GOVERNMENT OF KERALA

PROTOCOL

FOR

PREVENTION AND CONTROL

OF

EPIDEMIC DISEASES

Prepared by

DEPARTMENT OF ANIMAL HUSBANDRY
KERALA

PROTOCOL FOR PREVENTION AND CONTROL OF EPIDEMIC DISEASES

DEPARTMENT OF ANIMAL HUSBANDRY, KERALA

Unexpected outbreaks of animal disease epidemics or other animal health-related diseases have the potential to cause serious socio-economic consequences eventually leading to public panic. These emergencies are frequently caused by outbreaks of transboundary animal diseases (TADs), which are of significant economic, trade and/or food security importance. Such diseases can spread easily and reach epidemic proportions so that control/management, including exclusion, requires cooperation among several countries.

The occurrence of one of these animal disease epidemics may have disastrous consequences as they:

- compromise food security through serious loss of animal protein
- 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.
- add significantly to the cost of livestock production since costly disease control measures need to be applied;
- seriously cause major losses in national export income.
- inhibit sustained investment in livestock production.
- cause public health consequences where diseases can be transmitted to humans (i.e. zoonoses);
- cause environmental consequences when wildlife populations die out; and
- cause unnecessary pain and suffering to many animals.

A diseased condition may be said to exist when the normal body condition is disrupted by internal or external (disease causing) influences. According to the etiological agents and mode of transmission, diseases of animals are broadly classified into two namely Contagious and Infectious diseases. **Contagious diseases** are caused by microorganisms which spreads rapidly and transferred rapidly from one animal to another by direct or indirect contact. E.g.: -Foot & Mouth Disease in cattle. **Infectious Diseases** are also caused by microorganisms like bacteria, virus etc but are non-spreading, limiting to individual animals. Eg: - Tetanus, Black Quarter in cattle. All contagious diseases are

infectious all but infectious diseases are not contagious. Eg: -Anthrax, FMD, Brucellosis etc are infectious and contagious. Tetanus is infectious but not contagious.

Mostly these diseases are spread by contact with infected animals and also by insect agents (vectors) and later may be ectoparasites like Ticks and biting flies. The method of transmission from one animal to another may be through ingestion (swallowing), inhalation (breathing), or direct contact by animal agents (bite/abraded skin). Besides the above, mechanical transmission through utensils, fomites, air etc can also occur. The contamination can also happen by milkers, if they happen to nurse the infected animals.

Strict aseptic precautions are necessary to check the spread of the contagious diseases. Isolation of the affected animals is also necessary to limit the spread. Most of the viral diseases and some bacterial diseases of cattle fall under the above category. Eg: -FMD, Anthrax etc. These diseases are sometimes fatal and treatment of affected animals is almost futile and expensive. Some of the diseases run an acute course (sudden onset & short duration) and usually there would not be any time for treatment. These diseases are of significant economic importance, as recovered animals are poor producers and not fit for future maintenance.

Infectious Diseases are mainly bacterial diseases like Anthrax, Black-Quarter, Tetanus, Haemorrhagic septicaemia, Haemoprotozoan diseases like Babesiosis, Trypanosomiasis, fungal diseases like Aspergillosis. It is transmitted from one animal to another by ingestion (food), inhalation or through bites of flies and acarids (mites). Even some bacterial diseases are mechanically transmitted through flies. Other parasitic diseases are transmitted by ingestion of larvae (contamination of pasture) or through the agency of inter mediate hosts (snails in Fascioliasis-liver fluke infection). Developmental cycles are seen in the inter-mediate hosts. Hence life cycle can be disrupted by destroying intermediate hosts & there by the disease can be controlled. Most of the infectious diseases can be controlled by preventive vaccination except parasitic diseases. Highly potent and effective vaccines are available. Epidemics can be controlled by the use of curative serum treatment and preventive vaccinations. Chemotherapeutic agents and antibiotics can also be used to cure the disease at the onset.

A **zoonotic disease** is one, which naturally transmitted between vertebrate animal and man. Domestication has increased the incidence of zoonotic diseases because of close contact made between animals and man. Eg:-Rabies (Hydrophobia in man), Leptospirosis etc .

Prophylactic Vaccines are available for almost all bacterial diseases. Viral vaccines also confer immunity to affected animals .But occurrences of viruses in different types, strain variation, short period immunity for vaccines etc in disease like FMD poses difficulty in the control measures. In such cases polyvalent vaccines need to be used incorporating the most prevalent strains with frequent vaccination schedules.

Timely prophylactic measures like annual vaccination in endemic areas, isolation of affected animals, strict control over movement of animals by establishing check posts, timely diagnosis and treatment of affected animals, creation of public awareness through study classes, leaflets, posters etc will go a long way in preventing the incidences of infectious and contagious diseases.

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.

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 involves disease surveillance, reporting and epidemiological analysis that would lead to improved awareness and knowledge of the distribution and behavior of 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. In order to achieve this control, a State emergency disease contingency plans need to be developed and established, tested and refined.

ANIMAL DISEASE CONTROL PROGRAMME

A disease control program (DCP) is the combined system of monitoring and surveillance, disease control strategies, and intervention strategies that over a prolonged period of time is employed to reduce the frequency of a specific disease . In Kerala, Department of Animal Husbandry has a seperate wing, the Animal Disease Control Programme (ADCP) for the disease control,prevention ,monitoring & surveillance and epidemiological analysis.

A general outline of the protocol for Disease Control and Outbreak management is given below under the title "Foot and Mouth Disease". The same protocol can be used as a general guideline for controll of all Infectious and contageous diseases.

The Disease control protocol should be followed strictly ,in the event of an oubreak.

MAJOR DISEASES AND CONTROL MEASURES

1. FOOT AND MOUTH DISEASE (Mal: Kulamburogam)

Foot and Mouth Disease (FMD) is a highly contagious viral disease of all cloven - footed animals caused by an RNA virus of family *Picorna viridae*, genus *Aphthovirus.* The seven immunologically distinct serotypes of FMD virus identified so far are; O, A, C, Asia 1, SAT1, SAT2 and SAT3 which do not confer cross immunity. Numerous variants and sub types exist within each serotype. FMD is a significant economic disease due to its ability to spread rapidly and its profound effects on productivity. The disease affects all cloven footed animals including cattle, buffalo, sheep, goats and pigs and wild animals like deer, bison, antelope, wild pigs, elephant, giraffe and camels are susceptible.

Mode of transmission

The virus is present in great quantity in the secretions and excretions of the infected animal. Breath, saliva, milk, dung, urine and semen are the main sources of virus

- Inhalation of infectious aerosols
- Ingestion of virus contaminated food materials or milk
- Direct contact with contaminated fomites.
- Airborne transmission.

Incubation Period : 2- 14 days

Clinical Signs :

Pyrexia, anorexia, drooling of saliva, smacking of lips, grinding of teeth, lameness caused by vesicles on buccal and nasal mucosa, between claws and coronary band & teat. Complications include tongue erosions, ulcerations, hoof deformation, mastitis, abortion, permanent impairment of milk production, heat tolerance, and secondary infections. Symptoms and lesions are often mild in goats.

Morbidity and Mortality

Morbidity is usually 100%. Mortality is low in adult animals (1-5%) but may be higher with very virulent virus and secondary bacterial complications. Mortality is higher in young animals due to myocarditis.

Public Health Importance

FMD is not considered a public health threat.

Diagnosis

Clinical Symptoms are suggestive and should be differentiated from other vesicular diseases by laboratory confirmation.

Laboratory Diagnosis

Samples

Collect samples in the initial stage of infection, before applying any medical treatment on the lesions.

- Vesicular epithelium (min 1gm) preferably from mouth.
  It should be preserved in 50% glycerol phosphate buffer of pH 7.2-7.4 and should be transported under cold chain.
- Vesicular fluid (aspirated) from ruptured vesicles
- Paired Sera (acute & convalescent)
  Vesicular fluid and serum should be transported without preservative and strictly on ice.

Post Mortem Samples

- Vesicular epithelium as above
- Heart blood for culture on ice, Blood smears, Impression smears and Tissues in 10% formalin for histopathology to rule out other infections.

