Continuing Veterinary Education (CVE) and training of PARAVETS is essential to improve animal disease surveillance systems

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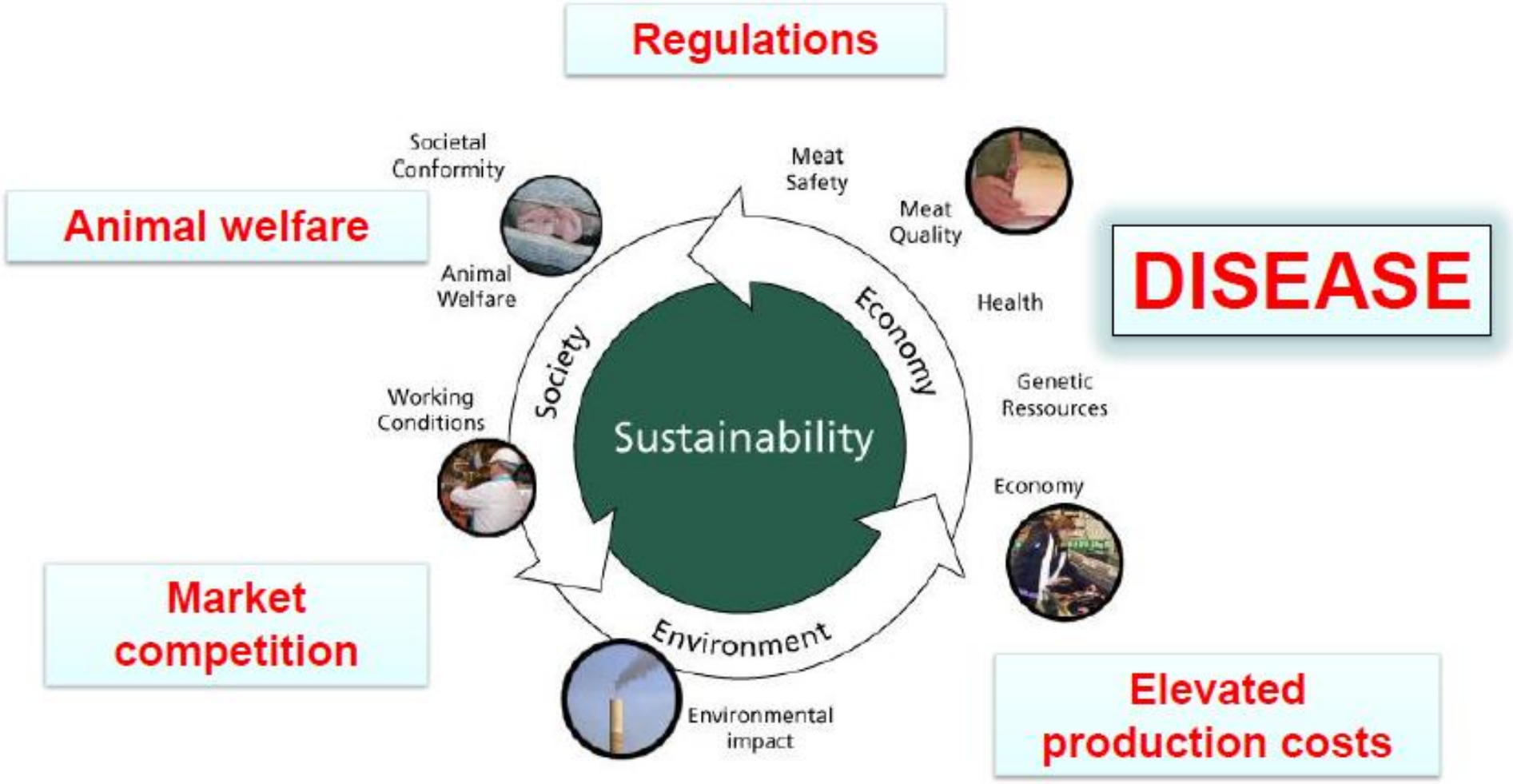
Disease is a major challenge for livestock Production

