinary diagnostic laboratories and regional veterinary offices (or local disease control headquarters) that will allow the efficient monitoring of the progress of disease eradication or control programmes. This is even more important for responses to emergency diseases. The development of a disease information system is an essential part of national animal disease emergency preparedness planning. It is desirable but by no means essential that this be computerized.

The information that is captured in this system should be limited to the essentials for the planning, implementation and monitoring of disease control campaigns and for national reporting. The

information system should not be cluttered with data that are not required for decision-making. It should be emphasized that the emergency disease information system needs to be a two-way process, with adequate feedback from AHD headquarters to the field and laboratory veterinary staff who originally collected and processed the information.

The following provides an indication of the type of information that may be included in the emergency disease information system:

- Results of field clinical and serological surveillance and of other activities such as abattoir and market surveillance.
- Exact geographical locations of infected farms or villages, with essential epidemiological data such as dates of detection and probable start of infection, livestock species affected with numbers of sick and dead animals and numbers at risk, diagnostic specimens collected, tracebacks and traceforwards and disease control actions taken.
- Results of laboratory investigations, collated with the above.
- Locations of quarantined areas and infected or surveillance zones, including data on susceptible livestock populations and locations.
- Priority lists of farms and localities for future surveillance and for vaccination programmes, etc. based on epidemiological analyses.
- Data related to the implementation and progress of vaccination campaigns and of any disease eradication procedures such as slaughter of infected or potentially infected animals, safe disposal of carcasses by burial or burning and disinfection of premises.
- Disposition and availability of essential human and physical resources such as vaccines, diagnostic kits, vehicles, disinfectants, etc.

Geographic locations feature prominently in the above disease information requirements. The emergency disease information system should therefore incorporate a facility for mapping. At a later stage in its development, consideration could be given to the incorporation of a geographic information system (GIS).

Assistance can be provided to countries in their development of emergency diseases information systems by the FAO/EMPRES programme. A transboundary animal diseases information system (TADINFO) is being developed by EMPRES which can be made available to countries that do not already have a suitable system in place.

9.0 Training Of Veterinarians And Other Animal Health Staff In Early Recognition Of Emergency Diseases And Collection And Dispatch Of Diagnostic Specimens

In many countries, particularly the developing ones, it is unlikely that many veterinarians or other animal health workers in either the public or private sector will have had first-hand experience with transboundary or other emergency animal diseases, as these diseases may never have occurred in the country or may have been exotic for a considerable period. This deficiency needs to be rectified by a systematic training programme for all those who, in their professional capacity, may be the first to come into contact with an incursion or outbreak of such a disease. Because a disease may strike in any part of the country and because of staff turnovers, training programmes should be both comprehensive and regular. This training must extend to staff in the remotest parts of the country.

Obviously, it will be neither practicable nor necessary to train personnel to a high level of expertise in these diseases. In most cases it is sufficient for trainees to be familiar with the basic clinical, pathological and epidemiological features of risk diseases and to know what to do if they suspect

one of these diseases. Perhaps most important is to inculcate in people an awareness that if they are confronted by an unusual disease outbreak, either in the field or in the diagnostic laboratory, they should include exotic diseases in the range of their differential diagnostic possibilities and act accordingly. They should be trained in the steps they need to take to secure a confirmatory diagnosis, including collection and transport of diagnostic specimens, and in the immediate disease control actions that need to be instituted at a disease outbreak site. More specialized training will be needed for personnel who are nominated as members of specialist diagnostic teams. Training should also be intensified for diseases judged to be of very high and immediate threat.

A number of training possibilities may be selected as appropriate, including sending key field or laboratory staff to another country to gain first-hand experience when there is a major disease outbreak. While this is the best type of training, it is unpredictable and expensive. Nevertheless, this possibility should be explored when there is a disease emergency in a neighbouring country. Staff would be able to observe the disease and disease control procedures in a similar environment and they would also provide additional human resources for the recipient country responding to the emergency.

Other international training opportunities may occur from time to time. Several countries with access to microbiologically high-security laboratory and animal facilities, such as Australia, the United States, the United Kingdom and South Africa, run training courses in which exotic diseases can be demonstrated by experimental infection of susceptible livestock species. There may be the opportunity for external students to attend. There is also the possibility of training for laboratory staff at world or regional reference laboratories or through programmes organized by the Joint FAO/IAEA Division. Training programmes may also be arranged occasionally by other international organizations.

To ensure early recognition of emergency diseases, all veterinarians and animal health workers should be trained to recognize basic clinical features, and to report immediately on any suspicions that arise during their everyday work

State emergency disease training workshops should be organized as the mainstay of training and should be targeted at government field and laboratory veterinary officers, veterinary practitioners, industry veterinarians and public health and quarantine veterinarians including those stationed at abattoirs, markets, border posts and air ports. Formal presentations and discussion sessions on the major emergency diseases should be supplemented as much as possible by audio-visual teaching aids, including colour slides and videos on the diseases. A list of available training aids is shown in Appendix 2. The presentations should also include discussion of the basic principles and strategies for preventing and eradicating the diseases. Practical demonstrations may also be carried out on the correct methods for collection and dispatch of diagnostic specimens.

At the same time, instruction should be provided on disease reporting responsibilities and procedures, disease surveillance and other field epidemiology methods and immediate disease control actions at the outbreak site(s).

Similar but simpler training workshops should be organized for auxiliary para-veterinary staff.

Field diagnostic manuals are most useful if they are prepared in a simple, practical and graphic format whereby they can always be carried in a vehicle and can be available for quick reference at the site of a disease outbreak. The manual should cover essential information on the etiological agent, host species, epidemiology, clinical signs, gross pathology, differential diagnosis and collection of diagnostic specimens for each of the emergency diseases.

Training in emergency disease recognition and management should also be an integral part of the curriculum of undergraduate veterinary students in universities.

10.0 Farmer Awareness/Education Programmes And Other Publicity Campaigns

This is one of the most critical, but sometimes neglected, aspects of preparedness planning for emergency diseases. It is also important for fostering a sense of participation in and support for emergency disease control/eradication campaigns among livestock farmers and other key stakeholders. It also engenders a "bottom-up" approach to planning and implementation of disease control programmes to complement the more traditional "top-down" approach adopted by governments.

The communication strategies should aim to make stakeholders aware of the nature and potential consequences of important livestock diseases and of the benefits to be derived from their prevention and eradication. Furthermore, they should always have an element of rallying the community to the common cause of fighting a disease epidemic.

When possible, professional communicators and extension experts should be enlisted to help design and carry out awareness and publicity campaigns. Ideally, personal visits and discussions with farming communities and livestock traders, etc. are preferable, but newspapers, radio and television can reach a large target audience quickly. Radio programmes have proved to be a very effective method for spreading the message. These should be broadcast at times of the day when most farmers could be expected to be listening to the radio, which may be early in the morning or at night.

10.1 Livestock Farmers

Early warning of outbreaks of potentially serious livestock diseases is only likely to occur if farmers are prompt to seek help from their local government veterinary officer, private veterinary practitioner, livestock extension officer or animal health assistant when they experience an unusual disease in their animals. This is the vital first link in bringing an occurrence of such a disease to official attention. It is therefore worth while devoting considerable attention to farmer and other public awareness programmes in emergency disease preparedness planning.

An essential prerequisite for encouraging farmers to make rapid contact with their district veterinary office or equivalent for help when faced with a disease outbreak is that a high level of trust and confidence has been established between the farming community and local animal health officials. This is not something that happens overnight. Farmers are more likely to report unusual disease occurrences at an early stage if they perceive that there will be tangible benefits in doing so. The required level of trust and confidence needs to be built up over time by regular visits to farming communities, well-planned extension programmes and an established pattern of assistance and advice on more routine animal health matters. Local animal health officials should be both accessible and easy to contact. Reports of unusual disease incidents should always be taken seriously and investigated promptly and thoroughly, even if on the surface they may appear to be false alarms.

Awareness campaigns on the more important emergency livestock diseases should become a routine element of extension programmes for farmers. They may be targeted particularly at diseases that have been identified as being of highest threat in risk analyses and at high-risk areas for entry and/or occurrence of these diseases. Farmer awareness campaigns should encompass:

- Simple descriptions of the nature of the diseases, how they are spread, their potential consequences for the individual farmer and local communities and the importance of their prevention and early detection.
- Basic zoosanitary procedures that farmers should routinely adopt. These may include purchase, as far as is practicable, of animals with a known animal health status from areas known to be free of diseases, segregation of newly purchased animals (particularly those acquired from livestock markets) from other animals on the farm or in the village for the first two weeks or so, segregation of any sick animals and elementary hygiene practices.
- Key clinical signs which may alert a farmer to the possible occurrence of particular diseases. These should be explained in straightforward, non-technical terms. The "3 Ds" used in rinderpest awareness campaigns are an excellent example. These are discharges, diarrhoea and death; farmers in risk areas are advised that if they see any two of these in their cattle they should assume that there is rinderpest and act accordingly.
- Information on whom to contact and how to contact them if there is an unusual disease occurrence.

A series of audio-visual aids may be prepared or obtained from external sources to support extension programmes. These should be designed for specific audiences bearing in mind the level of sophistication appropriate for each group. They may include posters, leaflets and videos. Selections of training aids which may be suitable for this purpose are listed in Appendix 2.

10.2 Livestock Traders

Livestock traders are another important target group for public awareness campaigns, but they are often overlooked. The movement of animals through livestock traders is often the key epidemiological factor in the spread of epidemic livestock diseases. The need to build up a climate of trust and confidence between animal health officials and livestock traders is just as important as that discussed for farmers. The general themes for emergency disease awareness should also be similar, although emphasis should be placed on the importance of sourcing animals from disease-free areas where possible, not buying any sick stock and following any rules about quarantine and vaccination, testing or identification of animals. The potential consequences of the occurrence of a disease for internal and international trade should be emphasized.

10.3 Public Awareness Campaigns

Campaigns targeted at specific groups should be supplemented by more general public awareness programmes. These can be channelled through media outlets including newspapers, radio and television. Radio broadcasts can be an extremely powerful (and perhaps the only) means of reaching farming communities and nomadic groups in remote areas or areas that have been rendered relatively inaccessible for various reasons. Radio Broadcasts Can Be An Extremely Powerful Tool In Public Awareness Campaigns

11.0 Specialist Diagnostic Teams

It is recommended that specialist diagnostic teams be ready to be mobilized when there is a report from the field of a suspected emergency animal disease. These arrangements should be made well in advance of any emergency and the members should be available and equipped to travel to a disease outbreak site at short notice. In this case they must have at their disposal all the equipment needed for the preliminary investigation of a disease and for collection and transport of diagnostic specimens.

The composition of the diagnostic team will vary according to circumstances but may include:

- A veterinary pathologist from the central or regional veterinary diagnostic laboratory.
- A specialist epidemiologist, preferably with first-hand experience or training in the major transboundary animal disease.
- A veterinarian with extensive experience of endemic diseases in the target livestock species.
- Any specialist (e.g. entomologist) required for special examinations.

The specialist diagnostic team should be given a high level of training in at least the identified high-priority emergency diseases and in participatory techniques.

The team would travel to a disease outbreak site with local veterinary staff, as directed by the office of the Director. They would be expected to make clinical examinations, collect histories and make preliminary epidemiological investigations, particularly in respect to tracebacks (have any new animals joined the infected herds or flocks in recent weeks and where did they come from?) and traceforwards (have any animals left the infected herds or flocks in recent weeks and where did they go to?). They would also autopsy sick or very recently dead animals and collect a range of diagnostic specimens appropriate to the endemic and exotic diseases included in the differential diagnosis and transport these back to the laboratory.

The team should also be able to take any immediate disease control actions at the outbreak site and should have the necessary authority to do this.

The specialist diagnostic team would be expected to report their assessment of the disease outbreak immediately to the state/provincial/ regional veterinary officer and the Director, AHD, specifying steps taken to secure a confirmatory diagnosis and advice given on further disease control strategies, including declaration of infected and surveillance zones.

12.0 Laboratory Diagnostic Capabilities

The rapid and accurate diagnosis of diseases can only be assured in fully equipped laboratories that have a range of standardized diagnostic reagents, experienced staff and a sufficient throughput of diagnostic specimens to maintain expertise. It should be noted that development of diagnostic expertise for exotic disease using tests that require handling the live agent should only be attempted in microbiologically high-security laboratories.

It would be impractical and excessively costly for the state to maintain a sophisticated state of the art veterinary diagnostic laboratory that has full capabilities for confirmatory diagnosis of all transboundary and other emergency diseases, many of which will be exotic. However, states that have significant livestock populations should have a veterinary diagnostic laboratory that is equipped and competent to undertake a broad range of standard techniques in pathology, virology, bacteriology and serology to the standard where the isolation and preliminary characterization of etiological agents for emergency livestock diseases could be attempted. For very high-threat transboundary animal diseases, consideration should be given to developing capabilities for some key diagnostic tests, such as ELISA antigen and antibody detection tests and fluorescent antibody tests. These are available in the G. B. Pant University of Agriculture & Technology and the Indian Veterinary Research Institute which are closely situated to Uttarakhand.

The OIE *Manual of standards for diagnostic tests and vaccines* provides authoritative information on diagnostic procedures for OIE List A and List B diseases.

Specimen transport containers should be kept at both central and state or provincial veterinary laboratories and should be made readily available for field veterinary officers and specialist diagnostic teams. They should ideally consist of leakproof primary containers such as glass universal bottles with a metal screw-cap and rubber washer. These should then be packed into a leakproof secondary container, such as a steel paint tin, with absorbent material and an icepack if chilling is required. This container should be placed in a robust outer container which must be clearly labelled. Specimen advice notes should also be provided. (Annexure-II)

13.0 Early Reaction Contingency Planning—Principles and Strategies

Early reaction is to carry out without delay the disease control activities needed to contain the outbreak and then to eliminate the disease and infection in the shortest possible time frame and in the most cost-effective way, or at least to return to the status quo that existed previously and to provide objective, scientific evidence that one of these objectives has been achieved.

It is far too late to leave the planning of an emergency disease eradication or control programme to the time when a disease outbreak has actually occurred. There will then be intense political pressure and pressure from livestock farmer groups for immediate action. In such a climate mistakes will be made, resources misused, deficiencies rapidly highlighted, and there will be unavoidable delays resulting in further disease spread and higher costs-unless there has been adequate forward planning and preparation.

This section first highlights the importance of effective quarantine services for the prevention of exotic animal diseases. It then describes the principles and strategies of epidemic livestock disease control and eradication that need to be taken into account in the preparation of early reaction contingency plans.

13.1 Preventing The Entry Of Exotic Animal Diseases

The old maxim that “prevention is better than cure” is particularly relevant to exotic animal diseases. Quarantine should be regarded as one of the most important core functions of government veterinary services. Transboundary and other exotic animal diseases can be introduced in many ways. These include entry of infected animals or germplasm (semen or ova), entry of contaminated animal products or biological products (e.g.vaccines), contaminated food waste from aircraft or ships, infected people (in the case of disease transmittable to animals), migrating animals and birds, or even by natural spread of insect vectors or by wind currents. While governments may be powerless to prevent some of the latter methods of disease introduction, the others can be considerably mitigated by efficient quarantine services.

Quarantine programmes should include the following:

- International border controls to prevent the smuggling or uncontrolled entry of animals, animal products and other potentially dangerous goods. At the same time, border programmes should provide a legal method for entry of the above through sound animal health certification and pre- and post-quarantine. Licensing of traders may be considered. Sensitivity will be necessary when there are uncontrolled animal movements across borders because of nomadism, transhumance, influx of refugees, etc. as harsh quarantine restrictions may just encourage smuggling and be counter-productive.
- Import quarantine. Quarantine conditions should be negotiated with exporting countries for the safe importation of animals, germplasm and animal products. This will include pre-export testing and quarantine, animal health certification and any necessary post-arrival

inspection, testing and quarantine. The OIE International Animal Health Code for Mammals, Birds and Bees provides guidelines for such programmes.
- Quarantine inspection of people and goods arriving at international airports and seaports.
- Safe disposal of international aircraft and ship food waste through incineration or deep burial.

13.2 General Principles Of Epidemic Livestock Disease Control And Eradication

A number of basic approaches may be used to control and eliminate epidemic livestock diseases. They are usually used in combination. The weighting that is given to the different approaches will be determined by the nature of the disease in question, the epidemiological circumstances and their acceptability and cost. The approaches to be used are summarized below.

13.2.1 Denial of Access Of The Disease Agent to Susceptible Host Animals

This may be achieved by:

- Applying good hygiene and sanitary practices when handling livestock. This includes disinfection of all personnel and equipment. In this context, veterinary services should note that there have been several well-documented cases of highly contagious diseases such as FMD being spread from farm to farm by veterinarians on their rounds.
- Removing potentially contaminated materials from the environment, by disinfection, destruction and/or safe disposal. This includes cleaning and disinfection of premises that have housed infected animals, destruction of contaminated feedstuffs and other materials and burial or burning of the carcasses of infected animals.
- Preventing the feeding of contaminated materials to livestock. Many diseases can be transmitted in this way. The classical example in recent years has been bovine spongiform encephalopathy (BSE). However, entry into the food chain is an important method of perpetuation and spread of other important animal pathogens, particularly by swill feeding. These include FMD, African Swine Fever, Hog Cholera (Classical Swine Fever) and Swine Vesicular Disease. These diseases have spread not only from farm to farm but from continent to continent. Controls on swill feeding by either enforcing strict bans on swill feeding of animal tissues to animals or allowing only the feeding of heat-treated swill to animals should be an integral part of the prevention and eradication of a number of epidemic livestock diseases including those mentioned above.