Laboratory Tests

- To detect presence of virus (Antigen) : ELISA & PCR
- To detect presence and/rise in antibodies : NSP ELISA & LPB ELISA

Test facility in Kerala

- State Institute for Animal Diseases, Palode.

PROTOCOL FOR PREVENTION & CONTROL OF FMD

1. **Preventive Vaccination**

   Primary vaccination : 3-4 months

Booster : After 1 month
Repeat every 4- 6 months
Dose & Route : 2ml, deep i/m neck region

- All animals in an area are to be vaccinated at the same time within a short duration.
- A deworming prior to vaccination is desirable

2. **Quarantine**: All newly purchased/incoming animals should be kept under quarantine for 3 weeks & vaccinated.
3. **Vigilance**: Early detection of the disease is vital for limiting the spread. Periodic public education/awareness programs will create awareness about the devastating effects of the disease.

PROTOCOL FOR OUTBREAK MANGEMENT

1.Local Veterinary Institutions

1. **Reporting** : Immediately reporting of an outbreak/suspected cases (SADEC/ADCP, SIAD & DAHO).

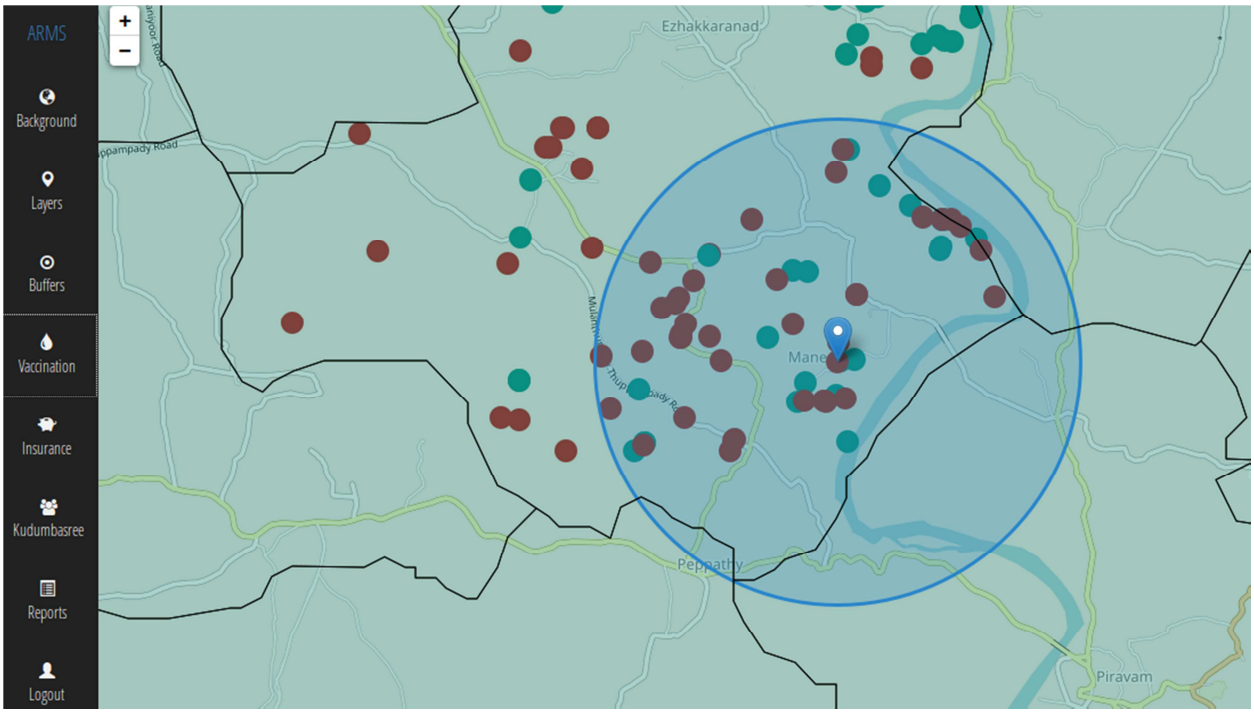
2. **Immediate Service** at the site/household/farm (Infected Premises)
   - Isolation of the animal/animals and prevent from straying
   - Collection of samples & forwarding for laboratory confirmation
   - Treatment of the affected as per standard protocol
   - Impose movement restriction at the site : animal, person, equipment, materials (feed, fodder & slurry) & vehicles
   - Improve zoo sanitary measures
   - Showering, change of clothings & foot ware of persons onto/off the site.
   - Cleaning & Disinfection of vehicle & equipments moving onto/off
   - Disinfection of shed & premises :4% NaCo3 (washing soda), 2% NaOH, 3% Sodium hypochlorite, Bleaching powder, 4-5% acetic acid (vinigor), Vircon (1%)
   - Burning of contaminated garbage, beddings, & other fomites.
   - Potentially infected animal products of the infected premises should be disposed at the site/treated to kill the virus.
   - Deep burial/burning of carcass in case of death
3. **Alert** : about the suspected outbreak among LSG members of the area, other live stock owners in the area, milkers, slaughter house people and milk society.
4. Movement of the milker in the area should strictly monitored.

5. Intimate/communicate other veterinary officers in the nearby institutions/panchayat.
6. **Impose ban** for rally, fair, cattle market & exhibitions in the area
7. **Animal movement restriction in the area** : No new purchase/selling until the outbreak is controlled
8. **Initiate containment vaccination** Initiate containment vaccination (5km zone) / border area (if the place is bordering other state/forest) Use Bhoomika ***http://gis.iiitmk.ac.in/ahd/*** to identify infected zone and vaccination zone .
9. If pigs are present in the contact premises, all measures should be taken not to spread the disease to them. In unavoidable cases, euthanasia of pigs in the infected/contact premises may be employed.
10. Common water bodies/grazing place may be temporally closed with warning signs/intimation
11. Constitute a monitoring/crisis management team at the local level. A member LSG can also be included depending on the situation.
12. Separate team for treatment & control activities is ideal

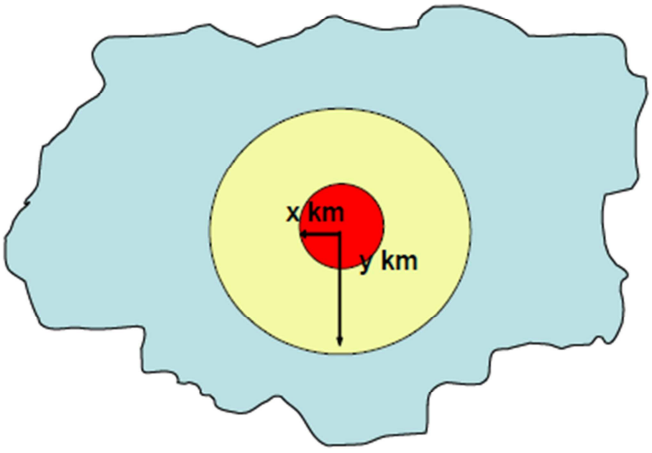
2. District Level

- The District Animal Husbandry Officer Should immediately convene a meeting of the officers like District coordinator, Epidemiologists, Laboratory officer,Thaluk coordinator and officers of affected are for outbreak management formulate a contingency plan and instruct the strategy for disease control.

- The District coordinator,Epidemiologist, and Laboratory officer should immediately visit the affected area ,assess the outbreak, collect samples from the affected animals and send for diagnosis.
- Immediately deploy a team specifically for treatment of the affected animals. The local veterinarian or para veterinary staff should not handle the affected animals.
- Deploy seperate teams for containment vaccination.Use Bhoomika ***http://gis.iiitmk.ac.in/ahd/*** to identify infected zone and vaccination zone .All the Panchayaths and Veterinary Institutions in such Panchayaths should be identified and intimated about the outbreak.