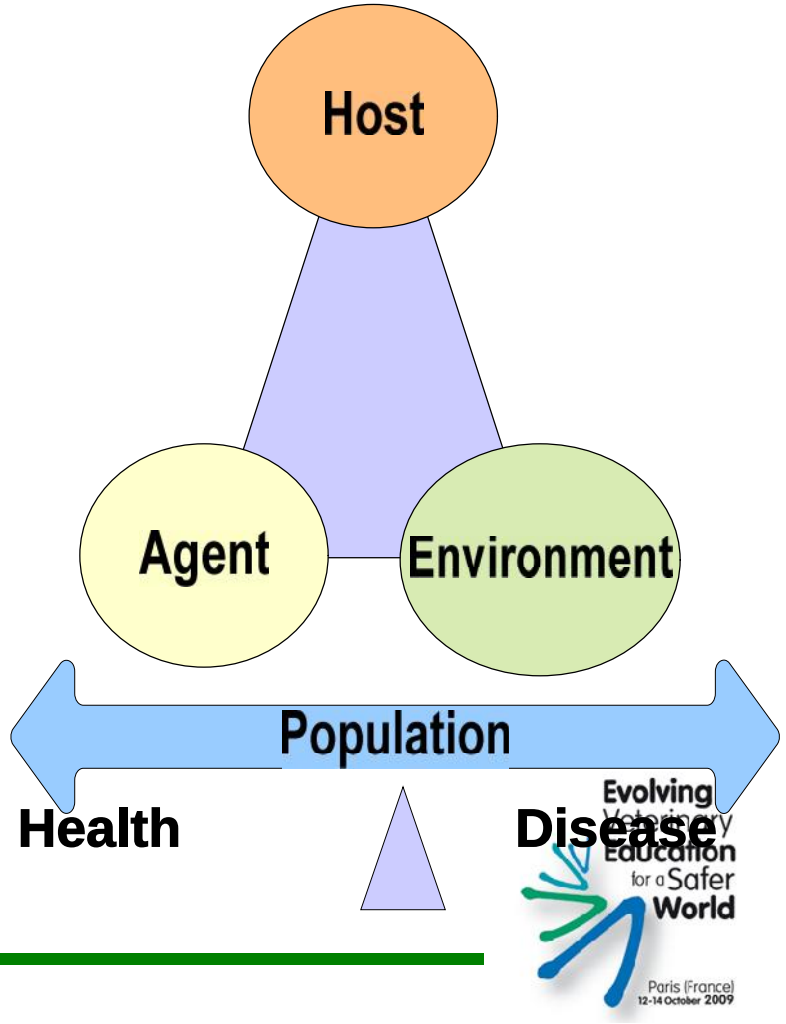


Animal Disease Surveillance

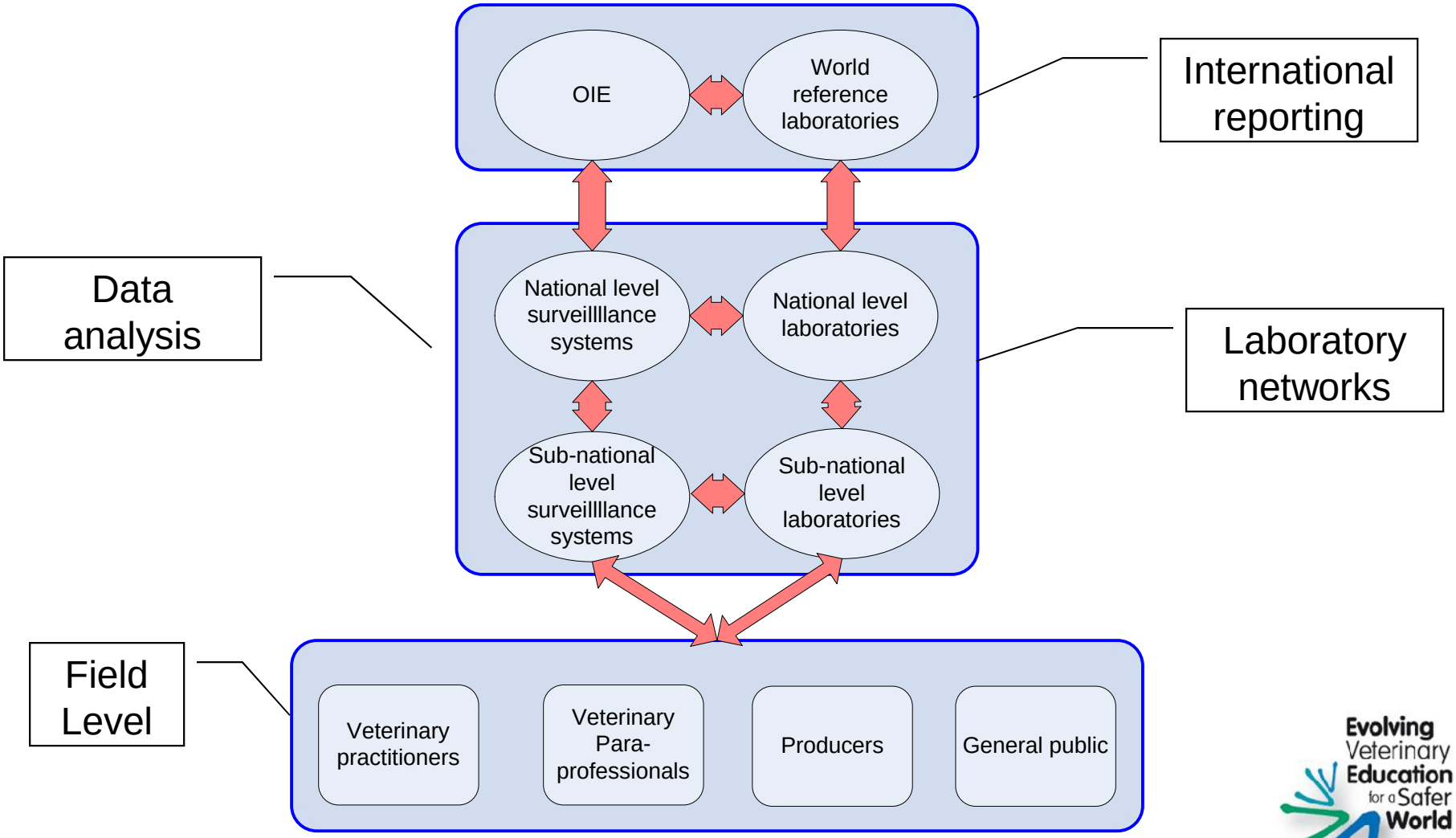
- ***Agent* (etiology)**
- ***Susceptible host***
- ***Environment***