13.2.2 Avoiding Contact Between Infected And Susceptible Animals

This is one of the most important approaches and may be achieved by:

- Quarantining of infected or potentially infected farms or areas. A ban or appropriate animal health restrictions are placed on the movement of susceptible species animals into or out of the quarantined area until infection is considered to have been removed. Restrictions may also be placed on the movement of people, potentially contaminated animal products and other materials.
- Imposing livestock movement controls. These are usually imposed over a wider area around the immediate quarantined or infected area, as part of a zoning policy (for example, within surveillance or control zones). With such controls the movement of susceptible species is only permitted under strict, designated conditions when it is deemed safe. This may include the transport of livestock direct to abattoirs for immediate slaughter for those diseases that are not transmitted by meat or other animal products. There may also be

bans or restrictions placed upon congregations of susceptible animals such as at livestock markets or race meetings.

- In some cases, through erecting large-scale fencing or other physical barriers. However, potential adverse effects, such as disruption of wildlife habitats and of traditional movements of people and their animals, should first be evaluated.

13.2.3 Removing Infected And Potentially Infected Animals

This is often referred to as an eradication policy. Susceptible species on infected farms or in designated infected areas are immediately slaughtered on site and their carcasses disposed of safely, usually by burial or burning. It is often combined with cleaning and disinfection procedures for the infected premises. Because of the rapid spread of epidemic diseases, all susceptible animals are slaughtered, whether obviously infected or not. For some infectious disease control programmes, such as for brucellosis and tuberculosis, it is possible only to slaughter animals that have been tested positive, but this is not appropriate for rapidly contagious epidemic diseases.

A component of an eradication policy may also be selective reduction of susceptible wild and/or feral animal populations in infected areas, but before embarking on such a programme a careful evaluation should be made.

13.2.4 Reducing The Number Of Susceptible Animals

This is an important approach used in many countries. In emergency disease control it is usually achieved by vaccination of susceptible animals. Vaccination may be done selectively (for example as “ring vaccination” around infected areas) or as “blanket” vaccination programmes in susceptible animal populations. Depending on the nature of the disease and of available vaccines, it may be possible to eliminate infection completely. More usually vaccination is used to reduce the level of infection in animal populations to an acceptably low level where other disease elimination policies are more feasible. In fact, in some cases routine vaccination may mask underlying infection in animal populations.

13.2.5 Reducing access of vectors to susceptible animals

This may be appropriate for insect-borne diseases and, in some cases, may be achieved by reducing vector numbers in an area by treatment and/or elimination of potential breeding sites. Large-scale insecticide spraying is generally too costly, ineffective in the long term, and/or environmentally unacceptable. Other approaches might be to treat susceptible animals with longacting insecticides during critical periods or remove animals from high-activity insect vector areas either continuously or during times of the day or year when insect vectors are most active.

13.2.6 Biological Control

To date, there has been only one emergency disease situation for which biological control has proved effective. This has been for the New World Screwworm Fly (*Cochliomyia hominovorax*) in the Americas and North Africa using the sterile insect release method (SIRM). SIRM techniques are also currently under evaluation for the Old World Screwworm Fly (*Chrysomia bezziana*).

14.0 Strategies For Epidemic Livestock Disease Control And Eradication

14.1 Containment First

Containment of an outbreak of an epidemic disease is the first priority. Stabilizing the situation is the prelude to eradication.

In order to contain the outbreak, one must be able to determine where the disease is - which farms or areas are infected and which are free. This means that all the active disease surveillance procedures already discussed should be put immediately into effect. There needs to be an intensive search for new foci of infection for the disease, with priority given to:

- Following up any reports or rumours of the disease.
- Regular (preferably daily) disease surveillance visits to farms or farming communities close to known foci of infection - in designated surveillance zones (see below).
- Following up epidemiological tracebacks. These are new animals that have been brought on to the infected farm in the period immediately before the disease was first noticed and that may have been the source of infection. Their origin must be identified, together with any other locations that they may have infected during transit, and investigated for the disease.
- Following up epidemiological traceforwards. These are animals that have left known infected farms during the critical period when they may have been in contact with infected animals. These animals may be spreading the disease to new areas so that the farms to which they have gone must be identified and investigated.
- Surveillance of any animals that have congregated with known infected animals over critical periods for transfer of infection, e.g. at common watering points or pastures and markets.
- Any high risk areas for spread or occurrence of the disease that have been identified by epidemiological analysis. An example may be Rift Valley Fever - those areas that have similar climatic features and build-up of mosquito vector populations to places where an outbreak of RVF is occurring.

As can be appreciated, the task of following up tracebacks and traceforwards and other epidemiological leads becomes very complicated if, for example, suspect animals have been through livestock markets. This points to the need for countries to have in place livestock identification mechanisms or at least effective “paper trails” (e.g. movement permits) for animals that have been sold or moved. As new foci of infection are identified, starting from where the disease was first detected, appropriate disease control actions must be put into place immediately and strictly enforced to prevent further spread of the disease from these foci. In most cases this will involve quarantining the infected farm or area and placing bans or restrictions on the movement of susceptible species animals and dangerous animal products or other materials in surrounding zones. The disease control/eradication strategies selected for the particular disease (e.g. eradication or ring vaccination) are then carried out.

14.2 Zoning

The proclamation of geographic areas in which specific disease control strategies are to be carried out is known as “zoning”. Zoning almost always takes place in the form of concentric “circles” around known or suspected foci of infection, with the most intensive disease control activities in the inner zones. The actual size and shape of the zones may be determined by administrative boundaries or geographic barriers or be driven by epidemiological or resource imperatives. The nature of the disease control zones and the activities carried out in each zone are dependent on the particular disease control/eradication strategy selected. These are described in the next sections.

14.2.1 For Disease Control Zones To Have The Desired Effect, They Must Be Made Well Known To The Local Farmers

Finally, disease-free zones or regions of the country may be declared. In these, the emphasis of surveillance shifts from detecting infection to proving freedom from infection. More emphasis should thus be given to such techniques as serosurveillance. In the early stages of a disease eradication campaign, while the extent of the disease is still being assessed, it could be expected that the disease control zones are comparatively large and the disease-free zones comparatively small. As the disease control campaign progresses, it is to be hoped that the situation would reverse with the ultimate aim of the whole country being declared disease free.

Zoning is now recognized as an important principle in the definition of the animal health status of countries by OIE.

14.2.2 Stamping Out By Slaughter Of Affected Herds Or Flocks

This is usually the most efficient method for the rapid elimination of an introduced exotic or other emergency disease. It is also often the most cost-effective. Not only is the disease eradication campaign shorter and achieved for a lower overall cost, but there is a much shorter waiting period before the state can be recognized as being free of the disease and the export of livestock and animal products resumed.

Several social, economic and other factors need to be carefully evaluated before eradication is selected as the desired strategy for any specific disease contingency plan. These factors include:

- Whether or not slaughter of infected animals is likely to gain general community acceptance on religious, ethnic, animal welfare and other social and economic grounds.
- Any comparative advantages and disadvantages and likely success of implementation of other strategies. In this context, vaccination should not be available for some epidemic livestock diseases so that eradication is the only viable option. African Swine Fever is a typical example. At the other end of the spectrum, eradication is unlikely to have much beneficial effect. This particularly applies to insect-borne diseases such as Rift Valley Fever and bluetongue.
- Whether or not the human resources, equipment and other physical resources are available to carry out all the activities needed for the implementation of a disease eradication campaign properly (see below). While eradication is likely to be less costly and more efficient overall, it may be quite resource-intensive in the short term.
- Whether adequate provisions and mechanisms are available for the fair and quick compensation of owners for any livestock or property destroyed in the campaign.

In an eradication campaign, activities carried out in designated disease control zones are described below.

14.2.2.1 Infected premises

It is here that the disease has actually been detected and includes all areas where there are susceptible animals that could have become infected through contact with the diseased animals. The premises may be a single farm, household or herd/flock, but could also be an entire village, settlement, common grazing land or even livestock saleyards. Activities to be undertaken are itemized below:

- The infected premises are immediately quarantined with a complete ban on the movement in or out of susceptible species of animals, animal products and potentially contaminated materials. Where necessary, this may be supported by disinfection/

decontamination of persons, vehicles, equipment and other materials leaving the premises.

- All susceptible species animals are immediately slaughtered, whether they are obviously infected or not. The animals should be slaughtered by methods that take account of animal welfare concerns and the safety of operatives. Rifles, captive-bolt guns or lethal injections (e.g. barbiturates) are most commonly used. For poultry, gaseous mixtures are often the preferred method. A mixture of at least 70 percent carbon dioxide in air in a sealed container is the most efficient, although carbon monoxide from vehicle exhaust pipes may also be used (provided adequate safety precautions are taken). Neck dislocation, either by hand or by mechanical devices may also be used for birds.
- Carcasses of all animals that have either been slaughtered or have died naturally of the disease are disposed of safely so that they no longer constitute a risk for further spread of the pathogen to other susceptible animals either by direct or indirect means, e.g. by carrion eaters or scavengers or by contamination of food or water. This is most usually achieved by deep burial (depending on such factors as the nature of the terrain, closeness of water-tables to the surface and availability of earth-moving equipment) or by burning (depending on such factors as availability of suitable fuels and the danger of starting grass or bush fires). If *in situ* disposal is not practical it may be possible to transport carcasses to a common disposal point in sealed vehicles. This should be done within the infected area (see below). Rendering of carcasses may also be satisfactory provided destruction of the pathogen can be guaranteed. Incineration is generally too expensive, except in special circumstances, e.g. for BSE. It may also be necessary to dispose safely of potentially contaminated animal products held on infected premises, e.g. meat, hides, wool, dairy products or eggs, depending on whether such products constitute a risk for transmission of infection. In some circumstances it may be safe to retain these for home consumption.
- Premises must be decontaminated. The environs of the infected premises, particularly where animals have congregated, must be thoroughly cleaned and disinfected. This includes animal houses, sheds, pens, yards, water throughs, etc. Potentially contaminated materials such as manure, bedding, straw and feedstuffs should be removed and disposed of as for carcasses. Appropriate disinfectants must be selected for each disease. These may consist of soaps and detergents, oxidizing agents, alkalis, acids and/or aldehydes. Insecticides should also be used to prevent the transfer of contamination by flies.
- After slaughter, disposal and decontamination procedures are completed, the infected premises are left destocked for a period that is determined by the estimated survival time of the pathogen in the particular environment. As a general rule, this is shorter in hot climates than in cold or temperate climates. However, a minimum for any disease is 21 days.
- Partial or complete restocking of susceptible animals in the infected premises is then allowed. However, these animals are kept under close surveillance and, provided there is no evidence of infection for a period equivalent to, say, two incubation periods for the disease, the premises may be released completely from quarantine.

14.2.2.2 Dangerous Contact Premises

These are premises where overt disease has not yet appeared, but for which epidemiological investigations indicate that there is a high likelihood that infection has been introduced. This circumstance might occur with an immediate neighbour to infected premises that have introduced animals from infected premises during the critical period for transfer of infection. A worst case scenario of a highly contagious disease being detected in a livestock market may lead to many dangerous contact premises.

These premises are put under the same tight quarantine as infected premises and are subject to intense surveillance (at least daily). Provided there is no evidence of infection, they may be released from quarantine after a period equivalent to at least two quarantine periods for the disease.

In certain circumstances a decision may be taken to slaughter animals from dangerous contact premises.

14.2.2.3 Infected zone

This is the area immediately surrounding infected premises. While its size and shape are influenced by topographical features, physical barriers, administrative borders and epidemiological considerations, OIE recommends that it should be at least a 10-km radius around a disease centre in areas with intense livestock raising and 50 km in areas where extensive livestock raising is practiced. Activities to be undertaken are itemized below.

- Strict controls should be maintained on the movement of susceptible species of animals and potentially contaminated animal products into or out of the infected zone. These should preferably be banned or only allowed in circumstances where there is no risk of further transmission of infection. An example might be the direct transport of apparently healthy animals to an abattoir for immediate slaughter, in the case of disease agents that are not transmitted by meat (e.g. CBPP and Rinderpest). Local salvage could be considered for such diseases if warranted by circumstances.
- Intensive surveillance is undertaken, ideally involving daily clinical inspection of susceptible species animals on all farms or other livestock premises in the zone. Inspection teams should wear protective clothing and practise good personal disinfection when leaving the premises. If wildlife or feral animals are likely to be involved, arrangements should be made with wildlife authorities for disease surveillance to be undertaken. In the case of avian diseases, arrangements may be made for a daily dead bird pick-up service (in sealed plastic garbage bags or the equivalent) from poultry farms, with these being taken back to the laboratory for autopsy and diagnostic tests. Surveillance should also be extended to include commercial and hobby aviaries.
- Closure of livestock markets and other congregations of susceptible species (e.g. race meetings and livestock). A decision on whether or not to close risk enterprises, such as abattoirs and dairy factories located in the infected zone, should be made after careful consideration of epidemiological and other factors, i.e. whether they constitute a significant threat for further spread of the disease. However, in some cases, there could be advantages in keeping the enterprise open as this tends to keep animals within the zone and retain the economic viability of the affected community. Strict zoosanitary codes of practice should be enforced in this case.
- Publicity campaigns should be carried out to inform people of the nature of the disease and of the restrictions in place.

The infected zone should be left in place for as long as can be reasonably expected, on the basis of epidemiological evaluations, that infection may still be present. However, there is a risk in maintaining restrictions for too long as resentment may build up in the community, with a resulting reluctance to maintain the livestock movement bans and other restrictions.

14.2.2.4 Surveillance (or Control Zone)

This zone is much larger and surrounds one or more infected zones. It may cover a whole province or administrative region (or clan or tribal area). Activities undertaken are described below.

1. There is enhanced active disease surveillance in the control zone. Herds and flocks should be inspected at about weekly intervals and this inspection should be supplemented by serological surveys.
2. Livestock movements into or out of the control zone are allowed, but livestock movements out of the control zone should be subject to permits after clinical examination of the animals.
3. Risk enterprises are allowed to operate but are subject to strictly enforced zoosanitary codes of practice.
4. Livestock markets and other congregations of animals should be suspended if they are considered to constitute a considerable threat for the further spread of the disease. If they are allowed to continue they should be subject to surveillance and rigidly enforced codes of practice.
5. Publicity campaigns should be carried out.

14.3 Vaccination Supplemented By Other Disease Control Measures

Well-planned, comprehensive vaccination programmes, supplemented by other disease control measures, can go a long way towards eliminating many epidemic livestock diseases. This may be the strategy of choice in areas where large-scale eradication is unacceptable for one reason or another.

There are a number of important issues to be evaluated before selecting a vaccination strategy. These issues are described below.

14.3.1 Vaccine Type

Different types of vaccine may be available and their comparative advantages and disadvantages should be evaluated. Live attenuated vaccines generally provide a more durable immunity and require fewer doses. However, assurances need to be obtained that the vaccine has been thoroughly tested on the types of animals for which it is to be used and it has been found to be safe and free of potential problems with teratogenicity if administered to pregnant animals, reversion to virulence or reassortment/recombination with field strains. Some live vaccines (e.g. oral Newcastle disease vaccine) can be administered in ways that involve little or no handling of animals. Inactivated (killed) vaccines should be safe in all circumstances. However, they often require two doses in a primary immunization course, together with periodic booster doses. Several new-generation genetically engineered vaccines show great promise, but few have yet come to commercial reality.

For epidemic livestock diseases such as FMD for which the causal agent exhibits antigenic variation, it is important to select the correct antigenic type and subtype vaccine in order to achieve good levels of immunity. Field isolates of the agent should therefore be regularly collected from different parts of the country and submitted to a world or regional reference laboratory for antigenic characterization. The most appropriate vaccine strain(s) can then be chosen.

14.3.2 Vaccine Quality

There have been several well-documented disasters where vaccines have actually caused the diseases that they have meant to prevent, often in previously free areas. This has happened because killed vaccines have been improperly inactivated and because both live and killed vaccines have been contaminated with virulent virus, perhaps through cross-contamination with challenge virus cultures in the same laboratory. Just as serious has been the use of ineffective vaccines, which have either lost their potency or perhaps were never potent even when they left the manufacturer. Not only does this cause waste of money and scarce resources, but also leads to a false sense of security.

Vaccines should always be sourced from highly reputable manufacturers who follow internationally accepted quality assurance procedures and codes of good manufacturing practice. The manufacturers should be subject to approval and quality control verification by independent national or international biological control authorities.

14.3.2 Vaccination Cover

The aim in vaccinating a population of animals is not only to protect the animals that are actually immunized, but also to cut down the rate of transmission of the pathogen in the target population to a level where infection is no longer sustained in that population. The latter is often referred to as herd immunity and a 70 percent vaccine coverage quoted as the figure to achieve this, but in many cases the justification is somewhat vague. In fact, in some cases, including FMD, it has been shown that a higher vaccination cover is required to achieve really good herd immunity.

14.3.3 Vaccine Protection

The ideal vaccine not only protects animals from the clinical disease if they are subjected to challenge by the disease agent in the field, but also prevents infection and virus growth. Not all vaccines match this ideal and a proportion of animals can develop a silent infection, especially in the respiratory tract after nasal aerosol challenge. Fortunately, virus multiplication is generally at a lower level than in unimmunized animals and the excreted virus is usually insufficient to establish transmission. However, in partially and suboptimally immunized populations the virus can continue to circulate within the non-vaccinated sector of the population. Thus, the impact of the disease can be reduced to a point where mortality is unremarkable against the normal background level of disease from diverse causes, particularly under extensive range management. Once vaccination ceases and the level of herd immunity falls, the disease becomes more visible. For this reason it is necessary to maintain enhanced active disease surveillance to detect any possible breakdowns until well after vaccination campaigns are stopped and freedom is confirmed. *Vaccination programmes are pivotal in the control of many emergency animal diseases, but should be carefully planned and targeted to meet a well-defined objective*

14.3.4 Vaccine Storage And Application

Vaccines must be stored at the correct refrigeration temperature at all times and used before expiry dates. This means that cold chains must be maintained for vaccines up to the time of their injection. Inactivated vaccines may require more storage space, as the dose volume is generally larger than for live attenuated vaccines. Heat-stable, live vaccines, if available, reduce cold storage problems.

Too often, injection of vaccines in the field becomes a hit-or-miss affair because animals are inadequately restrained. Vaccination teams must be trained in proper techniques and equipped to restrain animals properly.