Pictorial identification of infected and vaccination zone using Bhoomika web portal of Department of Animal Husbandry,Kerala



Ref OIE – Guidelines for animal disease control – May 2014

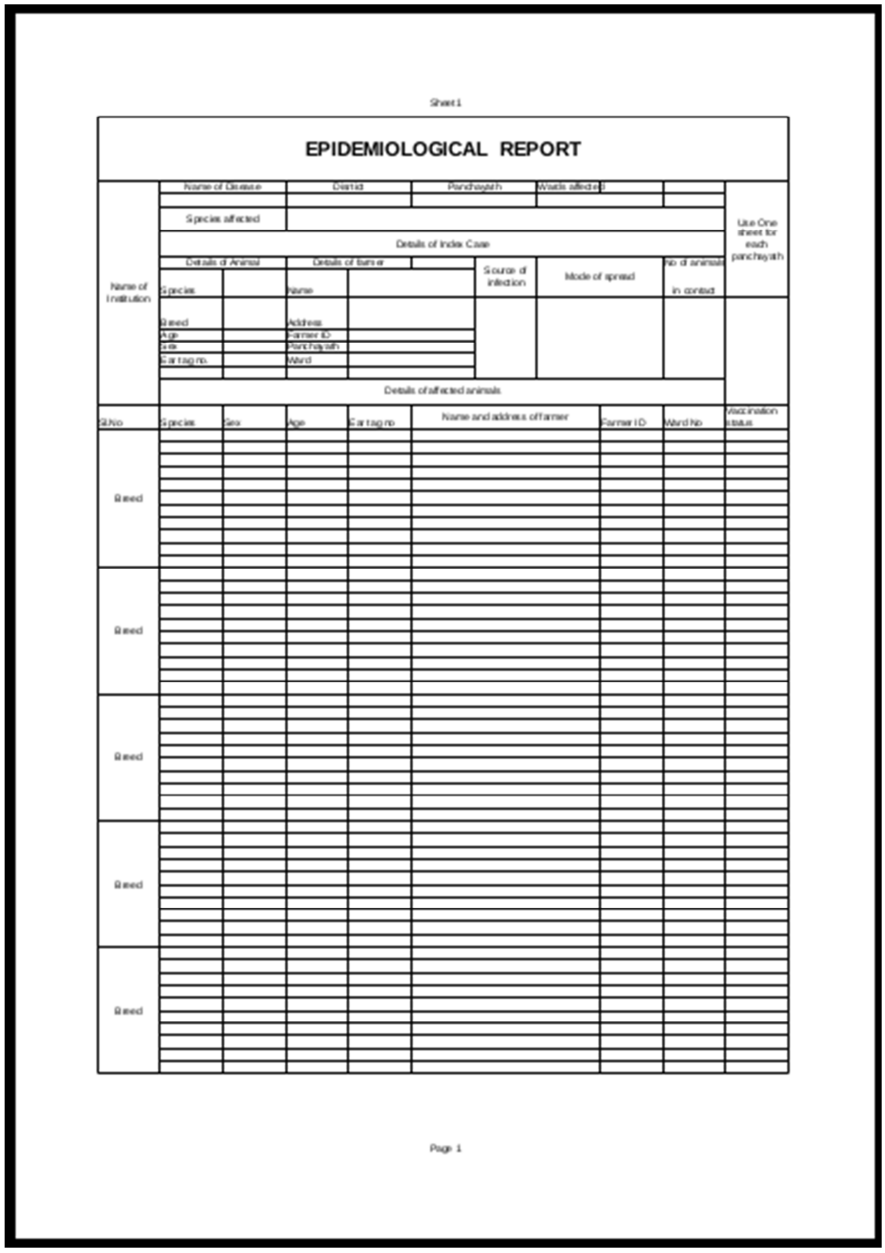
Containment vaccination in the affected area should be completed within the shortest possible time frame. District coordinator should monitor the progress of containment vaccination.

- Epidemiological investigation of the outbreak should be conducted by the District Epidemiologist and should send a report to the State Epidemiologist.

- Outbreak managenet and disease control activities should be closely monitored by the District management team.
- Necessary orders in this regard should be issued by the District Animal Husbandry Officer.
- Any lapse in Disease control measures from the part of Panchayath level institutions should be immediately reported to the District Animal Husbandry Officer.
- Necessary orders for ban on animal movemet should be requested if necessary, after reporting the matter to the District Collector.
- District Panchayath Authority , and elected representatives such as MLA,MP should be intimated of the outbreak and measures taken for Disease Control.
- **Initiate action as per livestock disease act 2009 sector 7(2) schedule to those who do not comply or cooperate with the control operations &restrictions.**
- **Lifting of ban** : Above restrictions can be slowly lifted once the situation is under control & no new case is reported in the last 15days.
- Purchase and distribution of necessary medicines ,antiseptics and other accessories should be immediately undertaken by the District coordinator.

EPIEMIOOGICAL INVESTIGATION

Proforma for Epidemiological Analysis



Sheet1

EPIDEMIOLOGICAL REPORT

Name of Institution	Name of Disease		District		Panchayath		Wards affected		Use One sheet for each panchayath
	Species affected								
	Details of Index Case								
	Details of Animal		Details of farmer			Source of infection	Mode of spread	No of animals in contact	
	Species		Name						
	Breed		Address						
	Age		Farmer ID						
	Sex		Panchayath						
	Ear tag no.		Ward						
	Details of affected animals								

Sl.No	Species	Sex	Age	Ear tag no	Name and address of farmer	Farmer ID	Ward No	Vaccination status
Breed								
Breed								
Breed								
Breed								
Breed								

Page 1

The Disrict Epidemiologist should conduct a detailed investigation about the outbreak and prepare a report in the above proforma. The report also should contain the following details.

1. Location and contact information

i) Name and address of owner/occupier of the animal owner and/or the sampled premises and the geolocation (latitude and longitude, if available) where disease occurred, with appropriate contact information (telephone and fax numbers, e-mail address).
ii) Name, postal and e-mail address, telephone and fax numbers of the sender.

2. Case information

i) Disease agents suspected and tests requested.
ii) Species, breed, sex, age and identity of the animals sampled, and trackability number when available.
iii) Date samples were collected and submitted.
iv) List and type of samples submitted with transport media used.
v) Case history:
a) The clinical signs and their duration including the temperature of sick animals, condition of mouth, eyes and feet, and milk or egg production data as relevant.
b) A list and description of the animals examined and the findings of the ante- and post-mortem examinations.
c) The length of time sick animals have been on the premise; if they are recent arrivals, from where did they originate.
d) The date of the first cases and of subsequent cases or losses, with, for tracking, any appropriate previous submission reference numbers.

3.Epidemiological information

i) A description of the spread of infection in the herd or flock.
ii) The number of animals on the premise by species, the number of animals dead, the number showing clinical signs, and their age, sex and breed.
iii) The type and standard of husbandry, including biosecurity measures and other relevant factors potentially associated with the occurrence of cases.
iv) History of foreign travel by owner or of introduction of animals from other countries or regions.
v) Any medication given to the animals, and when given.
vi) Vaccination history describing the type of vaccines used and dates of application.
vii) Other observations about the disease, husbandry practices and other disease conditions present.

Convalescent Period :

Recovery in uncomplicated cases is usually about 2 weeks. Convalescent animals should be provided all nutritional & medical supportive measures to improve health & productivity. They should be closely monitored regarding production, reproductive efficiency & health status. If found unfit for economical rearing, culling may be recommended.

Screening :

A small proportion of recovered animals can act as carriers for a short period (not more than 6 months). Testing of OP (Oro pharyngeal fluid) can identify the carriers.

3. PESTE DES PETITS RUMINANTS (PPR)

Peste des Petits Ruminants (PPR) is an acute, highly contagious viral disease of small ruminants caused by a virus belonging to family *Paramyxoviridae*, genus *Morbillivirus* and is antigenically similar to Rinderpest virus. Goats and Sheep are the only susceptible groups. Wild small ruminants like deer are occasionally affected. Cattle & Pigs in endemic areas may develop inapparent infections, but their role in circulation of virus & transmission of disease has not been established.

Mode of transmission

Virus is abundant in the lacrimal & nasal discharge, saliva and all secretions & excretions of incubating & sick animals. Transmission occurs through aerosols or direct contact between animals living in close contact, ingestion and through contaminated fomites. No carrier state, but animals in incubation period can transmit disease.