E**xtrinsic factors** that affect agent and the host and opportunity for exposure are

- Geology and climate,
- Biological factors - insect vectors
- Socioeconomic and Livestock rearing practices crowding, sanitation, and health services



Surveillance systems



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Disease Diagnosis is practical guidance for farmers

- Goal: Detecting pathogens of interest
  - Collecting the appropriate samples

Tissue: lung

Serum/Blood

Nasal swab

Feces

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Herd health is a key determinant of productivity of Farm Animals. Pre-clinical diagnosis of diseases can be a practical guidance for the

Success Disease Diagnosis Depends On

- ✓ Advance planning
- ✓ Collection of adequate and appropriate specimens
- ✓ Sufficient documentation
- ✓ Biosafety and decontamination
- ✓ Correct packaging
- ✓ Rapid transport
- ✓ Choice of a laboratory that can accurately perform the tests
- ✓ Timely communication of results

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Restraining of animal is a skill

Restraint involves complete or partial immobilization of an animal by physical and/or psychological means.

Understanding of animal psychology helps handlers to collect samples

Collection of samples from Young Piglet

Collection from Adult Pig

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DISEASE EPIDEMIOLOGY

OUTBREAK DATA SHEET UNDER ADVANCED ANIMAL DISEASE DIAGNOSIS & MANAGEMENT CONSORTIUM

CORE LAB-I, COLLEGE OF VETERINARY SCIENCE, KHANAPARA, GUWAHATI- 781 022

Name of Local Vet .....Address.....

Vill.....City.....State.....PIN.....

Phone.....E-mail.....

GPS location.....

Collection Date.....

Farm Attributes

Premises/Owner' Name.....

Vill.....

City.....

State.....

Phone .....

Human density.....

Type Of Management & Number

.....Org farm.....

.....Small unit.....

.....Free grazing.....

Location of OB with distance (km)

.....Weekly market

.....Daily market

.....Livestock Transit point

.....Wet land/.....Dry land

.....Hilly Area.....highway

.....Railway station

Location of OB with distance (km)

.....Major city

.....Slaughter house/slaughter point

.....Check point

.....Sanctuary/Forest

..... Water body

OB suspected due to

.....Entry of new animal

.....Visitors

.....Doctors/Paravet

.....Contact with wild

.....Waste feeding

..... Vector borne

Animal & Outbreak Attributes

Type of animal

.....Domestic

.....Wild

.....Feral

Type of Breed

Pure Breed (.....)

Cross Breed (.....X.....)

Local (.....)

Type Of Breeding

.....Natural

.....A.I.

Type Of Feeding

.....Commercial feed

.....Waste Feeding

.....Grazing

Vaccination Status

.....Vaccinated.....Un-Vaccinated

.....Single Vaccination On.....

.....Repeated Vaccination On.....

Repeated Vaccination Interval:.....*6month*/.....*12month*

Type of vaccination:.....

Company:.....Batch No.....

Cool Chain Maintain.....