It may be possible to give more than one vaccine at the same time, either at different sites or in the same injection, thus saving resources and possibly improving the acceptability of the vaccination programme to farmers. However, manufacturers should be consulted to determine whether this practice is safe and efficacious.

14.3.5 Vaccination And Disease Surveillance

Vaccination campaigns may complicate disease surveillance activities in two ways. First, if vaccination campaigns are not carried out in a comprehensive way and there is a mixture of

immunized and unimmunized animals in the population, clinical surveillance may be more difficult. This is because the disease, if present, may be very unevenly distributed. Second, there are few serological tests available that can discriminate between antibodies that have been derived from vaccination or from natural infection. Therefore interpretation of the results of serological surveys may be difficult. This problem can be alleviated somewhat by having a permanent identification system for vaccinated animals, so that it is at least known whether or not an animal has been vaccinated if it gives a positive or doubtful result to a serological test.

Vaccination programmes may be used as a tool for the elimination of epidemic livestock diseases in different ways, as described below.

14.3.6 Ring Vaccination

Ring vaccination is the rapid creation of an immune belt around an infected area and may be carried out to contain a rapidly spreading epidemic disease outbreak or in situations where the effectiveness of other methods to prevent the spread of the disease in and around infected zones, e.g. quarantine and livestock movement controls, cannot be guaranteed, or where these areas may be relatively inaccessible.

A decision to implement ring vaccination needs to be made quickly or else the size and number of infected areas may make this unmanageable. The width of the immune belt should be determined by epidemiological factors and resource availability considerations but, as a general guide, should be of the order of 20 to 50 km. Speed is of the essence and vaccination in the target ring should ideally be completed within a week or so. It is preferable to select a narrower ring for which human resources, vaccines and other resources are available for comprehensive vaccination within this time frame rather than to select a larger ring where gaps may be left in the immune belt for longer periods. The vaccination ring would then be extended later as necessary. Having selected the target area for the ring, vaccination should commence at the outer circumference and move centripetally towards the infected herds or flocks. Separate vaccination teams should be used for herds/flocks in which there is a high suspicion of infection.

Ring vaccination should be supplemented by other disease control measures including disease surveillance, livestock movement controls and, where possible, quarantine of infected premises. The movement of susceptible species animals into or out of the combined infected/ring vaccination zones should not be permitted. Livestock markets and other congregations should also be suspended in this area.

Intensive disease surveillance should be carried out within and around the infected/ring vaccination, with the greatest concentration of effort being in the area immediately surrounding the vaccine ring.

A decision could be taken to extend the vaccination ring inwards or, if necessary, to have a second outer vaccination ring.

14.3.7 Blanket Vaccination

This involves the comprehensive vaccination of all susceptible species animals over a larger area. It may be the preferred option when the disease outbreak has become well established and there are multiple foci of infection, or when other disease control methods are impractical for one reason or another. The vaccination area should cover known and suspected infected areas together with those areas considered to be at high risk for spread of the disease.

The latter may include known livestock movement routes. It may be necessary to carry out several rounds of vaccination over a few years in the target area, until the clinical disease apparently disappears, or the incidence is at least reduced to a level where other disease control measures can be followed.

The vaccination campaign should be supplemented by heightened disease surveillance activities both inside and outside the vaccination area(s), together with publicity programmes. The movement of animals from vaccinated areas to disease-free areas should be regulated in such a way as to minimize the possibility of spread of infection.

Whichever vaccination programme is selected, the following guidelines should be followed:

1. The purposes of the vaccination programme should be carefully defined and the programme targeted to meet the desired objectives. If the national goal is eradication on a regional or countrywide basis, vaccination should not be allowed to become merely a routine activity of government veterinary services.
2. Having selected the target animal population and area, the vaccination should be carried out as comprehensively as possible, with the target as close to 100 percent vaccination cover as practicable.
3. Different vaccination teams should be used for herds/flocks that are known or thought to be infected and those that are thought to be free. This is to minimize the possibility of spread of the disease.
4. For the same reason, groups of animals from different herds should not be congregated together for vaccination.
5. Vaccinated animals should be permanently identified as such, even if this involves something as simple as earnotching.

15.0 Mixed Strategies

Although the previous two strategies have been presented as alternatives, they are not mutually exclusive. It is quite sound to combine elements of both to suit different epidemiological or resource availability circumstances or to suit different phases of an eradication campaign.

For example, it may be decided to slaughter infected herds or flocks and then to use ring vaccination in a control zone around them, or targeted vaccination in other strategically important areas. One disadvantage is that it will complicate the interpretation of disease surveillance, particularly that of serological surveys. However, a combination of eradication and vaccination may well be selected in a number of countries or areas where there may be some doubt about the ability to maintain strict quarantine or animal movement controls or where there are inadequate resources for comprehensive disease surveillance. Vaccination may also be used to dampen down the rate of spread of an epidemic disease to the point where “stamping out” can be applied.

15.1 Strategies For Dealing With Special Circumstances

15.1.2 Nomadism and transhumance

The presence of an epidemic disease in highly mobile cattle herds and sheep and goat flocks in the semi-arid and hilly areas complicates the eradication process greatly.

Nomadic and transhumant pastoralists are among the most knowledgeable of livestock farmers and they are amenable to cooperation with veterinary authorities if their confidence has been gained and

they are given the opportunity to participate actively in decision-making. Many are amenable to quarantine procedures as a part of their traditional disease management practices, providing they are carried out sympathetically with full consultation. This is important because changes in climate and weather, which have profound implications for the seasonal availability of feed and water, may affect their willingness to conform to quarantine regulations. Virtually all pastoralists are now familiar with the value of vaccines in controlling major epidemic diseases.

Knowledge and mapping of traditional livestock movements are the keys to anticipating the spread of emergency animal diseases and the risk of disease introduction

Confidence building achieved largely through communication and improvements in the veterinary-farmer interface must start well in advance of any disease emergency. This is a most important and fundamental activity of animal health services. A specialist unit of veterinarians and livestock production specialists is desirable to develop and implement strategies for animal health service delivery to such communities. Livestock graziers' organizations (or similar cooperative organizations representing the interests of pastoralists) and participatory animal health programmes involving community animal health workers have an important role in building confidence and cooperation as well as in undertaking many of the actions of disease control.

Mapping of migration routes and an understanding of the factors that drive migrations are the keys to anticipating future livestock movements and managing the risk of disease introduction.

Should a disease emergency involve migratory communities, it is essential to involve community elders in decision-making and implementation of control activities from the outset.

15.1.3 Insecure Or Otherwise Inaccessible Areas

Relative inaccessibility of areas as a result of natural causes (climate or topography) or insecurity resulting from civil unrest presents a major challenge to the successful control and elimination of epidemic diseases.

These areas often share a number of characteristics:

- They are remote, often inaccessible by road and distant from centralized services and may be inhabited by transhumant agropastoralist people who see other agricultural work as a supplement to their livestock-raising activities and/or they may be inhabited by nomadic pastoral people;
- They may be inhabited by people with a well established traditional way of life who are disinclined to change and whose decision-making processes are complex as they take into account climate, economic considerations (both monetary and non-monetary), social concerns, political factors, legal constraints or incentives and other ecosystem variables;
- They are experiencing civil conflict, resulting in insecurity, displacement of people, loss of assets, greater need to remain mobile and, to varying degrees, breakdown or stress to traditional social structures;
- They have been marginalized in that the inhabitants have relatively little development contact in terms of education, outside trade and government services, including veterinary services.

These characteristics have precluded the successful implementation of conventional vaccination programmes which have a "top-down" approach with predetermined targets for vaccine coverage and sero-surveillance results, a tight time schedule for predefined activities and contact with

communities is primarily only through local officials. Such a model fails to accommodate the dynamics of special action areas and lacks the inherent flexibility required to work in such areas. It is now realized that approaches that use local community-based participation are more likely to succeed. The participatory-based approach to the elimination of disease and the provision of animal health services promotes decentralized, community-based and privatized delivery of vaccination and other animal health services. These should be under the general supervision of official veterinary services. To carry out a successful disease eradication programme in a special action area, a thorough understanding of the complexities of the area and positive interaction and dialogue with a substantial cross-section of the local community are required. The use of thermostable vaccines, which are less reliant on refrigeration, is preferred, if these are available.

15.1.4 Wildlife Or Feral Animal Involvement In Epidemic Livestock Disease Outbreaks

This situation complicates emergency disease responses. The actual role of wild or feral animals in the epidemiology of the disease should first be considered. In some diseases they may act as a reservoir for the disease and be a genuine threat for transmission of infection to domestic animals, but in others they may simply be acting as an indicator of infection that is already occurring in livestock in the area.

Reduction programmes for susceptible wild or feral animals may be possible in infected areas, but may be precluded on ecological or environmental grounds. If attempted, care must be taken to ensure that such programmes do not simply act to disperse potentially infected wildlife to new areas. Wildlife vaccination has been extremely successful in eliminating fox rabies from some regions, but as yet has very limited application in other diseases.

It may be possible to limit contact between susceptible wild and domestic animals and thereby reduce the chances of transfer of infection from one to the other. This could be done by fencing, livestock-free buffer zones or removing livestock from epidemiologically important wildlife. In the case of epidemic poultry diseases such as highly pathogenic avian influenza (HPAI) and virulent Newcastle disease, poultry sheds can be wire-netted or otherwise sealed to prevent direct access of wild birds. Steps should also be taken to prevent faecal contamination of poultry feedstuffs. In the case of HPAI, faecal contamination of water supplies by wild water-birds is an important source of infection for chickens and other domestic poultry. This may be prevented by using water from town-water or underground water supplies. Alternatively, water drawn for poultry farms from dams, lakes or rivers where water-birds congregate may be treated by chlorination to remove any HPAI virus contamination.

If none of these measures is likely to be practicable and/or successful, it will probably be necessary to mount ring or blanket vaccination programmes for livestock in those areas where infection in wildlife constitutes a continuing threat.

As has already been stated, surveillance activities should be extended to wild and feral animal populations, in collaboration with wildlife authorities.

16.0 The End Game-Verified Freedom From Infection

This is often the most critical phase of the eradication campaign and occurs when the clinical disease has apparently disappeared. If the wrong actions are taken at this stage and undetected pockets of infection are left, many of the benefits that have accrued from the eradication campaign may eventually be lost.

The State Government may make one of two potentially bad decisions at this stage unless they are properly advised. The first is that they may decide that since the clinical disease has waned or disappeared, the socio-economic losses are over and the scarce financial and other resources expended might be better diverted elsewhere. If disease control activities are prematurely wound down leaving undetected infection, the disease is likely to flare up into further serious outbreaks as immunity levels in animal populations decline.

The second, at the other end of the spectrum, is that routine disease control programmes such as annual vaccinations may be maintained indefinitely because of the fear of the political consequences if vaccination is stopped and there is another outbreak. In this case there will be a lasting economic burden from the control costs.

In both cases the export trade opportunities that may flow from having a nationally/internationally recognized disease-free status will not be available.

When the clinical disease appears to have disappeared from either a district/region of the state or the whole state it is time to take stock of the situation and to carry out a thorough epidemiological and economic assessment of future options.

It may prove desirable to maintain strategic vaccination if there is still a high risk of a new incursion of the disease from a neighbouring state/country, for example. On the other hand it is often advantageous to change direction completely by stopping vaccination programmes altogether and moving to a disease search-and-destroy policy. This does not necessarily mean that fewer resources will be devoted to combating the disease in the short term. Rather, they will be directed away from routine vaccination to increased activities directed to early warning and early response. There must be a willingness to enhance active disease surveillance activities and to maintain preparedness against the disease at a high level. In this way any disease breakdowns can be detected and eliminated quickly before they have done much harm by either a short, sharp targeted vaccination campaign or by eradication procedures. If the latter strategy is followed, it should be possible to declare provisional freedom from the disease after a suitable period following the cessation of vaccination. After further periods, declarations of freedom from the disease and finally from infection may be made to the Government of India / OIE. This is subject to demonstrated evidence of a high level of clinical surveillance and the carrying out of well-planned serological surveys giving negative results. At the stage where searches are being made for the last possible pockets of infection, consideration could be given to offering monetary or other forms of reward to persons reporting a clinical episode of what might be the disease in question or for actually finding the disease. However, the advantages and disadvantages should be carefully evaluated before embarking on this course.

Recommended standards for epidemiological surveillance in order to make declarations of freedom have been laid down by OIE for both Rinderpest and CBPP (commonly known as the OIE "pathways"). These pathways are shown in Appendix 3.

It is of course possible to foreshorten considerably the periods for declarations of freedom to be made if a “stamping out” policy has been followed.

17.0 Prioritization In State Emergency Disease Eradication Programmes

Much of the discussion in this section has been based on the presumption that an emergency disease outbreak has been detected relatively early and is still only present in one or a few separate pockets. Many states are not in this fortunate position and have to contend with an epidemic livestock

disease that has become well established in the country, and may well have been present for a number of years. In these circumstances, commencing a state disease eradication campaign that covers the whole country at once may be neither practical nor wise. The spreading of resources too thinly over too large an area may result in overall setbacks and frustrations.

It may be more effective in the long term to tackle the eradication in a step-by-step progression moving from one region to the next. In this case regions should be defined and selected on the basis that once eradication has been achieved in one region, and the campaign moves on to the next, there can be confidence that the disease will not re-enter the first region. Geographic barriers should be utilized wherever possible. Otherwise, utilization should be made of any epidemiological or livestock production and marketing patterns that tend to make an area a discrete unit in terms of disease spread.

Next is the question of prioritization - which region(s) to tackle first. There is merit in selecting the major livestock breeding areas in the country since they are often important source areas for the disease, and livestock movements (and possibly infection) tend to spread centrifugally from there. The other advantage of tackling these areas first is that, when free, they will act as a valuable source of disease-free animals for restocking other areas.

Further prioritization should also be based on an understanding of epidemiological factors and livestock production and marketing systems which influence how the disease spreads and to where. A policy could be to follow the spread of the disease, starting regional campaigns at its source and ending where it finishes. In tropical and semi-tropical countries, livestock movements and direct contact among animals are often overwhelmingly the most important method of spread of infection. Therefore a thorough understanding of livestock movement patterns and routes is often vital for effective prioritization within epidemic disease eradication campaigns.

18.0 Contingency plans

The state needs to have in place well-documented contingency action plans for specific, high-priority emergency diseases, together with a series of generic plans for activities or programmes common to the various specific disease contingency plans (e.g. setting up national and local animal disease control centres). They also need to have resource and financial plans and proper legislative backing for all actions. These contingency plans need to be considered and agreed upon in advance by all major stakeholders, including the political and bureaucratic arms of government and the private sector, particularly livestock farmer organizations. The contingency plans should be refined through simulation exercises and personnel should be trained in their individual roles and responsibilities.

18.1 Technical Contingency Plans

Technical contingency plans should consist of four sets of complementary documents:

1. Specific disease contingency plans that document the strategies to be followed in order to detect, contain and eliminate the disease.
2. Standard operating procedures for activities and programmes that may be common to several or all emergency disease campaigns.

3. Enterprise manuals that set out zoosanitary guidelines for enterprises that may be involved in an emergency animal disease outbreak.
4. Simple job description cards for individual officers.

These plans should be written in straight-forward language that can be understood and followed by all those who have to implement them. There is no need to replicate the last three sets of documents in the specific disease contingency plans. There should, however, be cross-referencing.

18.1.1 Specific Disease Contingency Plans

These should be prepared for each of the diseases that have been identified as being of high risk. They should not be very long, but should be clear, authoritative documents that provide sufficient information to allow authorities to make informed decisions on what policies and procedures should be used to control and eradicate an outbreak of that disease, and which are enforceable in law.

The format and contents of the disease contingency plans should be tailored to meet the requirements and circumstances of the state. However, the following model format, which is based on AUSVETPLAN with some modifications, may serve as a guide.

18.1.1.1 Nature Of The Disease

- Etiology
- Susceptible domestic and wildlife animal species
- World distribution and previous occurrences in the country
- Epidemiology (including likely pathways for spread within the country)
- Clinical signs and pathology

18.1.1.2 Risk Assessment (including potential consequences)

- Risk profile of the disease for the country
- Likely methods of introduction and geographical areas at high risk
- Potential consequences for food security and poverty alleviation, production losses, trade losses and public health

18.1.2 Diagnosis And Surveillance

- Early warning mechanisms for disease introductions/outbreaks
- Disease reporting procedures
- Field and laboratory diagnostic strategies
- Linkages with international reference laboratories
- Surveillance strategies during different phases of eradication

18.1.3 Principles Of Control And Eradication

- Methods to prevent spread of infection and to eliminate the pathogen
- Factors that may affect control and eradication: agricultural production systems, epidemiological, social and economic
- Feasibility of control and eradication in the country

18.1.4 Policy And Rationale

- Overall policy
- Zoning policy
- Disease control and eradication strategies and procedures in each zone
- Alternate disease control and eradication strategies and the general circumstances in which these other options would be used
- Strategies for dealing with special circumstances: disease in wildlife or feral animals, areas with nomadism or transhumance and difficult or relatively inaccessible areas
- Criteria for proof of freedom

18.1.5 Appendixes

- Criteria for defining infected areas and disease control zones
- Summary of disease control actions in infected areas and other zones
    - quarantine
    - livestock movement controls
    - stamping out, vaccination or other disease control procedures
- OIE International Animal Health Code for the disease

19.0 Standard Operating Procedures

These are detailed sets of instructions for key programmes and activities that tend to be generic rather than disease specific. They should be cross-referenced to the specific disease contingency plans.

Standard operating procedures may be prepared for:

- Organization and operation of the state disease control centre.
- Organization and operation of local disease control centres.
- Emergency disease reporting and information systems.
- Laboratory diagnosis and surveillance.
- Field diagnosis and surveillance.
- Zoning.
- Quarantine and livestock movement controls.
- Livestock destruction and disposal of carcasses.
- Cleaning and disinfection.
- Planning and performance of vaccination programmes.
- Valuation and compensation.
- Extension and public awareness campaigns.