Incubation Period : 4-6 days, but may range from 3-10days

Clinical Signs

- Onset is sudden with pyrexia which may last for 3-5days. Animal become anorectic and depressed.
- Cattarhal conjunctivitis : congestion of conjunctiva with profuse discharge & crusting
- Broncho pneumonia evidenced by cough , signs of respiratory distress & serous occulo nasal discharge later becomes muco purulent.

- Stomatitis : Gum becomes hyperaemic and erosive lesions develop with excessive salivation
- Diarrhoea : severe watery diarrhea is common in later stages

Morbidity & Mortality

Morbidity can be upto 100% with very high fatality rate in severe outbreak. Death rate is higher in young ones. However, morbidity & mortality may be lower in mild outbreak.

Public Health Importance

Not a zoonotic disease and no report of human infection with PPRV.

Diagnosis

1. **Clinical signs are suggestive** : Pneumonia, Diarrhoea & Stomatitis in small ruminants are sufficient for presumptive diagnosis.

2. **Differential Diagnosis** : CCPP, Pneumonic Pasteurellosis, FMD, Blue tongue & Coccidiosis

3. Laboratory diagnosis

Samples

Ailing animals :

- ✓ Swabs of conjunctival, ocular, nasal & oral discharges
- ✓ Blood in EDTA
- ✓ Convalescent sera

Necropsy samples :

- ✓ Mesenteric & bronchial lymph nodes, spleen, lungs for PPR antigen detection
- ✓ Impression smears & blood smears to rule out other bacterial infections
- ✓ Tissues (lungs, LN, Intestine) in 10% formalin

Laboratory tests

- Antigen detection : ELISA & PCR
- Antibody detection : ELISA

Testing facility under AHD in Kerala:

1.Chief Disease Investigation Office, Pacha P.O., Palode., Thiruvananthapuram-695 562

2. Regional Disease Diagnostic Laboratory (RP lab), Veterinary Campus, Palakkad

PROTOCOL FOR PREVENTION & CONTROL

Adopting regular vaccination campaigns and enforcing strict quarantine & vaccination of new comers can very effectively prevent PPR in a region as vaccine gives strong immunity.

1. **Preventive Vaccination**
   Primary vaccination – 3 months
   Revaccination - Every 3 years
   Dose & Route - 1ml, s/c
2. **Quarantine** : Outbreak in previously free area is usually by the introduction of an infected/animal under incubation. Strict quarantine for 21 days and vaccination during quarantine is recommended

OUTBREAK MANAGEMENT PROTOCOL

1. Reporting : SADEC/ADCP, CDIO & DAHO
2. Infected zone/farm
   - Isolation of affected animals
   - Supportive therapy of affected
   - Burning & Burying of carcasses, infected materials
   - Strict animal movement control & quarantine at the site
   - Improved hygiene & sanitation
   - Cleaning & Disinfection of premises & equipments : Same disinfectants as recommended for FMD can be employed
3. Outbreak alert : LSG, Small ruminant holders & slaughter houses
4. Containment vaccination of susceptible population in the region
5. Temporary ban on purchasing susceptible animals

Convalescent Period : Recovered animals demonstrate lifelong immunity and there is no carrier state.

4. CLASSICAL SWINE FEVER (Hog Cholera)

Classical Swine Fever (CSF) or Hog Cholera is a highly contagious and economically significant viral disease of pigs caused by an RNA virus of family *Flaviviridae*, genus *Pestivirus*. There is only one serotype which has ten subtypes and many strains. Domestic and wild (feral) swine are the only affected species.

Mode of transmission

- Source of virus : all secretions & excretions, blood, tissues, semen
- Ingestion : Pig can acquire infection after eating virus contaminated food. This most commonly occurs by feeding of uncooked or under cooked garbage or meat products.

- Direct contact with infected animals
- Contaminated fomites (premises, implements, vehicles, clothing, boots etc.)
- Airborne transmission over short distance in close confinement
- Transplacental infection: may create inapparant carrier piglets
- Vectors : Flies & Pests may carry infection to other areas
- Carrier pigs : pigs infected prenatally may intermittently shed the virus for longer periods (6-12 months)

Incubation Period : 2-14 days generally, but may be considerably longer.

Clinical Signs

Disease is manifested in acute, sub acute & chronic form. High fever, huddling, anorexia, conjunctivitis, constipation followed by diarrhea, hyperaemia/purplish discolouration of skin (ear, abdomen, inner thighs), neurological signs (ataxia, paresis, incordination, convulsions) are the general signs. Abortion, still birth, fetal mummification & weak piglets are other complications

Morbidity & Mortality

Varies depending on the strain of virus isolate, age of pig & immune status of herd. May reach up to 100%.

Public Health Importance

CSF does not affect humans. Virus is rapidly inactivated by cooking. But survives months in refrigerated meat.

Diagnosis

1. **Clinical Diagnosis** : suggestive clinical signs with post mortem lesions (button ulcers (necrotizing colitis), petichae in kidneys (turkey egg appearance), enlarged & hemorrhagic lymph nodes, infarction of spleen). Differential diagnosis is essential from other septicemic diseases like Pasteurellosis, Salmonellosis etc.

2. **Laboratory Diagnosis**

   Samples

   Ante mortem samples : Blood in EDTA/Heparin, Paired Serum sample.

   Post mortem samples :

   1)Lymph nodes (mesenteric), spleen, kidney, tonsil & pancreas for CSF confirmation

   2) Blood, Blood smears & Tissue (lungs, spleen, liver) impression smears to rule out other infections

   Preservation & Despatch : All samples strictly on cold chain

3. **Laboratory tests**

- Antigen detection : ELISA & PCR
- Antibody detection & monitoring : ELISA

4. **Testing facility under AHD** : Chief Disease Investigation Office, Pacha P.O., Palode., Thiruvananthapuram-695 562; Regional Disease Diagnostic Laboratory (RP lab), Veterinary Campus, Palakkad.

PROTOCOL FOR PREVENTION & CONTROL

1. **Preventive Vaccination**
   Do not vaccinate pregnant animals
2. **Quarantine :** Newly arriving pigs should be isolated for atleast 30 days before being introduced to the rest of herd
3. **Strict Biosecurity Measures in Pig farms**
   - Minimize visitors
   - Change of clothings & boots while entering/leaving sheds
   - Provision foot dips at entrance
   - Disinfection of vehicles while entering/leaving the farm
   - Pest/fly control measures
   - ***Do not feed uncooked/under cooked garbage/meat products/waste food to pigs as food scraps are the main culprits in CSF transmission***
   - Improved sanitation & hygiene

<u>OUTBREAK MANAGEMENT PROTOCOL</u>

1. Reporting : SADEC/ADCP, CDIO & DAHO
2. Isolate Infected farms
   - Isolate the affected animals : Treatment not effective.
   - Slaughter & burial/burning of affected depending on the severity of outbreak
   - Ban on the movement of pigs/sale from the farm
   - Stop breeding in breeding farms
   - Strict movement restriction : animals, visitors
   - Burning/burial of dead animals, beddings, contaminated feed & other waste
   - Disinfection & cleaning : premises, shed, vehicles & equipments : (1% formalin, 1% hypochlorite, 2% sodium hydroxide, 4% sodium carbonate)
   - Improve bio security measures
   - Restocking after complete depopulation, disinfection & gap of min 1 month
3. Detailed epidemiological investigation with tracing of possible sources (up stream) and possible spread (down stream) of infection with District Epidemiologists
4. Alert & Awareness to other pig farmers, authorities of rendering plants/slaughter houses

5. Containment Vaccination of susceptible population in the surrounding area

Convalescent Period : Recovery produce good immunity. However a good proportion of piglets born to infected sows may act as carriers and shed virus for long time. Hence should not be sold for rearing.

Monitoring & Screening : It is difficult to identify prenatally infected piglets as they do not develop good antibody response.