No. affected/at risk

...../.....0--3 months

...../.....3--12 months

...../.....1--2 years

...../..... > 2 years

Total Population

Just before OB.....

No. Animal died

.....0--3 month

.....3--12 month

.....1--2 years

..... > 2 years

Total Population

After Subside the OB.....

Clinical Signs

.....Fever

.....Hyperemia

.....Cyanosis

.....Conjunctivitis

.....Respiratory Distress

.....skin nodule

.....Constipation

.....Diarrhoea

.....CNS

.....Wasting

.....Abortion

.....Tick/mite/infestation

PM Lesions

Skin :

Brain: congested

Tonsil : Congested / Ulcer

L N : Enlarged / Hyperemia

Spleen : Enlarged / Infarct

Kidney : Pinpoint / Petechial Haemorrhage

Lung : consolidated

Heart : Congested/ Haemorrhagic

Liver :

SI:

Ileum : Congested

Colon : Single / Multiple Ulcer

Record on outbreak

1st sign recorded.....

Last case seen.....

Duration of OB.....

Tentative diagnosis :

.....Infectious

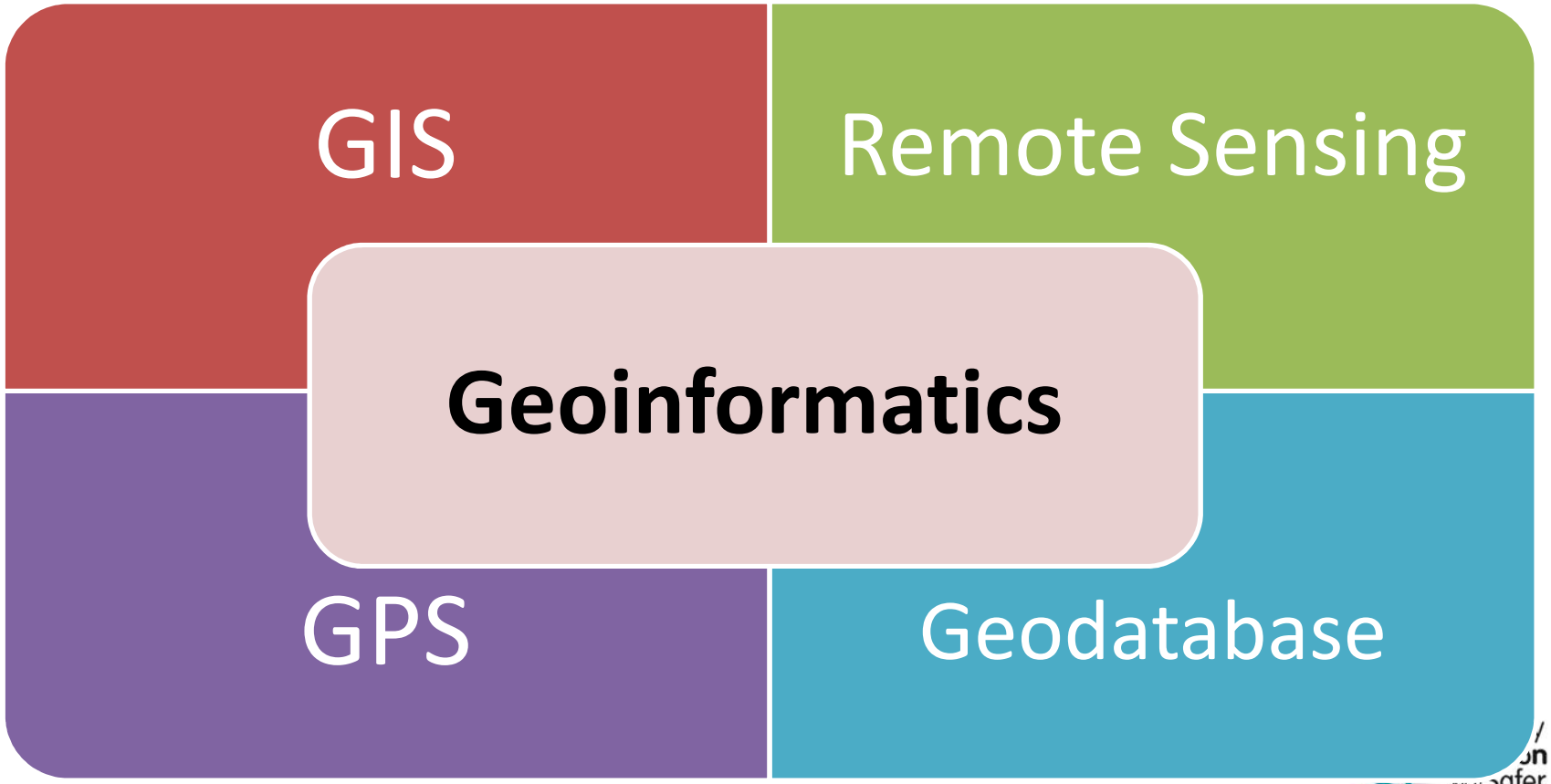
.....Parasitic

.....Poisonong

.....Accident

Phone: 0361-2364941 (O)/2131244(R), 09435558788(Mo)/ 9435014705(Mo) ; Fax: 0361-2337700/2364941 ; E-mail : nnbarman@gmail.com / drskdas53@gmail.com

Geographic information System (GIS)



Collection, Preservation and Dispatch of Samples

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WHAT FOR WE COLLECT SAMPLES ?

- Disease diagnosis-
  - *Direct examination (rapid diagnosis).*