19.1 Enterprise Manuals

These are codes of zoosanitary practice and instructions for action in what could be deemed as risk enterprises in a disease emergency. They should cover acceptable and unacceptable zoosanitary practices when these enterprises find themselves located in infected areas, disease control zones, or disease-free areas.

They may be prepared for:

- Livestock markets
- Livestock shows, race meetings and other congregations of animals
- Abattoirs and knackeries

- Small goods (meat) processing plants
- Dairy factories
- Feedlots
- Egg hatcheries
- Artificial breeding centres
- Animal quarantine stations
- Livestock traders and transporters
- Zoos, wildlife parks and commercial aviaries
- Veterinary practices

19.2 Job Description Cards

This is the final level of technical contingency plans. Job description cards are simple, itemized lists of roles, duties and responsibilities which are distributed to all personnel who are likely to be involved in the response to an animal disease emergency, and should be distributed well in advance of a disease emergency.

20.0 Support Plans

Support plans are for the provision of the vital backing that will make the implementation of the disease contingency action plans possible. They may be specific for each disease contingency plan but tend to be more generic in nature.

20.1 Financial plans

Experience has shown that delay in obtaining finances is one of the major constraints to the rapid response to emergency disease outbreaks. The application of even modest funds immediately will certainly save major expenditure later. Forward financial planning is therefore an essential component of preparedness.

Financial plans need to be developed which provide for the immediate provision of contingency funds to respond to disease emergencies. These are for the necessary funds required over and above normal operating costs for government veterinary services. The plans should be approved by all arms of government, including economic planning authorities and the department of finance.

The funds may cover the cost of the whole eradication campaign but more usually will cover the initial phases of the campaign, pending a review of the outbreak and the control programme and of the funds required to finalize eradication.

The conditions under which funds may be released should be specified in advance. Normally they would be provided to the Director Animal Husbandry when he or she advises that:

- The emergency disease has been diagnosed or there are reasonable grounds to suspect that the disease is present.
- The outbreak is capable of effective control and/or eradication.
- There are approved plans in place to do so.

The funds may be held as special funds which are sequestered for the purpose or there may be drawing rights provided up to a predetermined realistic amount against a specific government account.

The financial plan should also include the provisions for compensation to owners for any livestock or property destroyed as part of the disease eradication campaign. The payment of inadequate compensation is not only inherently unfair, but is also counterproductive to the campaign. Inadequate compensation fosters resentment and lack of cooperation and encourages farmers to hide the presence of the disease. Compensation should be based on the fair market "farm-gate" value of the animals at the time of slaughter (assuming a value that the animal would have had as a healthy one). The same principle should be applied to products and property. The valuation should be carried out by an independent, professional valuer. If individual valuations are not practical, then generic valuations for different classes of livestock may be acceptable. Compensation for consequential, rather than direct, losses are usually difficult to administer and are inappropriate.

20.2 Resource Plans

The first step in preparing a resource plan is to make a resource inventory, listing all the resources that will be needed to respond to a moderate sized outbreak of each of the high-priority emergency diseases. This includes personnel, equipment and other physical resources. The following resource lists required for different operations should be regarded as indicative rather than exhaustive:

- State animal disease control centre: senior disease control veterinarians and epidemiologists, financial and administrative officers and extra staff for recording and processing epidemiological and other information; maps (1:50 000 and 1:10 000), computers and communication equipment to local headquarters (e.g. facsimile, e-mail).
- Local animal disease control centres: senior disease control veterinarians and epidemiologists, technical support and suitable administrative offices, office equipment, maps, computers, communication equipment with headquarters (facsimile, e-mail) and field staff (radio) and proformas for various disease control operations.
- Diagnostic laboratories: trained laboratory staff, standard laboratory equipment plus any specialized equipment for key emergency diseases and diagnostic reagents for antigen and antibody detection.
- Diagnostic/surveillance: veterinarians and support veterinary auxiliary staff, transport, maps, communications equipment, leaflets or posters on the disease(s), diagnostic collection kits and transporters, blood collection equipment and animal restraint equipment;
- Vaccination: vaccination teams, vaccines, central and local refrigeration storage, transport, maps, cold storage transporters, vaccination equipment and animal restraint equipment;
- Slaughter, burial and disinfection: supervising veterinarian, personnel, transport, humane killers, ammunition and other approved means of killing (e.g. carbon monoxide gassing of poultry), protective clothing, animal restraint equipment, front-end loaders and earth-moving equipment, approved disinfectants, soaps and detergents, shovels, scrapers and high-pressure spraying equipment;
- Quarantine and livestock movement controls: enforcement teams, transport, roadblocks (if necessary), signs and posters.

Next, a list of existing resources is prepared, including their specifications, quantities and locations. A register should be maintained of specialized staff, together with their qualifications and expertise/experience with key emergency diseases. These resource lists and staff registers should be maintained at the national disease control centre and, where appropriate, at regional offices.

Comparison of the inventory lists of needed and available resources will inevitably highlight many deficiencies. The resource plan should identify how these deficiencies will be rectified in an emergency.

There are several options for accessing the necessary extra resources:

- A list of where essential equipment and stores may be purchased, hired or borrowed.
- In some cases of hard-to-obtain items it may be desirable to maintain a central store (e.g. disinfectants). Likewise, items which take some time to prepare (e.g. proformas) may also be stored.
- Arrangements should be made for supply of personnel and equipment through the national disaster plan.
- Arrangements should be made through veterinary associations for the temporary employment or secondment of veterinary practitioners in an emergency.

Supply of vaccines and diagnostic reagents presents special problems, as international sources are limited for a number of diseases. Sources of high-quality products are even more limited. These sources, and methods of ordering, should be identified in advance. Even then, manufacturers and suppliers may not carry adequate stock reserves to be able to fill an emergency order. Consideration could thus be given to coming to some contractual arrangement with manufacturers for guaranteed supplies in an emergency. For vaccines there may also be the opportunity to join a suitable international vaccine bank.

The resource plan and associated inventory lists need to be regularly updated.

20.3 Legislation

Acts of parliament or state government regulations that provide the legislative framework and powers to carry out all necessary disease control actions need to be put in place in advance as part of preparedness planning. This may include legislation to:

- Make proclaimed animal diseases compulsorily notifiable.
- Allow the entry of officials (or other designated persons) on to a farm or other livestock enterprise for disease surveillance purposes and for the collection of diagnostic specimens.
- Authorize the proclamation of infected areas and disease control zones.
- Authorize the quarantining of farms or other livestock enterprises.
- Authorize any bans on the movement of livestock, livestock products or other potentially contaminated materials or the issue of permits to move these only under specified animal health conditions.
- Authorize the compulsory destruction and safe disposal of infected or potentially infected animals and contaminated or potentially contaminated products and materials, subject to fair compensation.
- Authorize any other necessary disease control actions, including compulsory vaccination.
- Provide for compensation to be paid to owners of livestock and property destroyed as part of disease control programmes and define standards for such compensation.
- Allow codes of practice to be mandated for risk enterprises and activities (e.g. livestock markets, abattoirs, knackeries and dairy factories) and authorize any necessary disease control actions for such activities.
- Authorize the compulsory identification of animals, where appropriate.

21.0 Simulation Exercises

Simulation exercises are extremely useful for testing and refining contingency plans in advance of any disease emergency. They are also a valuable means of building teams for emergency disease responses and for training individual staff.

Disease outbreak scenarios that are as realistic as possible should be devised for the exercises, using real data where possible (e.g. for livestock locations, populations and trading routes). The scenario may cover one or more time phases during the outbreak with a possible range of outcomes. However, neither the scenario nor the exercise should be overly complicated or long. It is best to test just one system at a time (e.g. operation of a local disease control centre). Simulation exercises may be carried out purely as a paper exercise or through mock activities - or a combination of both approaches. At the completion of each simulation exercise there should be a post-mortem of the results. This review should identify areas where plans need to be modified and further training is needed.

A full-scale disease outbreak simulation exercise should only be attempted after the individual components of the disease control response have been tested and proved. Earlier exercises of this nature may be counterproductive.

22.0 Training

All staff should be thoroughly trained in their roles, duties and responsibilities in a disease emergency. Obviously more intensive training will need to be given to those who will be in key positions. It should also be borne in mind that any staff member, from the AHD, Directorate downwards, may be absent or may need to be relieved during a disease emergency for one reason or another. Back-up staff should therefore be trained for each position.

23.0 The Need For Regular Updating Of Contingency Plans

Contingency plans, once prepared, should not be treated as static documents. They should be regarded as living/dynamic documents that need to be regularly reviewed and updated as warranted by changing circumstances. This should be the responsibility of the state animal disease emergency planning committee. In reviewing and updating contingency plans, the following factors should be taken into account:

- Changing epidemiological situations, both within the state and the country and externally.
- New disease threats.
- Changes in livestock production systems and internal or export trade requirements.
- Changes in national legislation or in the structure or capabilities of government veterinary services (or other government instruments).
- Experiences (both within the country and in neighbouring countries), results from training or simulation exercises and feedback from major stakeholders including farmers.

STANDARD OPERATING PROCEDURE FOR DISEASE OUTBREAKS

An outbreak is the occurrence of cases of an illness, specific health related behavior or other event, clearly in excess of normal expectancy in a community in a specific time period. An outbreak is limited or localized to a village, town or closed institution. However, the magnitude could involve wider geographic areas, even beyond one district, thus called an epidemic (A dictionary of Epidemiology, 4th Edition, 2001, John M Last). In case of diseases which are under eradication or elimination phase; even a single case of such disease may be treated as an outbreak, e.g. Rinderpest. Rare but internationally important diseases, with high case fatality rate and with the potential of importation due to existence of conducive epidemiological conditions e.g. avian influenza etc. and in the end outbreaks of unknown diseases/syndromes.

The occurrence of more than the expected number of cases included in the scheduled list (Annexure-I) shall be the start of the outbreak and will warrant the initiation of control and containment measures immediately by the local Veterinary Officer with the help of his staff. The Joint Director/Chief Veterinary Officer (JD/CVO) of the respective district shall be informed immediately both telephonically and in writing. The complete details of the case/cases shall be maintained in the appropriate format (Annexure-II "CASE WISE OUTBREAK INFORMATION REPORT"). A separate sheet shall be filled for each case affected with the disease and a complete record and follow up shall be maintained on a daily basis. This format will be maintained by the concerned Veterinary Officer and shall be preserved at his/her Veterinary Hospital. The animal/animals shall be maintained in a state of quarantine at the owner's premises in a separate room and all other animals in contact shall be immediately removed to a separate location and the owners, veterinary officers and other supporting staff shall also maintain sanitation protocols so that they do not serve as a nidus for the spread of infection to other areas. All possible effort will be made to start therapeutic treatment in case of diseases where treatment exists and supportive treatment in case of diseases where treatment does not exist. In case vaccine against the disease is available then immunization for the same shall be immediately started in a ring fashion. Ring fashion would mean that one or several teams shall start vaccinating from roughly a three kilometer radius towards the center of the outbreak and another team shall start vaccination from roughly a six kilometer radius back towards the epicenter of the outbreak. At the end of the day a consolidated outbreak information report will be compiled on prescribed format (Annexure-III, "CONSOLIDATED OUTBREAK INFORMATION REPORT") and sent to the office of the JD/CVO by fax/email/telephonically.

2.0 Endemic Outbreak (Non-Zoonotic)

In case the number of animals affected is less than fifty (50) and the disease is non-zoonotic in nature (excluding Rinderpest) and limited to a single location or village the outbreak shall be classified as an endemic.

As soon as information about any disease in several animals is reported from an area the VO of the concerned hospital along with whatever staff he/she deems necessary shall immediately proceed to the affected area.

Depending on the nature of the disease and initial diagnosis biological samples from affected animals and the ones in contact with the affected animals shall be collected and sent for confirmatory diagnosis to the nearest DIO laboratory. The specimens/samples to be collected will depend on the suspected disease; a detailed suggestive list for the type of samples to be collected for various diseases is upended to these directions as Annexure-IV.
In case treatment for the disease is possible then therapy will be started immediately and in case treatment is not possible then supportive therapy will be initiated accordingly. The farmers will be counseled and educated about the disease process and precautions to be undertaken; the importance of quarantine, isolation, segregation, sanitation, disinfection, etc. will be explained to them in detail so that they also participate in the containment process proactively.

All details of the outbreak will be recorded on prescribed formats i.e. Annexure-II, III & IV and sent to designated officers as indicated in the SOP.

In case further assistance is sought by the leader of the first team the Joint JD/CVO of the district shall constitute a team of Veterinary Officers (VO), Livestock Extension Officers (LEO) and other support staff of the adjoining Hospitals and LEO Centers. The VO of the concerned block shall be the leader of the said team. On receipt of information the members of the said team shall immediately convene at the concerned Veterinary Hospital and shall proceed to the area of outbreak to initiate relief operations immediately.

3.0 Epidemic Outbreak (Non-Zoonotic)

In case the number of affected animals exceeds by more than fifty (50) and are spread over a wider area or number of villages the outbreak shall be treated as an epidemic. The information about the incidence shall then also be sent to the Additional Director of the concerned division (Kumaun/Garhwal) telephonically and in writing by post as well as by fax and/or telegram and email. The information to be sent shall also be on prescribed format (Annexure-III) so that in case the disease spreads to other areas, uniformity is maintained in the reporting system and compilation of the same is done in a systematic manner. The format shall be filled up in quadruplicate with the first copy to be sent to Additional Director (Kumaun/Garhwal); the second copy to JD/CVO of the concerned district; the third copy to the Joint Director (Disease Control), AHD Directorate and the fourth copy is to be retained at the Veterinary Hospital for record.

The team upon reaching the site shall try and assess the gravity of the situation and collect information on the following points:

1. Whether the initial diagnosis of the disease seems to be correct/doubtful
2. Whether all the affected animals are showing similar consistent signs/varying signs
3. Whether the number reported to be suffering from said disease is as reported.
4. Whether they have been segregated and quarantined from the healthy animals.

5. Whether necessary samples have been collected and if so have they been collected as per recommendations for the said disease. (Annexure-IV "LIST OF DISEASES AND SAMPLES TO BE COLLECTED")
6. Whether samples have been analyzed on the spot (Patient Side) / at the Veterinary Hospital / sent to appropriate laboratory.
7. Whether the samples have been sent by post / courier / special messenger.
8. A tentative situation report (SITREP) along with consolidated outbreak report (Annexure-III) shall be sent to the office of the Joint Director (District) with a copy to Additional Director (Divisional HQ) and Joint Director-Disease Control (HQ) on prescribed format. (Annexure-V "SITUATION REPORT"). This report shall be dispatched daily by the close of office hours every day. The Joint Director of the district shall make it a point to inform and keep the district administration updated on the progress of the disease.
9. The report shall indicate whether the disease is simply endemic or epidemic and whether it is zoonotic or not.
10. The type and scale of assistance required including manpower, materials, medications, surgicals, disposables, vaccines and any other materials. (A suggestive list is enclosed for reference as Annexure-VIII) must be included in the estimation.
11. Whether check posts have been set up or not. In case they have been set up then their list with their location, officer/s incharge and contact phone number/s.

In case the outbreak is classified as an epidemic but non zoonotic then a control room shall be established immediately at a location having facilities of communication possibly including phone, fax, internet and police/forest radio network. On receipt of information of an outbreak the Additional Director (Kumaun/Gharwal) shall immediately proceed to the affected area and shall remain constantly in contact with the Joint Director of the district and Disease Control (HQ) and if the need arises then shall also keep the Director AHD informed. He/She shall also establish liaison with the district administration and shall be responsible to keep the Commissioner of the respective division informed regularly about the non zoonotic epidemic.

The Additional Director (Kumaun/Gharwal) shall be the complete incharge of this control room and shall also set up his camp office at this site. He shall oversee the management of the entire operations; his orders in all matters shall be final. He shall be assisted in this task by the Joint Director of the district. This control room shall by far and large be at a place as near as possible to the epicenter of the epidemic. This control room shall be manned 24 hours by a senior Veterinary Officer who shall be incharge and shall be assisted by a team of secretarial staff and a Chief Veterinary Pharmacist to maintain inventory and ensure distribution of medicines, vaccines and materials. The Joint Director (District) shall ensure mobilization of all possible help from the district administration and shall also provide all logistical support to the response team.

The JD/CVO (District) shall also be responsible for informing the district administration and the Joint Director-Disease Control (HQ) about the nature of the outbreak and the actual situation on ground. Who in-turn shall be responsible for informing the Director, Animal Husbandry about the gravity of the situation and the measures adopted to contain the disease outbreak. It shall be the final decision of the Director, Animal Husbandry to access the situation and then finally inform the departmental Secretary and other officers of the state government.

Another control room shall be established at the Directorate of Animal Husbandry, and shall also be manned round the clock by the Officers of the Directorate. They shall compile all information being received from the field and send regular situation reports (SITREP) on prescribed format (Annexure-V) to the following Officers daily at the close of day:

1. P.S. to H'onble Minister of Animal Husbandry, Uttarakhand
2. P.S. to Chief Secretary, Uttarakhand
3. P.S. to Animal Husbandry Commissioner, Ministry of Animal Husbandry & Dairying, Government of India
4. P.S. to Principal Secretary & Commissioner, Forest and Rural Development
5. P.S. to Secretary, Animal Husbandry, Ministry of Animal Husbandry & Dairying, Government of India.
6. Secretary, Animal Husbandry, Uttarakhand
7. Secretary, Disaster Management, Uttarakhand
8. Secretary, Forest
9. Commissioner, Gharwal/Kumaun

4.0 Zoonotic Epidemic

Incase the disease is tentatively diagnosed to be zoonotic then the chronology of events to be followed will more or less be the same except for the containment and disinfection procedures to be followed.