5. RABIES (Hydrophobia)

Rabies is an acute, fatal, viral encephalitis of carnivors, transmissible to all mammals caused by an RNA virus of family *Rhabdoviridae* and genus *Lyssavirus*. Seven distinct types are known within the genus of which classical rabies virus belong to Type 1. It is a disease of mammals in nature; however, all warm blooded animals are susceptible. A wide variety of wild fauna like fox, jackal, wolf, mongoose etc act as reservoirs.

Mode of transmission

Source of virus: Saliva of the infected animal is the main source of virus, even though all secretions & excretions may have virus

- ***Mostly by the bite of infected animals***
- Contamination of wounds, cuts, lacerations etc by virus laded saliva : Licking by infected animals
- Through intact mucous membrane (conjunctiva, oral mucosa) : splashing on eyes, drinking of unboiled milk
- Blood is not infective

Incubation Period

Highly variable depending on the species, site of bite and many other factors. 10days – 3 months generally, but may be shorter or longer. Animals in the end stage of incubation period (3-4 days before the onset of symptoms) excrete virus in the saliva & is infective.

Clinical Signs: Highly variable

Both furious form (mad dog) and dumb (paralytic) form exists. Usually change in behavior is the first sign. Change in tone, restlessness, anorexia or deprived appetite, tendency for biting, dropping of lower jaw, inability to swallow, signs of throat obstruction, salivation eating/chewing of inanimate objects, wandering, violent behavior, paralysis followed by death are the general clinical profile.

Morbidity & Mortality

Morbidity varies. Rabies is an invariably fatal disease in animals.

Public Health Importance

It is disease transmissible to man by the bite of infected animal. Caring & petting of infected animals, drinking of unboiled milk, slaughtering of infected animals etc. also pose risk to man

Diagnosis

1. **Clinical diagnosis is challenging**. History of bite with suggestive signs should arise suspicion.
2. **Laboratory Diagnosis**

   Brain is the most ideal sample for laboratory diagnosis and testing of brain of naturally died animal is essential to rule out rabies with certainty. It is risky sampling brain under field conditions by untrained and non immunized persons.

   Samples

   Small animals : Whole carcass

   Large animals : Head

   Other samples (corneal smears, saliva, milk etc) : Only positive results are diagnostic. Hence not recommended for general purpose

   Laboratory tests : No single test is 100% reliable.

   Antigen detection : by Fluorescent Antibody Test, Lateral flow test, Negribody detection, Immunohistochemistry, Molecular tests are employed in combination/alone in different laboratories

Laboratory facility under AHD :

1. Chief Disease Investigation Office, Palode., Thiruvananthapuram
2. Rabies Diagnostic Laboratory, District Veterinary Centre, Kollam
3. Regional Disease Diagnostic Laboratory (ADDL), Manjadi, Thiruvalla
4. Regional Disease Diagnostic Laboratory, Kannur

<u>PROTOCOL FOR PREVENTION & CONTROL</u>

1. Prophylactic Vaccination

   Primary vaccination (Canines & Felines) – 2-3 months

   Booster - After 1 month

   Repeat - Every year

   Livestock – Optional, being an endemic country
2. Minimum two vaccination campaigns in a year

3. Sero monitoring of random samples from vaccinated dogs
4. Dog registration & licensing
5. Initiate stray dog management by ABC
6. Educate public & school children : Awareness program

PROTOCOL FOR POST EXPOSURE MANAGEMENT

Post exposure treatment regimen :

- Rabies vaccine : 1ml (s/c or i/m) on 0, 3, 7, 14, 28 & 90
- Wound management : washing & application of antiseptic
- Tetanus toxoid

1. **Bite from proven rabid dog/srtay dog**
   - Non immunized dog :
   - ✓ Euthenasia, if owner willing
   - ✓ If owner not willing, post exposure treatment and complete isolation for 6 months
   - Routinely immunized dog
   - ✓ Post exposure treatment and complete isolation/observation for 6 months
   - Livestock
   - ✓ Post exposure treatment and observation for 6 months
2. **Bite from other immunized dogs/pet dogs (available for observation)**
   - ✓ Post exposure treatment
   - ✓ Observe bitten dog for a minimum of 10 days

Remarks : *Post exposure treatment is not 100% successful even in immunized dogs. In large animals, efficacy is still lower. Hence owner must be made aware before initiating Post exposure treatment*

PROTOCOL FOR MANAGEMENT OF ANIMALS WITH RABIES SUGGESTIVE SYMPTOMS

- Reporting : SADEC/SIAD/DAHO
- Complete isolation & allow natural death
- Send carcass for laboratory confirmation
- Euthanasia, if circumstances necessitates.
- Advice & Counseling of all exposed with immediate direction for seeking medical treatment

6. ANTHRAX (Mal : Adappan) (Wool Sorter's disease, Splenic fever, Charbon)

It is an acute, febrile, infectious and contagious disease characterised by sudden death and exudation of dark red, tarry blood from the natural openings of the body. It is wide spread throughout the globe. Causative agent is ***Bacillus anthracis*****,** a rod shaped bacilli . The bacilli are non-motile, very large rod- shaped and capsulated, gram positive and spore bearing. Spores are formed while the organism are exposed to the air i.e. the spores are formed when the organisms came out of the body. The spores thus formed remain viable in the soil for as long as 10-12 years. Spores could be killed with great difficulty by the strongest disinfectants.

Never open a carcass for investigative purposes, if it is doubted that the death was due to Anthrax. The organisms are free to escape to the soil and be there in a sporulated form for years together and to re infect the cattle in favorable conditions. The disease affects all species of animals. Mortality can be very high, especially in herbivores.

The mode of infection in cattle is by

- Ingestion of contaminated feeds, water and by grazing on infected pastures.
- Through wound infection (rare)
- Inhalation of spores
- Vectors like biting flies

Incubation period is 1 to 14 days (usually 2-3 days)

Symptoms

Usually symptoms are not observed because the disease runs a **peracute** course (death within 1-2 hours). High fever at the onset (105 ^{o}f -107^{o}f), dullness and depression, off feed, congested mucous membrane convulsion and death. The carcass will be highly distended and bloated up. Tarry blood will be seen escaping from mouth, anus and other natural openings. The blood is unclotted and dark. There is great enlargement of spleen (splenomegaly). In **acute** form the disease may run for 2-3 days and the animal shows high fever (105 ^{o}f -107^{o}f), drooping of the ears and congestion of mucus membrane, off feed, cessation of milk secretion ,depression ,convulsion and death. Mortality rate is 90-95%. Occasionally cutanious form of Anthrax (diffuse, painless swelling at neck/lower part of chest or as carbuncle in man) may also occur when cattle infected through skin

Public Health Importance

More than 95% of human anthrax cases take the cutanious form and result from handling infected carcasses or hides, hair, meat or bones from such carcasses. Bacillus anthracis is not invasive and requires a lesion to infect.

- Protection for veterinarians and other animal handlers involves wearing gloves, and other protective clothing when handling specimens from suspected anthrax carcasses and never rubbing the face or eyes.

- The risk of gastrointestinal anthrax may arise if individuals eat meat from animals infected with anthrax
- The risk of inhaling infectious doses becomes significant in occupations involving the processing of animal byproducts for manufacturing goods (industrial anthrax).

Diagnosis

Presumptive diagnosis can be made from the clinical signs itself.

Sample collection: DO NOT OPEN THE CARCASS IF ANTHRAX IS SUSPECTED.

- Collect blood smears from peripheral circulation, preferably from ear tip.
- Piece of ear tip for Ascoli's test preserved in ice

Laboratory Tests

- Demonstration of encapsulated *B. anthracis* in smears of blood
- Cultural isolation and identification of the organism on blood agar plates
- Molecular diagnosis
- Animal inoculation

Testing facility under AHD in Kerala:

- All Regional Disease Diagnostic Laboratories and Clinical Labs of 14 DVCs.

Treatment

Refer to the nearest Veterinary Surgeon

<u>PROTOCOL FOR PREVENTION AND CONTROL OF ANTHRAX</u>

Vaccination is recommended only in identified endemic areas

1. Preventive Vaccination
   - ⦿ Vaccine - Anthrax spore Vaccine from IAH & VB, Palode
   - ⦿ Primary vaccination – At 6 months
   - ⦿ Booster - After 6 months
   - ⦿ Revaccination - Annual in endemic areas preferably in May
   - ⦿ Dose & Route - 1ml s/c at neck region
2. Quarantine
   - ⦿ Strict quarantine of newly introduced animals for 15 days and observation is recommended

OUTBREAK MANAGEMENT

1. **Reporting:** SADEC/ADCP, CDIO & DAHO
2. **Management of Infected Premise**
    - Isolation of incontact / suspected animals
    - Collection of samples for laboratory confirmation.
    - Strict animal movement control
    - Proper disposal of carcass –
        - ✓ Never open anthrax suspected carcass.
        - ✓ Plug all natural orifices with cotton dipped in disinfectants.
        - ✓ Deep burial of the carcass in a pit of 6 feet depth by lining and covering with lime or burn it with diesel/kerosene
        - ✓ Burn all beddings, straw, excreta & other contaminated materials.
        - ✓ Clean and disinfect all the utensils used
    - Disinfect the shed and premises with 10% formalin/ 5% Lysol/ 5% sodium hydroxide.
3. **Outbreak alert**: Alert Veterinarians in nearby institutions/Panchayaths, LSG members, other livestock owners, milkers, milk society and slaughter houses in the area.
4. Restrict animal movement in the locality.
5. Place temporary ban on new purchase/selling.
6. Carry out containment ring vaccination in a 5km zone in the region
7. Carry out detailed epidemiological investigation to identify the source of infection/index case.
8. **Lifting of ban**: Above restrictions can be slowly lifted if no new case is reported in the last 15days.

7. HAEMORRHAGIC SEPTICAEMIA(Mal: Kuraladappan) (Pasteurellosis; shipping fever)

It is an acute/ sub acute, infectious and contagious disease affecting cattle, buffaloes, sheep, goats and pigs characterised by high fever, difficulty in breathing, discharge from nostrils and swellings of the throat and dewlap. Since there is haemorrhages in the internal organs and septicaemia, the disease is called Haemorrhagic Septicaemia. The causative organism is ***Pasteurella multocida***. Sometimes another species of pasteurella viz Pasteurella septica also is responsible for the disease. The disease is seen as seasonal

outbreaks after the onset of rain. Buffaloes are more affected. Factors, which lower the body resistance, like change in climate, under nutrition etc predispose the infection.
P.multocida is an organism, which is usually seen in the throat of healthy animals. It is also assumed that such normal inhabitants of the respiratory tract become virulent when the general resistance of the animal is lowered due to external causes like transportation, climatic change, viral diseases like FMD etc. Hence the name Shipping Fever.

Route of infection:

- By ingestion
- By inhalation

Incubation period 2—5 days

Symptoms

High fever, difficulty in breathing, discharge from nostrils, in appetence, salivation and sudden death are seen in acute cases. In clinical cases the animal shows pyrexia (105 ^{o}F—108^{o}F), dullness, dropped head, hot painful swelling of the throat, neck and dewlap region. Laboured breathing also is seen.

Mortality and morbidity

Case fatality approaches 100% if treatment is not followed at the initial stage of infection

Public Health Importance

There are no confirmed reports of human infections with *P. multocida*

Diagnosis

Clinical signs like high fever and swellings of the throat and dewlap are suggestive.

Sample collection

Ailing animals

- Whole blood / tissue samples from transported only on ice

PM samples:

- Blood smears
- Impression smear from heart ,lungs ,liver and submaxillary fluid
- Tissues in 10% formalin

Laboratory Tests:

- Demonstration of organism in blood smears
- Demonstration of organism in oedema fluid smear of live animals

- Demonstration of organism in impression smear from heart ,lungs ,liver and submaxillary fluid of dead animals.
- Confirmation requires the isolation and characterisation of the pathogen
- Molecular techniques- PCR & QPCR

Testing facility under AHD in Kerala:

- All Regional Disease Diagnostic Laboratories and Clinical Labs of 14 DVCs.

Treatment

Refer to the nearest Veterinary Surgeon

PROTOCOL FOR PREVENTION AND CONTROL OF HS

1. Preventive Vaccination
   - Vaccine - HS Oil adjuvant Vaccine from IAH & VB, Palode
   - Primary vaccination – At 4- 6 months
   - Revaccination - Annual vaccination before the onset of monsoon preferably in February /March.
   - Dose & Route - For animals weighing < 140kg - 2ml i/m
     For animals weighing > 140kg - 3ml i/m
2. Quarentine
   - Strict quarantine of newly introduced animals for 15 days and observation is recommended

OUTBREAK MANAGEMENT

1. Reporting: SADEC/ADCP, CDIO & DAHO
2. Management of Infected Premise
   - Isolation of incontact/suspected animals
   - Collection of samples for laboratory confirmation.
   - Strict animal movement control
   - Proper disposal of carcass –
   - Disinfect the shed and premises with 10% formalin/ 5% Lysol/ 5% sodium hydroxide.
3. **Outbreak alert**: Alert Veterinarians in nearby institutions/Panchayaths, LSG members, other livestock owners, milkers, milk society and slaughter houses in the area.
4. Restrict animal movement in the locality and place temporary ban on new purchase/selling.

5. Carry out containment ring vaccination in a 5km zone in the region
6. Carry out detailed epidemiological investigation to identify the source of infection/index case.
7. **Lifting of ban**: Above restrictions can be slowly lifted if no new case is reported in the last 15days.

POULTRY DISEASES

1. SALMONELLOSIS OF POULTRY (Pullorum Disease)

This is a group of disease affecting animals, man and birds (poultry) caused by different species of Salmonella. They also cause food poisoning in animals and man. The organism is widely distributed in the atmosphere.
It is a rod shaped organism. The diseases caused by different species are listed below:

- *S. pullorum* - Pullorum disease and bacillary white diarrhoea (BWD) in chicks.
- *S. gallinarum* - fowl typhoid
- S.typhi - Typhoid in man
- S.para typhoid - Para typhoid in man

Pullorum Disease

It is an infectious disease of chicks caused by *S.pullorum* characterized by white diarrhoea, emaciation and death. It can also infect adult birds. It affects chickens, turkeys, game birds, guinea fowls, sparrows, parrots, ring doves, ostriches and peafowl. The mortality rate is very heavy. The bacterium is fairly resistant to normal climate, surviving months but is susceptible to normal disinfectants.

Mode of transmission

The infected bird (reactor and carrier) is by far the most important means of perpetuation and spread of the organism. Birds may infect not only their own generation by horizontal transmission, but also succeeding ones through egg transmission localization of *S. pullorum*or *S. gallinarum* in the ovules before ovulation.

Feces from infected birds are also a source of bacteria. Horizontal transmission occurs through contaminated feed, water, and litter or through contaminated fomites. Mechanical transmission is also there. Transovarian transmission is of grave concern, when eggs are taken for hatching purpose. The incubator and brooder are also infected. The chicks hatched out from the infected eggs become carriers of the infection. Sometimes the whole farm may be infected in this way and causes heavy economic losses. The chicks with bacillary white diarrhoea if treated and recovered, become carriers

Mortality and morbidity

Morbidity is 10-80%; mortality is increased in stressed or immunocompromised flocks and may be up to 100%. The route of infection is oral or via the navel/yolk.

SIGNS

- Inappetance
- Depression
- Ruffled feathers
- Closed eyes.
- Loud chirping
- White diarrhoea
- Vent pasting.
- Gasping
- Lameness

Post-mortem lesions

- Grey nodules in lungs, liver, gizzard wall and heart.
- Intestinal or caecal inflammation.
- Splenomegaly
- Caecal cores
- Urate crystals in ureters.

DIAGNOSIS

- Isolation and identification. In clinical cases direct plating on Brilliant Green, McConkey and non-selective agar is advisable. Enrichment procedures usually rely on selenite broth followed by plating on selective media.

  Differentiate from Typhoid, Paratyphoid, paracolon, other enterobacteria, chilling and omphalitis

Testing facility under AHD in Kerala:

- All Regional Disease Diagnostic Laboratories.