1. First and foremost the owners of the affected animals will have to be taken into confidence and they shall be made to understand the gravity of the situation being faced.
2. Secondly the Chief Medical Officer of the district shall be informed immediately about the occurrence of the disease so that they can initiate action as per their protocols immediately since human lives are at stake. The people or the family members of the affected animals shall be immediately vaccinated in case a vaccine for the disease exists and all medical help shall be made available to them by the concerned department.
3. Serum and other necessary samples for the disease shall be drawn and sent to the referral laboratory for confirmatory diagnosis. The samples shall be drawn as per guidelines given in Annexure-V and send by special messenger to the designated diagnostic laboratory. In addition to this a second set of samples shall be sent to the National Center for Disease Control (NCDC), New Delhi for secondary confirmation since the nature of the suspected disease is zoonotic.
4. In case the nature of the disease is such that treatment is possible then immediate treatment of the affected animals shall be initiated whereas in case no treatment exists then the recommended procedure for culling and disposal shall be adopted.
5. In case vaccination for the said disease is available then ring vaccinations shall be immediately started in a manner already described.
6. Once official confirmation of the zoonotic disease is attained from the designated laboratory then immediate action shall be initiated on the following counts:

    (A) The Director, Animal Husbandry will immediately inform the Secretary, AHD about all aspects of the disease including the causative agent; the morbidity and mortality numbers; whether the disease is single or multiple species; steps already taken for the containment of the disease; status of the SOP already initiated; availability of veterinary medical supplies and all other materials and equipments as per Annexure-VI.

    (B) The position of manpower in the affected area and the formation of additional response teams if required; the number of check posts setup. All roads, foot paths and other approach roads to and fro from the area should be covered so that movement of all animals and humans is monitored and/or stopped as the case may be.

(C) In case it is felt that the disease is assuming epidemic proportions then on the advice of the Director AHD, and in case the Government sees reason then necessary notification shall be issued covering the district in full and the state in part or in full so that movement of the specified species of animals in question or the movement of several species may be restricted within the boundaries specified (intra district, inter-district, interstate). If the situation so desires then the all human and vehicular traffic movement to and fro from the area of the disease may/will also be stopped and covered by this notification.

(D) In case a notification to this effect is issued then a copy of the same shall be sent to the P.S. to H'nible Minster of Animal Husbandry; P.S. Chief Secretary; P.S. to Principal Secretary & Commissioner, Forest and Rural Development; Secretary, Department of Health & Family Welfare; Secretary, Department of Home; Director General Police, Uttarakhand Secretary, Department of Animal Husbandry & Dairying-Government of India; Animal Husbandry Commissioner, Department of Animal Husbandry & Daorying, Government of India; Director General, Remount Veterinary Core; Director General, Indo Tibetan Border Police; Commandant, Indian Military Academy and Secretaries and Directors of Animal Husbandry of neighbouring states;.

(E) An immediate meeting of the following departments will be convened and shall be organized by the Director Animal Husbandry as the Member-Secretary and will be chaired by the Principal Secretary & Commissioner, Forest & Rural Development. The following officers of various departments shall be the constituent members of this meeting:

(i) Principal Secretary & Commissioner, Forest & Rural Development
(ii) Secretary Animal Husbandry & Dairying
(iii) Secretary, Health & Family Welfare
(iv) Secretary, Urban Development
(v) Secretary, Revenue
(vi) Secretary, Disaster Management
(vii) Secretary, Public Works Department
(viii) Secretary, Home
(ix) Secretary, Panchayat Raj
(x) Secretary, Forest
(xi) Commissioner, Garhwal/Kumaun
(xii) Director General, Health & Family Welfare
(xiii) Director, Urban Development
(xiv) Chief Engineer, PWD
(xv) Director General, Police
(xvi) Director, Animal Husbandry

(F) Once the meeting is convened, detailed minutes of the meeting shall be prepared by the office of the Director AHD and circulated to all concerned departments so that action can be initiated as per decisions taken.

In case it is felt that a statement is to be issued to the general public and the media then the Secretary, Department of Animal Husbandry and/or the Secretary, Health & Family Welfare, shall issue the necessary statement on behalf of the Government.

NOTE: UNDER NO CIRCUMSTANCES WILL ANY STATEMENT BE GIVEN TO THE MEDIA BY THE LOCAL OFFICERS, STAFF OF THE DEPARTMENT OF ANIMAL HUSBANDRY OR ANY OTHER PERSONNEL OF ANY DEPARTMENT INVOLVED IN THE DISEASE

CONTAINMENT PROCESS. IT WILL BE THE SOLE RESPONSIBILITY AND PURVIEW OF THE GOVERNMENT TO DO SO. THIS IS ESSENTIAL IN ORDER TO PREVENT PANIC AMONGST THE GENERAL PUBLIC.

(G) As far as the control of the disease amongst livestock is concerned the Additional Director (HQ) shall be overall incharge of the entire outbreak management effort. He shall be assisted in this function by the Joint Director (Disease Control) who shall make an initial assessment of the situation and make necessary arrangement for the movement of manpower, materials, medicines, vehicles and other equipment required. Necessary orders for the same shall be prepared by him/her and after due examination by the AD (HQ) shall be issued from the directorate.

(H) All officers and staff of the Directorate will be on a 24 hour standby. The Veterinary Officers-I posted at the Directorate shall be sharing the following responsibilities and shall take all necessary orders from JD(DC) and report to him/her directly:

(i) Veterinary Officer (Disease Control & Disaster Management) – Logistics (arrangement of materials, medicines, vaccines, etc.)
(ii) Veterinary Officer (Planning) – Transport Officer.
(iii) Veterinary Officer (Livestock) – Compilation of outbreak data and technical backstopping to VOs in the field.
(iv) Veterinary Officer (MIS) – Documentation & Reporting.
(v) Veterinary Officer (Reproduction) – Establishment (composition of RRTs, assigning of duties, etc.)

(I) The number and size of the Rapid Response Teams (RRTs) to be formed shall depend on the intensity and extent of the disease; geographical area involved; the number of animals affected and whether any human cases have been reported or not. The RRTs formed shall consist of one Senior Veterinary Officer, one Junior Veterinary Officer, two Livestock Extension Officers and two fourth class staff members. If need is felt then one Medical Officer shall also be a member of this RRT. The decision to this effect shall be taken by the Department of Health & Family Welfare after the assessment of the situation on the ground. If need is felt the latter can also take up the issue of human health separately at their level and as per their disease protocols and operating procedures.

(J) The first batch of RRTs shall be formed from the neighbouring districts and as required RRTs shall be initially formed from the division where the outbreak has occurred and secondly if the need arises from the districts of the other division. It is imperative that all RRTs shall remain on duty for a fixed period of three weeks thereafter they shall be replaced by a fresh team.

(K) The members of the RRTs shall take all necessary precautions with regard to their personal health and shall strictly observe recommended procedure along with the use of PPEs so that they do not accidentally become affected by that disease. In case a vaccination for the disease in question is possible then all personnel shall be vaccinated prior to departure for the affected area. In addition on the advice of the Medical Health Department all necessary precautions as well as any preventive medications if available will be made available to members of the RRTs.

(L) It shall be the responsibility of the Joint Director (Respective Districts) to arrange for transportation of these RRTs from their districts to the area of duty either by departmental vehicle or by hired vehicle. In no way shall these RRTs be ordered by him/her to move by public transport as this will take time in reaching their destination. On receipt of information all RRTs shall reach the control room of the affected area within 24 hours from the receipt of their orders.

(M) As soon as they reach the control room they shall be issued with a set of instructions to be followed; area in which they shall be working; complete kit consisting of medicines, vaccines, surgicals, PPE kits, etc. and any other materials.

(N) Each RRT will maintain a case wise outbreak report on prescribed format (Annexure-II) [In case of poultry case wise report would mean household/farm wise information]. Each RRT will ensure that by the end of the day (5.00 pm) they shall send a copy of the consolidated report (Annexure-III) on prescribed format to the local control room.

(O) On receiving the consolidated reports from all the RRTs in the field, the local control room shall formulate a situation report (SITREP) on prescribed format (Annexure-V) and send it by fax/email to the control room at the Directorate for further consolidation.

(P) In case the disease is occurring in several locations of the state then consolidation of all the SITREPS shall be done at the control room in the Directorate.

(Q) After consolidation of all SITREPS from various locations a final situation report shall be prepared and a copy of the same shall be forwarded to the following officers of the state:

i. P.S. to H'onble Minister of Animal Husbandry, Uttarakhand
ii. P.S. to Chief Secretary, Uttarakhand
iii. P.S. to Animal Husbandry Commissioner, Ministry of Animal Husbandry & Dairying, Government of India
iv. P.S. to Principal Secretary & Commissioner, Forest and Rural Development
v. P.S. to Secretary, Animal Husbandry, Ministry of Animal Husbandry & Dairying, Government of India.
vi. Secretary, Animal Husbandry, Uttarakhand
vii. Secretary, Disaster Management, Uttarakhand
viii. Commissioner, Gharwal/Kumaun
ix. Secretary, Health & Family Welfare
x. Secretary, Urban Development
xi. Secretary, Revenue
xii. Secretary, Disaster Management
xiii. Secretary, Public Works Department
xiv. Secretary, Home
xv. Secretary, Panchayat Raj
xvi. Director General, Health & Family Welfare
xvii. Director, Urban Development
xviii. Chief Engineer, PWD
xix. Director General, Police
xx. Director, Animal Husbandry

(R) Each RRT shall remain in the area of their operation for a minimum period of three weeks or in case the disease gets controlled earlier. This condition has been put in place since more the numbers of relief personnel that exit from the area of outbreak the higher is the chance of spread of the disease to other areas. This time period shall also not exceed above three weeks as the personnel working in these areas shall get stressed out by such time hence a replacement RRT shall be provided.

(S) When exiting the area of their operation all members of the RRTs (including clothings, shoes, personal articles and vehicles) shall be thoroughly disinfected and sanitized as per prescribed protocol.

(T) Depending on the ground situation one or several emergency RRTs shall also be formed for performing emergency duties during the night. These RRTs shall also act as reserve teams in case their services are required elsewhere.

(U) The RRTs shall be released from their area of operation on a rotational basis so that the ones having gone first are also relieved first.

(V) The lodging and boarding arrangements including food shall be made by the district administration. For this activity the JD/CVOs of the concerned districts shall establish liaison with the District Magistrate and ensure that necessary steps have been taken.

(W)

Chain of Events

Disease Outbreak		
Endemic	Epidemic	Zoonotic
Veterinary Officer	Veterinary Officer Local Administration	Veterinary Officer Medical Officer Local Administration
Joint Director District	Joint Director District Chief Development Officer District Magistrate	Joint Director District Chief Medical Officer Chief Development Officer District Magistrate
Joint Director-Disease Control (HQ)	Joint Director-Disease Control (HQ)	Joint Director-Disease Control (HQ)
Director Animal Husbandry	Director Animal Husbandry	Director Animal Husbandry Director General Health & Family Welfare
Secretary Animal Husbandry	Secretary Animal Husbandry	Secretary Animal Husbandry Secretary Health & Family Welfare
	Principal Secretary & Commissioner, Forest & Rural Development	Principal Secretary & Commissioner, Forest & Rural Development
	P.S. to Chief Secretary P.S. to H'onible Minister Animal Husbandry	P.S. to Chief Secretary P.S. to H'onible Minister Animal Husbandry

The main diseases for which vaccinations are being carried in farm animals in Uttarakhand at the moment are the following:

1. Foot & Mouth Disease (FMD)
2. Hemorrhagic Septicemia (HS)
3. Black Quarter (BQ)
4. Pestes des Pestes Ruminitas (PPR)
5. Fowl Pox (FP)
6. Ranikhet Disease (RD)
7. Swine Fever
8. Rabies

Annexure-I

List of Scheduled Animal Diseases

(a) Multiple Species Diseases

1. Anthrax
2. Aujeszky's disease
3. Bluetongue
4. Brucellosis
5. Crimean Congo haemorrhagic fever
6. Echinococcosis/hydatidosis
7. Foot and mouth disease
8. Heartwater
9. Japanese encephalitis
10. Leptospirosis
11. New world screwworm *(Cochliomyia hominivorax)*
12. Old world screwworm *(Chrysomya bezziana)*
13. Paratuberculosis
14. Q fever
15. Rabies
16. Rift Valley fever
17. Rinderpest
18. Trichinellosis
19. Tularemia

20. Vesicular stomatitis
21. West Nile fever

(b) Cattle Diseases

1. Bovine anaplasmosis
2. Bovine babesiosis
3. Bovine genital campylobacteriosis
4. Bovine spongioform encephalopathy
5. Bovine tuberculosis
6. Bovine viral diarrhoea
7. Contagious bovine pleuropneumonia
8. Enzootic bovine leucosis
9. Haemorrhagic septicaemia
10. Infectious bovine rhinotracheitis/Infectious pustular vulvovaginitis
11. Lumpy skin disease
12. Malignant catarrhal fever
13. Theleriosis
14. Trichomoniasis
15. Trypnosomiaisis

(c) Sheep and Goat Diseases

1. Caprine arthritis/encephalitis
2. Contagious agalactia
3. Contagious caprine pleuropneumonia
4. Enzootic abortion of ewes *(ovine chlamydiosis)*
5. Maedi-visna
6. Nairobi sheep disease
7. Ovine epididimitis *(Brucella ovis)*
8. Pestes des pestes ruminitas
9. Salmonellosis *(S. abortusovi)*
10. Scrapie
11. Sheep pox and goat pox

(d) Equine Diseases

1. African horse sickness
2. Contagious equine metritis
3. Dourine
4. Equine encephalomyelitis (Eastern)
5. Equine encephalomyelitis (Western)
6. Equine infectious anaemia
7. Equine influenza
8. Equine piroplasmosis
9. Equine rhinopneumonitis
10. Equine viral arteritis
11. Glanders
12. Surra *(Trypanosoma evansi)*
13. Venezuelan equine encephalitis

(e) Swine Diseases

1. African swine fever

2. Classical swine fever
3. Nipah virus encephalitis
4. Porcine cysticercosis
5. Porcine reproductive and respiratory syndrome
6. Swine vesicular disease
7. Transmissible gastroenteritis

(f) Avian Diseases

1. Avian chlamydiosis
2. Avian infectious bronchitis
3. Avian infectious laryngotracheitis
4. Avian mycoplasmosis (M. gallisepticum)
5. Avian mycoplasmosis (M. synoviae)
6. Duck virus hepatitis
7. Fowl cholera
8. Fowl Typhoid
9. Highly pathogenic avian influenza and low pathogenic avian influenza in poultry
10. Infectious bursal disease (Gumboro disease)
11. Marek's disease
12. New Castle Disease
13. Pullorum disease
14. Turkey rhinotracheitis

(g) Lagomorh Diseases

1. Myxomatosis
2. Rabbit haemorrhagic disease

(h) Other Diseases

Camelpox
Leishmaniosis

Annexure-II

CASE WISE OUTBREAK INFORMATION REPORT

(To be maintained at Veterinary Hospital)

Name	Mr./Ms./Mrs.
Father's / Husbands Name	Mr.
Address of Owner (City / Town / Village / Tehsil / Block / P.O.)	
Telephone No. (If Any)	
OPD No.	
Date	
Name & Distance of Nearest AHD Establishment (VH / VSC / SRC / Farm / others)	
Species (Bovine / Ovine / Caprine / Equine / Swine / Lagomorphs / Avian /	

others)	
Breed	
Age	
Sex	
Name of Suspected Disease	
Clinical Signs	
Samples Taken (Blood / Serum / Swabs / Blood & Impression Smears / Stools / Urine / Tissues / organs / Others)-Type & No.	
Treatment Initiated	
Control Measures Initiated	
Outcome (Mortality / permanent disability / percent loss of production / others)	
Phone Nos. VH V.O. Pharmacist LEO Others	Signature Name Designation Seal Place Date

Annexure-III

CONSOLIDATED OUTBREAK INFORMATION REPORT

(To be filled in quadruplicate)

Outbreak/No.: /Dated:

Name of Veterinary Hospital					
Name of Disease					
Place / Places Where Disease Incidence Reported (City / Town / Village / Tehsil / Block / P.O.)					
Date of First Incidence					
Species	Total No. Examined	Total No. Affected	Total No. Treated	Total No. Vaccinated	Total Mortality
Cattle					
Buffalo					

Sheep					
Goat					
Swine					
Horse					
Mule					
Donkey					
Poultry					
Canine					
Others					
TOTAL					
Name & Distance of Nearest AHD Establishment (VH / VSC / SRC / Farm / others)					
Clinical Signs					
Samples Taken (Blood / Serum / Swabs / Blood & Impression Smears / Stools / Urine / Tissues / organs / Others)-Type & No.					
Treatment Measures Initiated					
Control Measures Initiated					
Outcome (Mortality / permanent disability / percent loss of production / others)					
Phone Nos. VH V.O. Pharmacist LEO Others	Signature Name Designation Seal Place Date				

Annexure-IV

SITUATION REPORT – DATED..... TIME.....AM/PM

(To be sent daily)

Outbreak/No.: /Dated:

Name of Disease					
Place / Places Where Disease Incidence Reported (City / Town / Village / Tehsil / Block / P.O.)					
Date of First Incidence					
Species	Total No. Examined	Total No. Affected	Total No. Treated	Total No. Vaccinated	Total Mortality
Cattle					

Buffalo					
Sheep					
Goat					
Swine					
Horse					
Mule					
Donkey					
Poultry					
Canine					
Others					
TOTAL					
Samples Taken (Blood / Serum / Swabs / Blood & Impression Smears / Stools / Urine / Tissues / organs / Others)-Type & No.					
Control Measures Initiated					
Phone Nos. Control Room	Signature Name Designation Seal Place Date				

Annexure-V

LIST OF DISEASES AND SAMPLES TO BE COLLECTED

A laboratory diagnostic service may be of assistance to the Veterinarian, as it will enable him to arrive at a more accurate diagnosis and may provide information of value in instituting therapy or preventive measures. However, the success of laboratory examination depends mainly on the proper collection, preservation and dispatch of adequate and suitable material. The materials required for diagnosis and the methods to be adopted for their collection and preservation depend on several factors such as the kind of examination required, the disease under investigation, the apparatus available, the atmospheric conditions and the length of interval between collection and laboratory examination. All possible measures should be taken for specimen to reach the laboratory in the shortest possible time and as nearly as possible, in the same condition as at the time of their collection. Whereas the field officer can view the entire carcass and note the condition of all the organs, the laboratory worker will have available only the material supplied to him for examination.