PREVENTION AND CONTROL MEASURES

- Serological testing of pullets & elimination of carriers.
- Ensure Disease free breeder flocks
- Recovered birds are resistant to the effects of infection but may remain carriers.

- Vaccines are not normally used as they interfere with serological testing & elimination of carriers.

2. FOWL CHOLERA (Avian cholera, Avian pasteurellosis, Avian hemorrhagic septicemia)

It is the most common infectious disease of poultry caused by ***Pasteurella multocida.*** It is considered as a Zoonoses. Adult birds and old chickens are more susceptible. In parental flocks, cocks are far more susceptible than hens. Besides Chicken, the disease also concerns Turkey, Duck, Geese, raptors and canaries. Turkeys are particularly sensitive, with mortality ranging to 85-90%.

Symptoms

The affected birds are weak, droopy and inactive. Dull comb, dark wattles, ruffled feathers, loss of appetite, fever, difficulty in breathing, yellowish diarrhoea are other symptoms. Death may occur suddenly.

Treatment

Not economical in farms; Sulpha drugs(Sulpha dimidine16%solution)can be tried.

Testing facility under AHD in Kerala:

- All Regional Disease Diagnostic Laboratories and Clinical Labs of 14 DVCs.

Prevention and control Measures

- Effective management practices
- Treatment with antibiotics
- Proper biosecurity measures

3. DUCK PASTEURELLOSIS (Duck cholera)

A contagious endemic disease that affects domestic and wild ducks caused by *Pasteurella multocida* organisms. It usually occurs as a septicemia of sudden onset with high morbidity and mortality, but chronic and asymptomatic infections also occur.

Mode of Transmission

- Inhalation

Incubation period

- 4-9 days

Clinical signs

- Rhinitis
- Listless
- anorexia
- Depression and staying apart from rest of the flock
- Thick catarrhal nasal discharge
- Diarrhea may or may not occur

PM Lesions

Increased amount of peritoneal and pericardial fluids. Petechial and ecchymotic hemorrhages were common, particularly in subepicardial and subserosal locations, hemorrhages on the coronary band of heart, hemorrhages on air sac membranes adjacent to lungs. Haemorrhage at ileocaecal/oesophagal-proventricular region may also occur. Swollen liver with multiple, small, necrotic foci.

Mortality and morbidity

Up to 60%

Diagnosis

- Clinical symptoms
- Identification of Gram negative bipolar coccobacilli in heart blood or impression smear
- Cultural isolation of organism.

Testing facility under AHD in Kerala:

- All Regional Disease Diagnostic Laboratories and Clinical Labs of 14 DVCs.

PREVENTION AND CONTROL MEASURES

- Good management practices
- Treatment with antibiotics
- Proper biosecurity measures
- Preventive vaccination

4. NEWCASTLE DISEASE (Ranikhet Disease, Vasantha)

Most dreaded disease of Poultry caused by a RNA virus of family *Paramyxoviridae*. Disease is characterized by sudden & heavy mortality which spreads fast. In severe outbreaks with very virulent strains, mortality & morbidity could approach 100%. Incubation period varies from 2-14 days. Inhalation & Ingestion are the main mode of transmission. Infected birds excrete large amount of virus in the faeces.

Greenish diarrhea, listlessness, respiratory difficulties, swollen head, conjunctivitis & nervous signs are clinical signs. Post mortem findings of proventricular hemorrhage, diphtheritic/necrotic ulcers on caecal tonsil & intestinal mucosa, necrosis of spleen are suggestive. Human infection from NDV is possible from direct contact with the infected birds and usually as a transient conjunctivitis.

Presumptive diagnosis is possible from the pattern of mortality, clinical signs & suggestive lesions. Simple & Quick laboratory tests like Lateral flow tests can be used as farm side tests or for field diagnosis. Virus isolation, HA & HI tests, Molecular tests are the confirmatory methods.

Laboratory testing facility is available in all Regional Labs & many District Clinical Labs of Animal Husbandry Department.

5. INFECTIOUS BURSAL DISEASE (IBD)

IBD is an acute, highly contagious viral infection of young chicken caused by a RNA virus of family *Birnaviridae*. Chicken is the natural hosts of the virus. Turkeys and ducks may develop sub clinical or mild infections. Incubation period is short, 2-3 days. Morbidity and mortality are variable but may reach up to 90-100% in severe outbreak. Virus contaminated feed, water and droppings are the source of infection.

Anorexia, depression, ruffled feathers, watery diarrhea and prostration are the clinical signs. Post mortem lesions are characteristic: muscular hemorrhage of thigh & breast muscle. Inflamed, hemorrhagic & enlarged bursa with or without blood/mucus inside and nephrosis are the prominent lesions in acute outbreaks. As the virus cause immune suppression, the disease is often complicated with secondary infections. It is not infectious to human.

Post mortem diagnosis is easy as the bursal lesions are pathgnomonic. Field tests like Lateral flow test can aid in immediate diagnosis.

6. DUCK PLAGUE (Tharavu Vasantha)

It is an acute, highly contagious *herpesviral* infection of ducks and other water birds causing significant economic losses in duck industry in terms of mortality and decreased egg production. Ducks, geese and swan are the natural hosts. Incubation period ranges

from 3-7 days. Morbidity and mortality may range from 5-100%. Mortality is higher in adults than young ducks.

Onset is sudden. Mature birds dying suddenly in good flesh is the first sign. Droopiness, nasal discharge, conjunctivitis and diarrhea follow. The virus cause severe vascular damage and hence major PM lesions are wide spread tissue hemorrhage, petichal/echymotic hemorrhages on heart (paint brush), hemorrhagic/diphtheritic enteritis, necrosis of gizzard musculature and bronze coloured liver.

Diagnosis is often clinical and post mortem based. Molecular tests like RT PCR is confirmatory.

PROTOCOL FOR PREVENTION & CONTROL OF BACTERIAL AND VIRAL POULTRY INFECTIONS

1. Prophylactic Vaccination is the best method for preventing poultry infections. All poultry farmers should be encouraged to follow all vaccinations as per the schedule.
2. Weekly poultry vaccination facility encourages the farmers who rears birds in back yard systems.
3. Control & Prevention at farm level
   Construction:
   - All surface inside the building should be of impervious materials (concreate) to facilitate washing & disinfection
   - Proper ventilation in the building/pen to prevent dampness and ammonia build up.
   - Nipple drinkers are effective in preventing microbial contamination

   Biosecurity :
   - Foot bath at the entrance
   - Restriction of visitors
   - Use of protective clothings : mask, boots, overcoat etc
   - Disinfection & cleaning of cages, pen, water & feeding troughs and other equipments regularly.
   - Prevention of animals (dogs, cats) straying in the farm
   - Rodent control measures in pens, feed storage rooms
   - Bird proofing : Prevention of wild birds' entry by nesting
   - Facility for scientific disposal of dead birds, rotten egg & biological wastes (burial/burning)

- Periodic change of litter & burning of litter
- Monitoring of water source in the farm & treatment (water sanitisors) periodically

OUTBREAK MANAGEMENT PROTOCOL

1. Reporting : SADEC/CDIO/DAHO
2. At farm level
    - Immediate depopulation of the affected flock/ Isolation of sick birds
    - Check the in contact birds
    - Antibiotic treatment with supportive therapy is advised in bacterial infections. Treatment is not effective in viral outbreaks. Antibiotic & supportive therapy may reduce mortality. In contacts may also be treated
    - Burning/Burying of dead birds & other contaminated materials
    - Thorough cleaning and disinfecting of the cages and premises.
    - Remove all movable equipment from the cages and clean the equipment and all items to be reused, thoroughly.
    - Remove built-up litter completely.
    - Dispose of litter as far from the house as possible.
    - Flame the wire fencings of the house.
    - Wash the house thoroughly giving special care to the ceilings and walls of the house to remove all manure deposits.
    - Disinfect the house with a water-soluble compound such as quaternary ammonia, phenol compound, iodophor, coal-tar or a chlorine disinfectant.
    - Carry out all repair of the building if needed.
    - Apply an insecticide approved for poultry use.
    - Lock the building and let it stand empty for 2-4 weeks (down time) before introducing new stock to the cage.
    - Cleaning & disinfection of incubators if vertical transmission is indicated.
    - Give a down time of 2-3 weeks for incubators following disinfection.
    - Ban of sale/movement of birds
    - No new purchase till the outbreak is under control
3. Alert among other poultry farm owners
4. Containment vaccination among susceptible population