For meaningful results, the samples must have the following qualities:

1. Correct sampling
2. Correct preservation
3. Correct labeling and identification
4. Correct packing

General Considerations

White collecting material for the laboratory examination, the filed officer should have the following considerations.

1. The specimen from an animal in the advanced stages of the diseases is most desirable. If the disease is a flock or herd problem, specimens should be collected from more than one diseased or dead animal. In such flocks or herds submit specimens from one or two animals that are in various stages of illness.
2. The materials from ailing 5 to 6 or more animals should be collected at the height of body temperature / clinical signs.
3. When sero-diagnosed desired always paired sterile, about 2 ml sera should be collected. One serum sample at the time of start of disease and another after recovery (3-4 weeks) from disease.
4. The specimen submitted should be characteristic of the disease as seen in the field.
5. In collecting specimens every attempt should be made to avoid contamination with intestinal contents, hair and dirt etc.
6. Collect tissues in sterile containers, sealed and transported on sufficient ice to the nearest laboratory for storage and processing.
7. Small tissue pieces of ½ x 2 cms thick from organs showing the lesion are considered better for preservation and fixation in 10% formalin.
8. All specimens collected in bottles should be sealed, labeled clearly indicating the fixative/transport media used.
9. Care should be taken to seal and pack these bottles in hard boxes/polythene bags to avoid leakage during transit.

Identification of the Samples

In the covering letter, all particulars and a completer history including the following should be submitted with each sample by the filed officer.

1. Owners name and address
2. Description of the animal/bird including species , age, sex, colour, number of ear tag/brand/tattooing etc.
3. Duration of the condition or outbreak
4. Morbidity rate
5. Mortality rate
6. Clinical signs
7. Clinical diagnosis (Disease suspected)
8. Treatment history
9. Time of animal's death and that of necropsy
10. Necropsy rreport
11. Nature of feed including any change of feed that has occurred in recent past

12. Possibility of contact with animals of neighbouring farms
13. Specific tests required
14. Type of preservative used
15. Veterinarian's name address and telephone number

For quick disposal of the material, it is advisable to forward one copy of the letter by post and to enclose another in the parcel containing the specimen.

Preservation of Specimens

Fresh tissue which is left in a warm environment (at room temperature) will become liquefied with a foul odour, mainly due to autolysis and putrefaction. The examination of fresh specimen therefore requires the action of a preservative to prevent such deterioration. The preservation of cells and tissue constituents in as life like manner as possible is essential. The choice of preservative will be governed by the type of investigation required.

Methods of Preservation

1. Refrigeration:

(i) Natural Ice: This method of refrigeration is adequate only if the samples are properly packed and the distance to the laboratory is not great. Ice will preserve specimens for 18 to 24 hours during the winter months but only for 8 to 12 hours during hot weather. . Specimens packed in ice should be placed in a water container and surrounded by ice, either in the form of frozen cans of water or by packing a small container into a larger one containing ice, which may be refilled at intervals as desired. For the purpose a thermos flask may be used.

(ii) Dry Ice: This method of refrigeration is preferred if the specimen can be frozen without interfering with the laboratory procedures to be conducted. The specimen should be placed in plastic or other waterproof container and the dry ice wrapped in paper and placed in the box. Do not place the dry ice in direct contact with the specimen unless freezing is not a problem.

Do not send dry ice in an air proof metal containeras the ice will volatilize and pressure may result in an explosion.

Note: Materials collected for bacteriological examination should not be kept at sub zero temperature (-20^0C) while for virus isolation these can be stored at -20 to -80^0C. For most of the diseases keep at 4^0C.

2. Chemical Preservatives:

These preservatives save the specimens from decomposition and such specimens should not be used for bacterial examination.

These solutions are used when bacterial growth is to be kept to a minimum:

1. Formalin 10% 2. Alcohol 70% 3. Phenol 0.5% 4. Merthiolate 1: 10000
5. Glycerol Saline 50%may be used for specimens for viral isolations, however, frozen specimens are preferred.

Histopathological Examination:

Histopathological examination is done on fixed tissues. Fixation is the process of killing and hardening tissue. The aim of fixation is the preservation of cells and tissue constituents in as life-like manner as possible and to allow the preparation of tissue to cut thin sections.

No single substance or known combination of substances has the ability to preserve and allow the demonstration of every tissue component. Because of this, some fixatives have only special and

limited application and most are mixtures of two or more reagents designed to make use of the special features of each. The choice of fixative will depend upon the type of investigation required. One fixative will rarely be suitable for a variety of methods. it is therefore, convenient to divide them in different groups according to their uses.

1. Micro-anatomical Fixative: These are used when it is desired to preserve the anatomy of tissues with correct relation of tissue layers and large aggregate of cells to one another. Most of the routine work of pathological histology is done with such fixatives eg. Formal Saline, Buffered Formal Saline, Alcoholic Formalin, Buffered Gluteraldehyde, Zenkers Fluid, Bouin's Fluid, Susa's Fluid Gendre's Fluid, Rossman's Fluid.

2. Cytological Fixatives: These are used when the preservation of intracellular structures or inclusions is of first importance. Often these elements are preserved at the expense of even penetration, ease of cutting and loss of other cell structures. Cytological fixatives are of two types:

(i) Nuclear Fixatives: Carnoy's Fluid, Clarke's Fluid, Flemming's Fluid New Comer's Fluid

(ii) Cytoplasmic Fixative: Champy's Fluid, Muller"s Fluid, Helly's Fluid, Regaud's Fluid, Schaudinn's Fluid, Formal Saline and Formal Calcium.

3. Histochemical Fixative: When histochemical tests are to be applied, it is essential that the fixative employed produces minimum changes in the element that is to be demonstrated. Freeze drying technique is ideal for this purpose, but it is very troublesome and time consuming for routine work. eg. Formal Saline, Cold Acetone, Absolute Alcohol.

The fixative of choice for specimens for histopathological examination is 10% Formal Saline. This preservative is prepared by diluting formaldehyde (40% stock solution) 100 ml (1 part) to 900 ml (9 parts) of normal saline solution (NSS 8.5%). For fixation of tissues, a sufficiently large quantity of formalin should be used, approximately 10 times as much preservatives as tissue.

Virological Examination:

Most of the known viruses affecting animals have a tendency for selective tissue localization and thus demand the utmost care in selecting specimens appropriate for the disease and as free as possible from bacterial contamination.

The transport media used specially for virological examination of the morbid materials are 50% phosphate buffered saline (pH 7.3-7.4) and Hank's balanced salt solution. 50% buffered glycerine saline is the general preservative for animal inoculation tests. For other tests especially for tissue culture, tissue samples should be fresh, refrigerated but not frozen. Blood sample sent without chilling should be collected in EDTA and 50% glycerine saline. Swabs for viral isolation should be placed into tissue culture fluid or isolation media containing antibiotics.

Tissue specimens may be placed in sterile, wide mouth, cork-stoppered bottles and forwarded frozen in dry ice or in 5 to 10 volumes of sterile 50% glycerol saline or preferably in a medium containing equal parts of pure buffered glycerine. The material should reach the laboratory in the shortest possible time after collection, preferably over ice in a thermos flask. When a viral disease is suspected antibiotics (Penicillin 1000 units and streptomycin 10 mg/ml) should be used in transport media and serum samples dispatched for diagnosis. This will inhibit contamination. About 20 gm each of spleen/lymph node tissues be collected for virus isolation. Always 5 to 6 or more animals be investigated and material collected for laboratory examination.

Scabs from pox may be forwarded in a dry sterile specimen tube without addition of a preservative. Materials from animals suspected for Rinderpest, PPR or Canine Distemper should not be collected in glycerol saline. It should be sent in sterile vials with ice.

Heart blood, serum and cerebrospinal fluid for identification of viruses should be forwarded in refrigerated sterile vials.
In case suspected for rabies in dog or other small animals, the entire head should be submitted in a water tight metal container placed in a larger container refrigerated with natural ice or dry ice. If the distance to the laboratory is too great for the specimen to arrive in a refrigerated condition, the brain should be removed and divided between the cerebral hemispheres; one hemisphere should be placed in undiluted neutral glycerine and the other in 10% formalin.

The small dead bird should be immersed in a 5% lysol solution, wrapped in lysol soaked cheese cloth and forwarded frozen in dry ice.

Type of Materials to be Collected in Different Viral Diseases:

Foot and Mouth Disease: Samples of epithelial debris from fresh lesions or the aspirated contents of unruptured vesicles is 50% buffered sterile glycerine saline preferably on ice. About 10 ml blood at the hight of body temperature in EDTA/Heparin. Tonsils and in calves pieces of heart in 10% formalin and ice separately.

Rinderpest/Bovine virus Diarrhoea : (1) From live animals, about 10 ml or more blood at the height of body temperature in anticoagulant, rectal swab in PBS on ice, nasal and pharygeal secretions, faeces (2) From dead animals, prescapular lymph nodes, spleen, (20-30 gm) on ice and (3) Lung, liver, spleen, tonsil etc. in 10% formalin. Materials 20 gm from 5 to 6 or more animals be collected and dispatched for better picture of disease/outbreak.

Peste des Petits Ruminitas (PPR): Pieces of intestine on ice.

Mucosal Disease: Nasal swabs, tissues or blood samples refrigerated immediately after collection.

Swine Fever: (1) Heparinised 20 ml blood in sterile vials or test tube on ice from live animal (2) Heart blood, pieces of spleen lymph node, pancreas (10 to 15 gm) in 50% buffered glycerine saline (3) Pieces of brain, lung, intestines, Ileocaecal region and kidney in 10% formalin from dead animal. Material from 5 to 6 or more animals be collected in order to give diagnosis/ true picture of disease. Materials for isolation and serological tests may be collected in sterile vial on ice without glycerine.

Transmissible Gastroenteritis (Swine): Faeces, jejunum-ileum.

Malignant Catarrhal Fever: Lymph nodes and spleen preferably in ice or in 50% glycerine-saline, blood in O.C.G. or heparin or sodium citrate and all tissues in 10% formalin for histopathology.

Blue Tongue: Blood taken in Sodium Citrate or EDTA, lesion material, spleen and regional lymph nodes.

Rabies: Whole intact head in ice or half portion of brain in 50% glycerine saline in water tight hard box and the rest half portion of brain in 10% formalin as well as salivary glands **.** Alternative and preferable, small pieces from hippocampus and brain (cerebellum, medulla, cerebrum, spinal cord) in 50% buffered glycerine and 10% formalin separately duly sealed in bottles and packaged in thick polybags and hard box, labeled **"Suspected for Rabies"** Where available fresh smears from brain may be stained with Seller's stain.

Pseudorabies: Brain, lesion material, regional lymph nodes.

Pox (Sheep, Goat, Cow & Buffalo): Scab in sterile container on ice, scab in 50% buffered glycerine, skin lesions in 10% formalin, separately.

Bovine Herpes Virus 1,2,3/IBR/IPV, Bovine Mammilitis/Parainfluenza 3/Adenovirus. etc>: Paired serum (sterile) samples on ice (IBR/IPV, Bovine Mammilitis) (2) Swabs from vaginal and nasal lesions and pieces of trachea, lung in transport medium on ice (3) Smears amd pieces of trachea, liver, turbinate bone, lung in Bouin's fixative/10% formalin.

African Horse Sickness/Arbo Viruses: Blood at the height of temperature, in heparin (5-10 units/ml) or EDTA, paired sera samples in sterile container on ice. About 10 ml blood and 2 ml serum add antibiotic or merthiolate may be collected on ice. Dead animals- (1) Spleen, lymph nodes, intestine, internal organs etc. in 10% formalin.

Caprine Artheritis/Encepahalitis/Maedi/Visna Disease: Paired sera samples, joint capsule, lung, brain on ice and 10% formalin.

Canine Distemper: Pieces of lung, urinary bladder, liver, trachea, stomach, wall and brain in 10% formal saline. Impression smears from liver, piece of liver and spleen on ice.

Influenza (Equine, Porcine and Avian): Nasal swab in PBS or Hanks medium on ice, paired serum, lung, tracheal mucosa, nasal pharyngeal secretion.

Equine Infectious Anaemia (EIA): Paired sera samples, all internal organs in 10% formalin.

Equine Arteritis Virus Infection: Whole blood, nasal and pharyngeal secretions, placenta and foetus, regional lymph nodes, spleen.

Infectious Canine Hepatitis: Liver, gall bladder and kidney in 10% formalin-saline. Impression smears from liver fixed in methanol. Spleen and liver in sterile containers on ice.

Canine Parvovirus: Rectal swab in PBS, pieces of intestine, heart on ice, all internal organs in 10% formalin.

Rift Valley Fever: Whole blood.

Ranikhet Disease: (1) Freshly dead/moribund bird on ice (2) Portion of liver, spleen, trachea, bronchi, lung in 50% buffered glycerine saline on ice (3) Proventriculus in 10% formal saline.

Marek's Disease: (1) Live bird in acute stage of disease (2) Feather follicles from chest and neck in transport medium (3) Paired sera samples (4) Portion of peripheral nerve, trachea, ovary, liver, kidney, spleen and skin in 10% fromalin for histopathology.

Infectious Bursal Disease (Gumboro Disease): (1) Live affected chick/bird (2) Bursa of fabricious in transport medium (3) Paired sera samples (4) Bursa of Fabricious, kidney, spleen in 10% formalin for histopathology.

Infectious Bronchitis/Other Respiratory Diseases: (1) Swab from exudate, lung (2) Paired sera samples.

(For diagnosis of poultry diseases it is desired that a few ailing/moribund/dead birds may be sent for collection of suitable material at the laboratory)

Bacteriological Examination:

The material must be collected with aseptic precautions and dispatched in sterile containers to prevent contamination from extraneous sources. In case of dead animals, the specimens shluld be taken soon after seath to avoid the chances of invasion of tissues by putrefactive bacteria rendering the specimens unsuitable for examination.

Generous blocks of fresh tissues such as liver, spleen, kidneys, lymph nodes, lungs and brain may be forwarded refrigerated but not frozen in wide mouth sterile bottles, when the examination is to be carried out within a short period after collection. If, however, the examination is to be delayed by a few days, it is preferable to preserve the tissues in 25% glycerine saline. While forwarding material in this preservative, it would be better to send larger pieces of the tissues, so that if necessary, cultures may be attempted from their central areas where the glycerine penetration has been the least.

Liquid material such as heart blood, cerebrospinal fluid and inflammatory exudates may be taken either on sterile swabs, sealed in pipettes or collected in tubes or bottles with strict aseptic precautions. The surface of the organ should be well seared with a hot spatula and a sterile syringe and needle or pipette inserted into it for drawing the material. If the peritoneal fluid is required, an area on the abdominal wall is seared thoroughly and a sterile knife is used for holding the cavity open and sterile pipettes for drawing the fluid.

For taking swabs of the contents of a closed abscess in a living animal, clip the hair from the area and paint it with tincture of iodine. Open the abscess with a sterile scalpel and take swabs from the wall as well as from the contents of the abscess and keep the swabs in sterile tubes. To collect wound discharge, the wound should be thoroughly cleaned with warm water and soap, and sterile non-antiseptic cotton wool or gauze dressing applied. The material should be collected after about 24 hours by inserting a sterile swab underneath the dressing.

For bacteriological examination of the intestinal flora, ligate about 6 inches of the bowel at both ends and forward the loop unopened under refrigeration.

If there are abnormal contents in the uterus, a small segment is isolated between ligatures and retained unopened for bacteriological examination. While it is desirable that the specimen for immunological study be refrigerated in transportation, serum for agglutination and complement fixation test may be preserved with 0.5% phenol or 1:10000 merthiolate.

Type of Materials to be Collected in Different Bacterial Diseases:

Anthrax: Cotton swabs soaked in exuded blood/blood taken from a superficial ear vein, in acute and per acute anthrax.
In swine, organisms are not present in blood, so swabs should be taken from exudates and the cut surface of hemorrhagic lymph nodes.
Flame fixed blood smears of cattle and sheep. From subcutaneous swelling in horses, swine and dogs. Swabs of blood from ear vein for cultural examination from dead animals. A small piece from tip of ear or muzzle (1/2 x 1 cm approx.) in saline or without any preserve in sterile glass test tube or bottle on ice duly sealed. *It is not advisable to open the carcass suspected for anthrax in the field.* If opened, it should be properly disposed by burning.

Blackleg (Black Quater): Impression smears from the affected muscle tissue; exudate from lesions; pieces of affected muscles on ice.

Tetanus: Material from wound site (isolation is not usually attempted)

Bacillary Haemoglobinuria: Affected liver tissue.

Botulism: Suspected food, meat, forage and urine.

Enterotoxaemia, Lamb Dysentery: Intestinal pieces with contents inside tied with thread or contents of small intestine with and without chloroform separately on ice, kidney, urine.

Listeriosis: (1) Aborted foetus, brain, placenta (2) All internal organs in 10% formalin/on ice (3) Half brain under refrigeration and half in 10% formal saline

Vibriosis (pigs): Affected portion of intestine.

Campylobacteriosis: Prepeutial washings, semen, foetal stomach contents, cervicovaginal mucus (sample should reach the laboratory within 6 hours of collection under refrigeration or at room temperature in transport media).

Brucellosis: Paired sera samples, blood and abomasal contents of aborted foetus, placenta with 2-3 cotyledons, vaginal swabs in PBS, separate bottle on ice, whole foetus if small on ice. For ABR milk is used avoiding colustrum and milk from drying off animals or those suffering from mastitis. Milk, serum, vaginal mucous etc. from dam.

Haemorrhagic Septicemia: From sick animals fixed smears from blood and throat swelling and from dead animals, smears from heart blood and liver. Heart blood in a sterile pipette/bottle, lymph node and spleen on ice.

Johne's Disease: Rectal pinch smears, bowl washings (at least 10 gm preserved in 10% formalin). In dead animals terminal portion of ileum with iliocaecal valve, mesentric lymph gland in 10% formal-saline.

Glanders: Exudate from skin and ung lesions in vials on ice. Impression smears from exudate duly fixed, tissue containing early nodules, pus from ulcers.

Tuberculosis: (1) Cough material in sterile container from live animal (2) Sample of milk in sterile container (3) Suspected lesions in 10% formal saline (dead animal) (4) Smears from lesions fixed by heat (5) Lymph glands or lung lesions in sterile container for isolation in 50% buffered glycerine.

Leptospirosis: (!) Blood serum (2) Pieces of liver and kidney in 10% formalin (in dead animals) and (3) Milk or urine in vials by adding 1 drop of formalin per 20 ml.

Salmonella Sp.: Intestinal swab, heart blood, bile in sterile container on ice.

Actinomycosis & Actinobacillosis: (1) Smears from pus lesions, pus in vial on ice (2) Formalin preserved materials from lesions (affected muscle)

Mycoplasmosis/CCPP/CBPP/Coryza: (1) Swab from lesions, nasal and vaginal swabs in PBS on ice (2) Piece of lung preserved in 10% formalin for histopathological examination and on ice separately. Paired sera samples.

Chlamydia/Psittacosis: (1) Nasal swab, lung pieces in sterile container on ice and internal organs in 10% formalin (2) Fixed impression smears from liver, lung and foetus (3) Paired sera samples

Mycotic Infections: Deep skin scrap in sterile vials

Skin Diseases (Ring Worm, Mange, Mites): Skin scrappings for identification of ectoparasites and fungus in vials.

Parasitological Specimen:

For all parasitological specimens 5-10% formalin of formal saline and 70% alcohol are used as preservatives. After collection, ectoparasites and intermediate hosts can be sent as such or after fixation. 70% alcohol does not retain the colour of ticks as well as does the chloroform formalin mixture. The latter is prepared by adding chloroform in excess to 10% formalin and shaking it thoroughly. The chloroform is allowed to settle and the top solution is poured constituting the chloroform formalin mixture which retains the natural colour of ticks, if dropped alive.

Fleas and lice are collected on a sheet of paper either by combing or with the help of a camel hair brush moistened with xylene. These insect forms are best preserved in 70% alcohol, with 5% formalin as a second choice. Sufficient exudates or scabs and crusts formed from exudate in 70% alcohol and deep skin scrappings (until petechial hemorrhages appear) in 5% formalin are collected if mites are suspected. Skin pieces are collected in 10% formalin.

The collection of fleas, lice and mites from skins of small animals and birds is best accomplished by brushing, combing and shaking the fur, hair or feathers over a large sheet of white paper and placing them in a vial containing 70% alcohol. Dead small birds and animals can be transported as such in securely tied polythene bags. The ectoparasites can also be collected by dipping and washing the birds in a pail with water containing small amount of detergent. The parasites are collected with the help of a strainer. Larval forms should be collected and placed in a vial of 70% alcohol or 5% formalin.

Common blood protozoan parasites can be visualized in thin blood smears. For demonstration of microfilariae thick blood smears, whole blood or hemolysed (with acetic acid) centrifuged blood is desirable.

The trophozoite forms of intestinal protozoa seldom survive in dead animal and at room temperature. Faeces or intestinal contents as such or in normal saline must, therefore, be examined immediately after collection or retained at body temperature till examined. Protozoan cysts are comparatively resistant and can be identified in faeces for 3-4 days. Refrigeration further preserves them.

The best all round preservative for helminths is 5-10% formalin or formal saline. Samples of faeces should be examined for the presence of helminth ova as soon as possible after collection or put in hot 10% formalin (one part formalin: 3 part faeces) to prevent development and hatching of eggs and decomposition of sample. The sample of faeces to be cultured must be free from earthy or bedding contamination otherwise it may be heavily infected with free living nematodes ot their larvae.

Alive worms are washed by shaking in normal saline and then put for about an hour in 70% alcohol, normal saline or water at 37^0 to 40^0C to cause them to die in an extended state. Dead worms are fixed in 5% formalin and may later be transferred to 70% alcohol. The final preserving fluid, either 70% alcohol or 5% formalin, should contain 5% glycerine to prevent drying of helminth worms through evaporation of preserving fluid.

Theileriosis: (1) Biopsy smears from swollen lymph nodes from early stages of disease fixed with methanol. Blood smears fixed in methanol or alcohol. Two to three blood smears from each case.

Babesiosis: Thin blood smears from early stages of disease fixed with methanol. Two to three blood smears from each case.

Anaplasmosis: Thin blood smears from ear vein fixed with methanol. Two to three blood smears from each case.

Surra/Trypanosomiasis: (1) Blood in anticoagulant on ice (2) Blood smears fixed in methanol.

Gastro-Intestinal Parasitic Disease: (1) Faecal sample in 10% formalin and (2) in dead animals, parasites (round worms in 70% formalin) for identification. All internal organs in 10% formalin.

Serological Samples:

Paired samples (one taken at the onset of the disease and another taken 2-3 weeks later) aree desirable. For anaplasmosis it should be frozen or preserved with 0.2% Beta propiolactone. In other cases, it may be preserved with sodium merthiolate 1:10000 or carbolic acid 1:200.

Immunoflourescense Samples: Serum as such and freshly collected, refrigerated or frozen tissue.

Biopsy Samples:

1. Bone marrow smears for hemopoietic disorders.
2. Lymph nodes for lymphosarcoma (whole or part)
3. Liver biopsies for histopathology or chemical estimation
4. Skin biopsy in 10 times volume of 10% formal saline
5. Skin scrappings for mite infestation and hair samples for fungal infections are sent without any preservatives or in 5% formalin.

Blood Samples:

1. Blood smears for hemopoietic disorders or blood infections shluld be fixed in methyl alcohol, dried and sent.
2. Blood samples for haematology-Anticoagulants viz. EDTA 2mg/ml, Sodium Citrate 3.8% - 1ml/10ml, Hellar and Paul formula – (0.8 g Potassium oxalate, 1.2 Ammonium oxalate, water 100cc), Heparin – 0.1 IU/ml or 1 mg/5 ml (not good for rabbit blood)

For prothrombin time estimation Sodium citrate or Potassium oxalate is used.

Anticoagulants for Blood:

a. Heparin 5-6 i.u./ml of blood
b. Oxalate phenol glycerine (OCG) solution-1 part to 2 parts of blood erythrocytes.

c. Ethylene Diamine Tetra-acetic (EDTA) at the rate of 1-2 mg/ml of blood.

Blood is transported in chilled condition, but never frozen for both clinical examination as well as virus isolation. Where bacterial isolation is not required, antibiotics may be added.

Cerebrospinal Fluid:

Examination soon after collection is desirable. For leucocytes EDTA and for glucose estimation sodium fluoride is added as a preservative.

Synovial Fluid: One clotted (2-3 ml) and one unclotted sample (2 ml) with EDTA or Sodium citrate be submitted.

Serous Cavity Fluid: No preservative is required and used for bacteriological or cytological examination.

Sputum: No preservative is required and is used for bacteriological or parasitological examination.

Toxicological Examination:

In case suspected for poisoning, each specimen should be forwarded for laboratory examination in a separate wide mouth glass stoppeered bottle or a jar under refrigeration without the addition of a preservative. The material submitted to a laboratory should include stomach with its contents after tying both ends; about 30 cm each of ileum and colon and their contents with their ends tied. In the case of ruminants, about 1 kg of well mixed contents of rumen; about 0.5 kg of liver; one or both the kidneys and adipose tissue, contents of urinary bladder, blood or other specified material and specimens of plants suspected for poisoning and also specimens that have been dried in shade.

In cases that may result in Vetero-legal action, particular care should be exercised for safe possesion from the time the specimens are collected until they are delivered to the toxicologist. The type of poison suspected should be stated to assist in the laboratory diagnosis. All bottles and packings should be carefully sealed by the officer making the examination, closed in such a manner that they cannot be opened without destroying the seal.
When an officer forwards articles to the chemical examiner or toxicologist for examination, he should at the same time address and forward separately a letter to the chemical examiner regarding their dispatch, the letter should contain:

1. An impression of the seal used in closing
2. A list of articles forwarded and information as to how the articles have been forwarded.
3. The name of the Officer from whom the order has been received to forward the articles, and the number and date of such order.
4. Information as to the number and kind of animals affected and the number of deaths.
5. Any information obtained on post mortem examination, nature and duration of symptoms which may be likely to indicate the probable nature of the poison.

Aflatoxicosis: (1) Suspected feed (specially groundnut cake) about 100 g each (2) Piece of liver (50g), spleen in 105 formal saline and on ice separately

Poisoning Cases: (1) Stomach and intestinal contents 100 g on ice (2) Left over fodder 100 g (3) About 100 g liver pieces in alcohol on ice.

Forage Poisoning: Samples of grass/fodder, plants, liver and stomach contents on ice.

Poisoning:

S. No.	Suspected Poison	Required Material *(In order of importance)*
1.	Arsenic (Acute)	1. Liver 2. Kidneys 3. Stomach Contents
2.	Arsenic (Chronic)	1. Hair 2. Liver 3. Urine
3.	Alkaloids	1. Liver 2. Urine 3. Brain 4. Stomach Contents
4.	Copper	1. Liver
5.	Cyanide	1. Stomach Contents 2. Liver 3. Oxalated Blood
6.	Insecticides (Chlorinated)	1. Fat 2. Liver 3. Stomach Contents 4. Lymphoid Organs
7.	Insecticides (Organophosphate)	1. Oxalated Blood 2. Liver 3. Stomach Contents 4. Lymphoid Organs
8.	Lead (Acute)	1. Kidneys 2. Liver 3. Urine
9.	Lead (Chronic)	1. Hair 2. Liver 3. Kidneys 4. Urine
10.	Mercury	1. Liver 2. Kidneys 3. Stomach Contents 4. Intestinal Contents
11.	Nitrate and Nitrite	1. Stomach Contents 2. Whole Blood
12.	Phosphorous	1. Stomach Contents 2. Whole Blood 3. Oxalated Blood
13.	Phenols-cresols	1. Liver 2. Stomach Contents 3. Kidneys
14.	Rodenticides	1. Stomach Contents 2. Liver 3. Urine
15.	Strychnine	1. Stomach Contents 2. Urine 3. Liver 4. Brain
16.	Sodium Chloride	1. Oxalated Whole Blood 2. Brain 3. Stomach Contents

The following are the minimum quantities of the specimens to be sent for toxicological examination:

S. No.	Name	Amount
1.	Blood	30 to 50 ml
2.	Brain	Entire
3.	Fat	200 g
4.	Hair	5-10 g
5.	Intestinal Contents	one
6.	Kidneys	500 – 1000 g
7.	Liver	500 – 1000 g
8.	Stomach Contents	500 – 1000 g in large animals and all available contents in small animals
9.	Urine	All available

Miscellaneous Condition:

1. Mastitis: Milk samples in sterile tubes on ice.
2. Abortion: Whole foetus on ice or all internal organs, vaginal swab in PBS or Hanks, pieces of palcents in sterile containers on ice and in 10% formalin separately. Paired sera samples.
3. Infertility and Sterility: Sterile semen, prepucial swab and paired sera sample on ice.
4. Pyrexia: Blood smears, blood in EDTA and paired blood serum on ice.

Note:

1. In general for diseases of unknown etiology it is essential to collect feed, blood smears and blood serum from live animals. In dead animals stomach contents, spleen lungs, liver, kidney, intestine in sterile containers and 10% formalin separately. Specimen packed for rabies , glanders and anthrax be marked *"suspected for"*
2. About 10 ml blood, 6 ml sterile serum, 20 g tissues be collected for virus isolation. Examine 5 – 6 animals for collection of materials.
3. Paired Serum: One serum (2 ml)at the time of onset of disease and another 3 weeks after first collection when animals almost recover from disease.
4. The Veterinary staff attending the dogs/suspected cases of animal rabies should be immunized with anti-rabies vaccine.
5. Use washing soda and soap for washing of floor.
6. All instruments be kept in boiling water for 30 minutes after post mortem examination.
7. All requests for investigation should be sent by the Officer incharge preferably through Director/Additional Director/Joint Director etc. along with full details of disease suspected, its gravity and the officer to be contacted for further correspondence/or for intimation of results.

Washing and Sterilization:

(1) Glasswares: All glasswares used for collection of material are first washed with warm water. Used glasswares are first autoclaved for 30 minutes at 15 pounds pressure (presusure cooker). Wash with detergent or 3% washing soda at 80^0C. Use soft brush for removing protein. Vim or soap may be used on outer surface of glassware only. After washing in running water 10 times, the glassware may be washed in glass distilled or metal distilled water 3 times. Dried in air or oven. Tubes and bottles may be plugged with cotton cloth. Aluminium foil and paper be used for packing of glassware. All the glasswares are sterilized at 180^0C for one hour in hot air oven/Autoclave/Pressure cooker.

(2) Transport Media: Sterilize at 15 lbs for 30 minutes in autoclave or pressure cooker and store at 4^0C.

Preparation of Fixatives/Media?Preservatives:

Formal Saline Solution

37-40% Formalin	-	100 ml
Sodium Chloride	-	9 g
Tap Water	-	900 ml

Buffered Neutral Formalin Solution

37-40% Formalin	-	100 ml
Distilled Water	-	900 ml
Sodium Phosphate Monobasic	-	4 g
Sodium Phosphate Dibasic (anhydrous)	-	6.5 g

Formalin Sodium Acetate Solution

37-40% Formalin	-	100 ml
Sodium Citrate	-	20 g
Tap Water	-	900 ml

Formalin Ammonium Bromide Solution

37-40% Formalin, neutralized	-	15 ml
Ammonium Bromide	-	2 ml
Distilled Water	-	85 ml

Formalin Alcohol Acetic Acid Solution

37-40% Formalin	-	5 ml
Alcohol 80%	-	90 ml
Glacial Acetic Acid	-	5 ml

Formol Calcium Solution

Calcium Chloride Anhydrous	-	1 ml
37-40% Formalin	-	10 ml
Distilled Water	-	90 ml

Zenker's Solution -

Distilled Water	-	1000 ml
Mercuric Chloride	-	50 ml
Potassium Dichromate	-	25 ml
Sodium Sulphate	-	10 ml

Bouin's Solution

Picric Acid (Saturated Aqueous Solution)	-	50 ml
37-40% Formalin	-	250 ml
Glacial Acetic Acid	-	50 ml

Formal Sublimate

Formalin	-	100 ml
Saturated Solution of Mercuric Chloride	-	900 ml

Carnoy's Solution

Absolute Alcohol	-	75 ml
Glacial Acetic Acid	-	25 ml

Clarke's Solution

Absolute Alcohol	-	75 ml
Glacial Acetic Acid	-	25 ml

Newcomer's Solution

Isopropanol	-	60 ml
Propionic Acid	-	30 ml
Petroleum Ether	-	10 ml
Acetone	-	10 ml

Dioxane	-	10 ml

Orth's Solution

Potassium Dichromate	-	2.5 ml
Sodium Sulphate	-	1 ml
Distilled Water	-	100 ml
Mix and Add: Formalin 37-40%	-	10 ml

Hank's Balanced Salt Solution (HBSS)

HBSS Dry Powder – 1 vial (Micro lab or Himedia or any make)
Distilled Water – 1000 ml
Dissolve the powder and add 0.5 g Gelatin powder. Sterilize at 15 lbs pressure for 30 minutes. Cooll and add sterile sodium bicarbonate to make pH 7.4 and antibiotics (Penicillin 1000 iu/ml Streptomycin 10 mg/ml). Store in 3 ml quantity in vials at 4^0C for collection of swabsand fluid for virus isolation.

Merthiolate and Sodium Azide Solution:

0.001% concentration of either of the two is good preservative for serum used for serological test. But not for serum used for neutralization test. Use antibiotics when serum neutralization test is desired.

M/25 Phosphate Buffer Glycerol (pH 7.6):

Solution A: M/25 Disodium Hydrogen Phosphate: A quantity of Na_2HPO 12 H_2O is spread out and dried in an incubator for 3 or 4 days. 7.13 g of the dried salt is made up of 1 liter with double distilled water.
Solution B: M/25 Potassium Dihydrogen Phosphate; 5.45 g of KH_2PO_4 is made upto 1 liter with double distilled water.
Buffer Solution: 6 parts of solution A+1 part of solution B gives abuffer solution of approximately pH 7.6.
Mix the buffer solution with equal volume of pure glycerol and adjust it to pH 7.6.

Phosphate Buffer Saline (PBS), pH 7.2

Sodium Chloride	_	8.5 g
Di-sodium Hydrogen Phosphate	-	0.56 g
Potassium Dihydrogen Phosphate	-	0.14 g

Nutrient Broth (Ready made dehydrated media are also available. Follow instructions given on bottle):

Beef Extract (Lab-lemco)	-	10 g
Peptone	-	10 g
Sodium Chloride (NaCl)	-	5 g
Distilled Water	-	1000 ml

Oxalate Phenol Glycerine (OCG) Solution:

Potassium Oxalate	-	500 ml

Glycerine	-	500 ml
Carbolic Acid	-	5 g
Distilled Water	-	500 ml

Stains:

Ready made BDH/E, Merk Giemsa/Gram's/Ziehl Nelson Acid fast stains are locally available.

Decalcification:

Perenyi's Fluid

10% Nitric Acid Aqueous	-	40 ml
Absolute Alcohol	-	30 ml
0.5% Chronic Acid Aqueous	-	30 ml

Nitric Acid Method

1. Place calcified specimen in large quantities of nitric acid solution until decalcification is complete (Change solution daily for best results).

Instruments/Other Items Needed for Collection pf Specimens:

(a) Surgical Instruments:

Scissors 6" long – 2 Nos., Forceps 6" – 2 Nos., Sharp Scalpel or Blade Holders with BP Knife – 2; these should be sterilized in autoclave or oven. Each instrument should be packed separately.

(b) Gloves:

Latex gloves of different sizes.

(c) Pasteur Pipettes:

Rubber bulbs of 30 ml capacity to be fitted in pasteure pipettes for collection of body fluids.