VACCINATION SCHEDULE FOR CATTLE

Disease	Name of vaccine	Dose and Route	Age and booster doses	Immunity	Storage / Shelf life	Time of vaccination
Haemorrhagic Septicemia (*Pasteurella multocida*)	Haemorrhagic Septicemia Oil Adjuvant Vaccine (IAH & VB, Palode)	For animals weighing less than 140kg - 2ml i/m more than 140kg - 3ml i/m	First vaccination at 4 to 6 months of age. Annual revaccination	1 year	1 year at 4^0C	Before onset of monsoon . Feb/ March
FMD (Picorna virus)	Polyvalent oil adjuvant vaccine	As recommended by manufacturer	First vaccination at 4 months of age. Booster every five to six months	6 months	4^0C or as recommended by manufacturer	Before onset of monsoon preferably in Feb/March August/September
Black Quarter (*C. chauvoei*)	Black Quarter Vaccine (IAH & VB,	For animals weighing less than 140kg - 5ml s/c more than	First vaccination in animals above 4 months	1 year	2 years at 4^0 C	May (Recommended in disease prone

	Palode)	140kg - 10ml s/c	of age Booster vaccination after 10 days in endemic areas. Annual vaccination recommend ed			areas)
Anthrax (*B anthracis*)	Anthrax spore Vaccine (IAH & VB, Palode)	Bovine - 1 ml s/c at neck region	First vaccination in animals above 6 months of age. Annual vaccination recommend ed in endemic areas.	1 year	6 months at 4^0C	May (In endemic areas first year at six months interval then annually for five years)

VACCINATION SCHEDULE OF GOATS

Disease	**Name of vaccine**	**Dose and Route**	**Age and booster doses**	**Immunity**	**Storage / Shelf life**	**Time of vaccination**
Haemorrhagic Septicemia (*Pasteurella multocida*)	Haemorrhagic Septicemia Oil Adjuvant Vaccine (IAH & VB, Palode)	2ml i/m	First vaccination at 4 to 6 months of age. Annual revaccination	1 year	1 year at 4^0C	Before onset of monsoon . Feb/March
			First			Before onset of

FMD (Picorna virus)	Polyvalent oil adjuvant vaccine	As recommended by manufacturer	vaccination at 2 to 3 months of age. Booster every five to six months	6 months	4^0C or as recommended by manufacturer	monsoon preferably in Feb/ March August /September
PPR (*Morbilli virus*)	PPR Vaccine(IAH & VB, Palode)	1ml s/c	First vaccination - 3 months Revaccination every 3 years	3 years	1 year at -20 ^{0} C	Preferably before onset of monsoon
Enterotoxemia (*Cl perfringens* type D)	Enterotoxemia vaccine(IAH & VB, Palode)	Sheep and goat -2.5 ml s/c	First vaccination - 3 months and above Booster 2.5 ml on 14th day	1 year	1 year at 4^0C	Preferably Before onset of monsoon
Anthrax (*B anthracis*)	Anthrax spore Vaccine (IAH & VB, Palode)	Sheep - 0.5 ml s/c at neck region Goat - 0.2 ml s/c at caudal fold	First vaccination above 6 months of age. Annual revaccination	1 year	6 months at 4^0 C	May (In endemic areas fist year at six months interval then annually for five years)
Tetanus (*C tetani*)	Tetanus toxoid	1500 IU s/c or i/m	Immediately after birth (if dam is not protected) Repeat every three weeks upto 3 months of age 2- 3 months of age (if dam is protected)			In pregnant animals 1st vaccination at 3½ months 2nd dose at 4½ months of pregnency

VACCINATION SCHEDULE FOR PIGS

Disease	Name of vaccine	Dose and Route	Age and booster doses	Immunity	Storage / Shelf life	Time of vaccination
FMD (Picorna virus)	Polyvalent oil adjuvant vaccine	As recommended by manufacturer	First vaccination at 3 months of age. Booster every five to six months	6 months	4^0C or as recommended by manufacturer	Before onset of monsoon preferably in Feb/March& August/ September
Classical swine fever (*Peste virus*)	Classical swine fever vaccine (IAH & VB, Palode)	1ml i/m (10 dose diluted in 10 ml diluent or 15 dose diluted in 15 ml diluent)	2 weeks in piglings of unvaccinated dam, 2 months in piglings of vaccinated dam	1 year	6 months at -20 ^{0} C	_
Anthrax (*B. anthracis*)	Anthrax spore Vaccine (IAH & VB, Palode)	Pig - 0.5 ml s/c at inner thigh	First vaccination above 6 months of age. Annual revaccination.	1 year	6 months at 4^0 C	May (In endemic areas first year at six months interval then annually for five years)

VACCINATION SCHEDULE FOR POULTRY

Disease	**Name of Vaccine**	**Dose and Route**	**Age and booster doses**	**Immunity**	**Storage/ shelf life**

Marek's Disease	Marek's Disease Vaccine	0.2ml s/c in neck region	Day old	Life long	As recommended by manufacturer
Infectious Bursal Disease	Attenuated live virus vaccine and Inactivated vaccine	IBD attenuated live virus vaccine -in drinking water	3wks - Broilers, commercial layers & breeders 8- 10 wks - Breeders	–	As recommended by manufacturer
		Inactivated vaccine- i/m	16- 18 wks in breeders		
Ranikhet Disease	Ranikhet Disease F strain vaccine (RDF) (IAH & VB, Palode)	1 drop intraocular/ intranasal	From day old to seven day old chicks	Lasts upto 8-10 weeks	1 year at -20^{0}c, 3 months at 2 to 4 ^{0} c
Ranikhet Disease	Ranikhet Disease K strain vaccine (RDK/ R_2B) (IAH & VB, Palode)	0.5 ml s/c in wing web.	1st dose at 6-8 weeks of age. Booster dose at 16th to 18th week.	One productive year.	1 year at -20^{0}c, 3 months at 2 to 4 ^{0} c
Fowl Pox	Fowl Pox Vaccine (FPV) (IAH & VB,Palode)	Prick method- 2 pricks 1cm apart in wing web	6-8 weeks of age	1 year	2 years at -20^{0}c, 1 year at 2 to 4 ^{0} c

VACCINATION SCHEDULE FOR DUCKS

Name of disease	Name of Vaccine	Dose and Route	Age and booster doses	Immunity	Storage/ shelf life

Duck Plague	Duck Plague Vaccine (DPV) (IAH & VB, Palode)	0.5 ml s/c in wing web	1st dose at 6th week of age Booster at 12thweek. Annual revaccination recommended	1 year	1 year at -20^{0}c, 3 months in freezing chamber of refrigerator at -5 ^{0} c
Duck Pasteurellosis	Duck Pasteurella Oil Adjuvant Vaccine (IAH & VB, Palode)	First dose - 0.3ml i/m for birds of 4 weeks of age (in leg muscle)Booster dose – 0.3 ml i/m on 30th day Revaccination - 0.5 ml i/m(in leg or breast muscle) at every 6 months interval	First dose in birds of 4 weeks Booster dose on 30th day Revaccination at every 6 months interval	6 months	1 year at 4^0 C

VACCINATION SCHEDULE FOR DOGS
(WSAVA recommendation)

Age of animal	**Name of Vaccine**	**Dose and Route**	**Booster doses**	**Storage/ shelf life**
7 weeks (breeders) 10 weeks (others)	Puppy DP	As recommended by manufacturer	10 weeks of age	As recommended by manufacturer
13 weeks	Poly valent vaccine	As recommended by manufacturer	Booster at 19 weeks of age and then annual vaccination	As recommended by manufacturer
16 weeks	PAR	As recommended by manufacturer	Booster at 24 weeks of age then annual	AS recommended by manufacturer

			revaccination	