(d) Bottles/Vials:

5 ml clear screw capped McCartney/Biju bottles with rubber stoppers aand metal screw cap. Presterilized disposable bottles may be used. Empty bottles/vials after washing and sterilization may be used. Sterile non breakable bottles are also available in the market.

(e) Microscopic Glass Slides:

Standard size being 7.7 cm x 2.5 cm and 1.1 mm thick with smooth margins.

(f) Swabs:

Cotton swabs in strong bamboo sticks (15 cm long) are prepared and sterilized in individual tubes for collection and transport of body fluids.

(g) Syringes:

Glass/disposable plastic syringes of 5/10 ml size are used for collection of blood and body fluids. For large animals 16 SWG needles and for small animals 20 SWG 30 mm long needles should be used.

(h) Sealing and Labelling Tape Rolls

This should be used for sealing the vials containing serum/blood/other fluids etc. and for labelling the materials. The details of materilas should be written by water proof ink.

(i) Packing Boxes:

Light, strong wooden boxes of approprate size for keeping the bottles/vials.

(j) Sterilized Absorbent/Non Absorbent Cotton:

Absorbent cotton for making the swabs and non absorbent cotton for plugging the test tubes/bottles/vials and also to be used as packing material for protecting the glasswares during transportation.

(k) Polythene Bags:

Thick polythene bags of assorted size for keeping the stomach contents/morbid tissues/faeces etc. and transported on ice.

(l) Protective Garments:

Aprons, gum boots and face mask.

Annexure-VI

INFORMATION TO BE PACKED ALONG WITH THE MATERIAL

1. Owners Name & Address :

2. Description of the Source Animal :

3. Nature of Container Used : Sterile/Unsterile

4. Preservative / Transport Medium Used :

5. Anticoagulants Used in Blood :

6. Disease Suspected :

7. Clinical Signs / History :

8. Necropsy Findings (In Brief) :

MATERIALS BEING SENT

1. Blood : Heart Blood/Peripheral Blood
2. Smear : Blood/Pus/Impression Smears
3. Swabs : Nasal/Eye/Rectal/Vaginal/Others
4. Serum : Single/Paired
5. Scrappings : Skin/Pock Lesions/Others
6. Excretions : Faeces/Vomitus/Urine/Others
7. Discharges : Eye/Nasal/Mouth/Rectal/Vaginal/Others
8. Epithelium : Tongue/Lips/Gums/Foot/Others
9. Others :

LABORATORY EXAMINATIONS DESIRED

10. Bacteriological Examination : Heart Blood/Discharges/Tissues/Any Others
11. Virological Examination : Heart Blood/Tissues/Skin Scabs/Others
12. Parasitological Examination : Blood/Blood Smear/Faeces/Others
13. Toxicological Examination : Liver/Stomach Contents/Feed/Fodder/Others
14. Histopathological Examination : Name the Tissues Being Sent

(i)_____ (ii) _____ (iii) _____ (iv) _____

(v) _____ (vi) _____ (vii) _____ (viii) _____

Signature of the Officer In-charge
Name:
Designation:
Seal

Annexure-VII

Format of letter to be sent along with clinical/morbid material for laboratory diagnosis

Letter No.:_____ Dated: _____

From:

_____
_____
_____
_____
_____

To,

The Coordinator
Animal Disease Diagnostic Center
College of Veterinary & Animal Sciences
G.B.Pant University of Ag. & Tech.
Pantnagar, 263145 (Uttarakhand)

Through:_____

I am sending herewith the material for laboratory diagnosis. The details of the materials are given below:

1. Owner's Name & Address: _____

2. Description of the source of animal: _____

   Species _____, Breed _____, Age/Date of Birth _____, Sex _____

   Identification No. _____

3. Date & Time of Death: _____

4. Date & Time of Collection of Material: _____

5. Brief History of the Case:
   Duration of Illness/Outbreak:
   Clinical Signs/Symptoms Observed:
   Morbidity/Mortality Rate:
   Treatment History:

   Necropsy Findings (In Brief):

6. Nature & Contents of Specimen (Type of Material):
   Blood/Serum/Faeces/Urine/Skin Scrapping/CSF/Synovial Fluid/Biopsy:
   Morbid Material for Histopathology:
   (1) _____ (2) _____ (3) _____
   (4) _____ (5) _____ (6) _____

   Plant/Feed Material:
   Other Material:
7. Preservative/Transport Media Used:
8. Examination(s) Desired:
9. Any Other Information/Remark

Signature:_____
Name:_____
Seal:

Annexure-VIII

Check List of Medicines, Surgicals, Disposables, Materials, Equipments

1. ANTIBIOTICS

S. No.	Name	Details
1.	Inj. Penicillin	20 lakh i.u.; 40 lakh i.u.
2.	Inj. Strptomycin	0.75 g; 2.5 g
3.	Inj. Ampicillin	1g
4.	Inj. Streptopenicillin	2.5 g
5.	Inj. Amoxicillin+ Cloxacillin	2g; 3g; 4g; 4.5g
6.	Inj. Ampicilllin +Cloxacillin	2g; 3g; 4g; 4.5g
7.	Inj. Amoxicillin+Sulbactum	3g; 4.5g
8.	Inj. Tetracycline HCl	30ml, 100ml
9.	Pd. Tetracycline HCl	100g
10.	Pd. Doxycycline	25g; 500g; 1kg
11.	Inj. Gentamycin	30ml; 100ml
12.	Inj. Chloramphenicol (Crystalline)	1g; 2g
13.	Inj. Cefotoxime Sodium	1g; 2g; 3g
14.	Inj. Ceftrioxone Sodium	1g; 2g; 3g; 4g
15.	Inj. Ceftrioxone+Tazobactum	3375 mg
16.	Inj. Cefaperazone	4.5 g
17.	Inj. Amoxycillin+Tazobactum	3350 mg
18.	Inj. Lincomycin	5 ml

2. ANTIBACTERIALS

S. No.	Name	Details
1.	Inj. Enrofloxacin	15ml; 100ml
2.	Liq. Enrofloxacin	100ml; 500ml; 1 liter
3.	Inj. Ciprofloxacin	100ml
4.	Inj. Sulphadimidine (33.3%)	100ml; 500ml
5.	Inj. Sulphamethoxazole+Trimethoprim	30ml
6.	Inj. Sulphadiazine+Trimethoprim	30ml

3. NSAIDS/ANTIPYRETICS/ANTISPASMODICS

S. No.	Name	Details
1.	Inj. Nimuselide	15ml, 100ml
2.	Inj. Ketoprofen HCl	30ml; 100ml
3.	Inj. Meloxicam	30ml; 100ml
4.	Inj. Meloxicam+Paracetamol	30ml; 100ml
5.	Inj. Paracetamol	30ml
6.	Inj. Analgin	30ml
7.	Inj. Maxxtol	30 ml; 100 ml

4. ANAESTHETICS

S. No.	Name	Details
1.	Inj. Lignocain HCl	30ml
2.	Inj. Xylazine HCl	30 ml; 10 ml; 2ml
3.	Inj. Ketamine HCl (50 mg/ml)	10 ml

5. ANTI HISTAMINICS

S. No.	Name	Details
1.	Inj. Pheneramine Maleate	30ml; 100ml
2.	Inj. Chlorpheneramine Maleate	30ml; 100ml

6. STEROIDS

S. No.	Name	Details
1.	Inj. Dexamethasone	2ml; 5ml; 10ml
2.	Inj. Betamehtasone	1ml; 5ml
3.	Inj. Prednisolone	10ml
4.	Inj. Triamcinalone Acetonide	5ml
5.	Inj. Hydrocortisone	100mg

7. BRONCHODIALATERS

S. No.	Name	Details
1.	Inj. Theophylline	2ml
2.	Inj. Aminophylline	2ml
3.	Inj. Budsenoid (for nebullization)	1ml

8. FLUIDS

S. No.	Name	Details
1.	Inj. Ringer Lactate	500ml; 1 liter
2.	Inj. DNS	500ml; 1 liter
3.	Inj. NSS	500ml; 1 liter
4.	Inj. Intalyte/Rintose	500ml; 1 liter
5.	Inj. Iron Dextran	500ml

9. VACCINES

S. No.	Name
1.	As per requirement

10. OTHER BIOLOGICALS

S. No.	Name
1.	Anti-Sera (Tetanus & antisera for any other diseases if available)
2.	Tetanus Toxoid
3.	Tuberculin
4.	PPD for John's Disease
5.	Antigen for Brucellosis (Abortus Bangs Ring Test)

11. DISINFECTANTS

S. No.	Name	Details
1.	Sodium Hydroxide	
2.	Lime	
3.	Formalin	
4.	Glutaraldehyde	
5.	Phenyl	
6.	Potassium Permanganate	
7.	Others	

12. ANTISEPTICS

S. No.	Name	Details
1.	Cetrimide	
2.	Hand Sanitizers	
3.	Dettol	
4.	Isopropyle Alcohol	
5.	Methyl Alcohol	
6.	Ethyl Alcohol	

13. HAEMEPROTOZOAN ANTIPARASITIC AGENTS

S. No.	Name	Details
1.	Buparvoquone	20ml
2.	Diaminazene Aceturate (RTU)	30ml; 90ml
3.	Quinipyramine Chloride+ Quinipyramine Sulphate	
4.	Quinipyramine Chloride	

14. OTHERS

S. No.	Name	Details
1.	Sterilized Disposable Syringes	2ml; 5ml; 10ml; 20ml; 50ml
2.	Sterilized Disposable Hypodermic Needles	16"; 18"; 20"
3.	Non-Sterilized Reusable PVC Disposable Syringes	20 ml; 50ml
4.	Non-Sterilized Reusable SS Hypodermic Disposable Syringes	16"; 18"
5.	I/V Infusion Sets	
6.	Distil Water	10ml; 100ml; 500ml
7.	Bandages	6"
8.	Gauze	
9.	Disposable face Masks (High Grade)	
10.	Disposable Head Caps	
11.	Personal Protection Kits	
12.	Sterile Vaccutainers for Sample Collection	5ml, 10ml
13.	Sterile Test Tubes (Glass/PVC)	50ml; 20ml; 10ml
14.	Centrifuge Tubes	15ml
15.	Disposable Gloves	6 No.; 61/2 No.; 7 No.; 71/2 No.
16.	Microscopic Glass Slides	
17.	Sample Collection Bottles/Containers	Various Sizes
18.	Surgical Packs	
19.	Post Mortem Sets	
20.	Vaccine Carriers	
21.	Insulated Sample Carrying Boxes	
22.	Sterilizer	
23.	Centrifuge	
24.	Gum Boots/Snow Shoes	
25.	Rain Coats	
26.	Torch	
27.	Batteries	
28.	Emergency Lights	
29.	Hurricane Lanterns	
30.	Kerosene Stoves	
31.	Aprons	
32.	Dungarees	
33.	Tents	
34.	Sleeping Bags	
35.	Blankets	
36.	Portable DG Sets	
37.	First Aid Kit	
38.	Packaged Mineral Water	
39.	Thermocol Boxes	
40.	Umbrellas	
42.	Nebulizing Machines with Large Animal Masks	

DISINFECTION PROTOCOL TO BE FOLLOWED AT THE TIME OF EVACUATION OF PERSONNEL INVOLVED IN RELIEF WORK IN NON ZOONOTIC DISEASE OUTBREAKS

A disinfection center is to be set up at a place located at the periphery of the area in which the outbreak is occurring under the supervision of an officer of the department.
The center shall have several rooms and bathrooms with facilities of hot water.
All personnel engaged in the treatment of affected animals shall mandatorily report to this center while moving out of the affected area.
They shall be provided with large PVC garbage bags to pack their soiled/dirty clothing which shall be sealed with packing tape or rubber bands.
Shoes shall also be cleaned thoroughly with available disinfectant with a brush and then air dried. If possible a separate pair of shoes/slippers may be used while coming out of the area and the old pair packed and sealed in the PVC bag.
Thereafter a freshly washed pair of clothes shall be put on.
After reaching their respective place of posting all personnel shall not engage in any clinical work for a period of 24 hours.
Vehicles used for relief work when moving out of the area shall be thoroughly cleaned with 1% phenyl applied for a period of 20-30 minutes before being rinsed with water.
An officer shall be deputed to man this center and shall ensure that every body is following the laid down protocol.

QUARANTINE AND DISINFECTION PROTOCOL TO BE FOLLOWED AT THE TIME OF EVACUATION OF PERSONNEL INVOLVED IN RELIEF WORK IN ZOONOTIC DISEASE OUTBREAKS

The following protocol shall be strictly enforced and followed:

As and when replacements arrive the personnel who have completed 21 days first shall be replaced first to the quarantine center and shall remain there for a period of one week and/or the reported incubation period of the disease.
The Veterinary Officers serving in and posted in the districts having the outbreak will not be relieved from their posts. Since them being more familiar with the territory shall help in guiding and implementing relief operations. This shall continue till such time that the outbreak is bought under control.
In addition to the above the Veterinary Officers posted in non clinical areas like (Chief Technical Officers, Veterinary Officers in laboratories, Veterinary Officers in Offices, etc.) shall also be mobilized for replacement
A disinfection and quarantine center is to be set up at a suitable place immediately in the periphery of the affected area under the supervision of an officer of the department.
The center shall have several rooms and bathrooms with facilities of hot water.
All personnel engaged in active treatment of animals shall mandatorily report to this center while moving out of the affected area. All officer and staff inclusive of Veterinary Officers, Livestock Extension Officers, Pharmacists, Dressers, Attendants, technicians, drivers, porters, support staff and vehicles shall have to undergo rigorous disinfection before evacuation from these areas. This is very important from the point of accidental spillage of the disease to other areas.
They shall be provided with large PVC garbage bags to pack their soiled/dirty clothing which shall be sealed with packing tape or rubber bands. Concomitantly if facilities exist then the clothes can be boiled/autoclaved and air dried and then packed in large PVC bags and sealed with tape.
Shoes shall also be cleaned thoroughly with available disinfectant and or 2% acetic acid with a brush and then air dried. If possible a separate pair of shoes/slippers may be used while coming out of the area and the old pair packed and sealed in the PVC bag.
An application of 0.2% citric acid on the whole body surface followed by a hot water bath with a strong carbolic soap.
Thereafter a freshly washed pair of clothes shall be put on.
Thereafter they will remain in quarantine for a period of seven days at this center or for the number of days of the incubation period for the disease in question.
After reaching their respective place of posting all personnel shall not engage in any clinical work for a period of 24 hours.
Vehicles used for relief work when moving out of the area shall be thoroughly cleaned with 1% phenyl applied for a period of 20-30 minutes before being rinsed with water.
An officer shall be deputed to manage this center and shall ensure that all personnel follow the laid down protocol.

NO.: **DATED:**

DEPARTMENT OF ANIMAL HUSBANDRY
UTTARAKHAND
PERFORMA FOR SUBMITTING POST MORTEM REPORT

DETAILS OF OWNER	**PARTICULARS**
NAME OF OWNER	
FATHER'S / HUSBAND'S NAME	
COMPLETE POSTAL ADDRESS	
VILLAGE / TOWN / CITY	
BLOCK & TEHSIL	
DISTRICT	
TELEPHONE NO.	
DESCRIPTION OF ANIMAL	
SPECIES OF ANIMAL	
BREED	
SEX	
TAG NO./BRAND NO./TATTOO NO.	
DATE OF BIRTH &/OR AGE	
PHYSICAL DISCRIPTION (HEIGHT & LENGTH IN CM)	
COLOUR	
HORNS (SHAPE & SIZE)	
TAIL (LENGTH IN CM & SWITCH COLOUR)	
ANY OTHER MARKING	
HISTORY OF DISEASE	
MILK PRODUCTION AT START OF LACTATION & AT TIME OF DEATH	
DATE & TIME OF START OF DISEASE	
DATE & TIME OF DEATH	
DATE & TIME OF POST MORTEM	
PLACE OF POST MORTEM	
POST MORTEM EXAMINATION	
PARTICULARS	**NECROPSY FINDINGS**
GROSS EXAMINATION	
RIGOR MORTIS (ABSENT / POOR / FAIR / GOOD)	
CONDITION OF CARCASS (DESCRIBE IN DETAIL)	
EYES	
NATURAL ORIFICES	
DETAILED EXAMINATION	
HEAD	
Condition of cranium	

Meninges	
Right Cerebrum	
Left Cerebrum	
Cerebellum	
Hypothalamus	
Ears	
Nasal Cavity (including nasal & frontal sinuses)	
Mouth (including tongue, teeth, upper & lower palette, epiglottis, etc.)	
NECK	
Atlas, Axis & Cervical Vertebrae	
Cervical Musculature & Ligamentum Nuchae	
Thyroid	
Trachea & Esophagus	
THORAX	
Thoracic Cavity	
Diaphragm	
Thoracic Vertebrae, Ribs & Sternum (Keel Bone in Poultry)	
Trachea & Esophagus	
Bronchi	
Lung Parenchyma	
Pleural Cavity	
Heart	
Pulmonary Artery & Vein	
Thoracic Part of the Superior & Inferior Venacava	
ABDOMEN	
Abdominal Cavity	
Stomach (Cardia, Fundus, Corpus & Pylorus)	
Duodenum	
Jejunum	
Large Intestine	
Anus	
Pancreas	
Spleen	
Liver	
Kidney (Left & Right)	
Urinary Bladder, Ureters & Urethra	
PELVIC CAVITY	
Condition of Pelvic Skeleton (Pubis, Ishchium, illium & sacrum)	
Female - Uterus, Cervix, Vestibule & Labia	
Male – Prostrate Gland	

LOCOMOTOR SYSTEM	
Condition of Forelegs	
Condition of Hind Limbs	
Condition of Spinal Chord BOOK VALUE VALUE OF THE ANIMAL AT THE TIME OF DEATH	

 # Systems which are not applicable to the species in question may be filled as NA
 # Systems showing no abnormalities may be filled in as NAD (No abnormality detected)

CAUSE OF DEATH:

SIGNATURE:
DATE: NAME:
PLACE: DESIGNATION:
REGISTRATION NO:
SEAL:

FAO contact details

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