  - *Isolation of causative microorganisms.*
  - *Serological investigation.*

- Disease surveillance,
- Health certification
- Monitoring the response to treatment and vaccination

TYPES OF SAMPLES

Samples for Microbiology:

Bacteriologic culture, virus isolation, in-situ hybridization, PCR,FAT, Latex agglutination tests, and ELISA.

Samples for Histology: Formalin-fixed tissue

Samples for Toxicology:

✓Tissues or fluids for chemical analysis .
✓Feed or water is suspected- composite sample should be sent
✓Feed to experimental animals to reproduce the signs and lesions

Types of Samples……..

Samples for Hematology:

Anticoagulated whole blood

Several blood smears- prepared immediately

Samples for Clinical Chemistry:

Require serum, occasionally plasma
Serum should be refrigerated or frozen until analyzed.

Samples for Serology:

Acute sample in early course of the disease
Convalescent sample collected 10-14 days later

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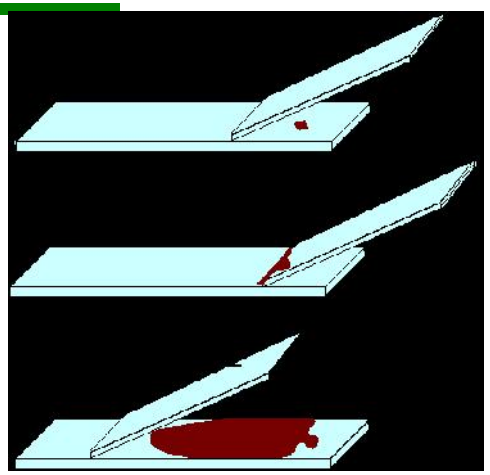
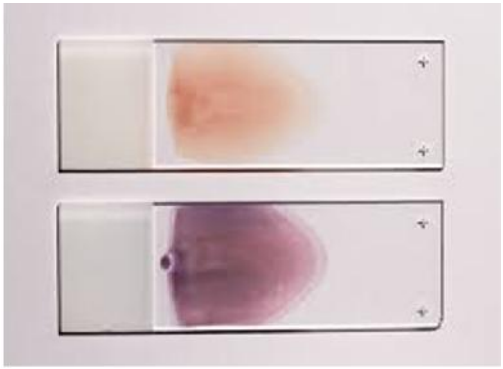
BLOOD SMEARS

Collection



Capillary blood from finger prick

- make smear
- fix with methanol or other fixative



Handling and transport

Transport slides within 24 hours

Do not refrigerate (can alter cell morphology)

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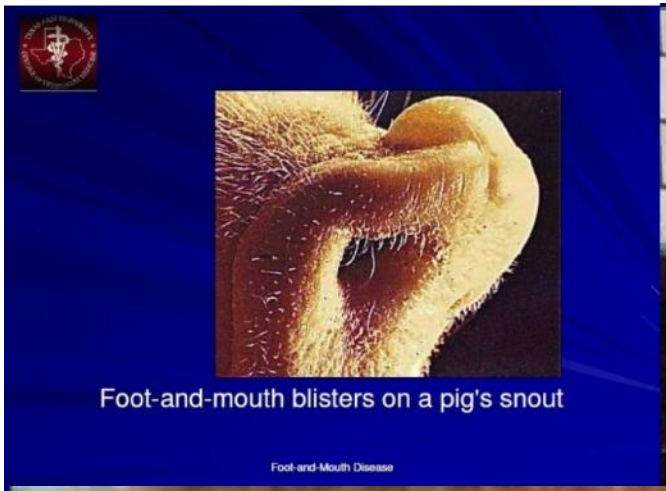
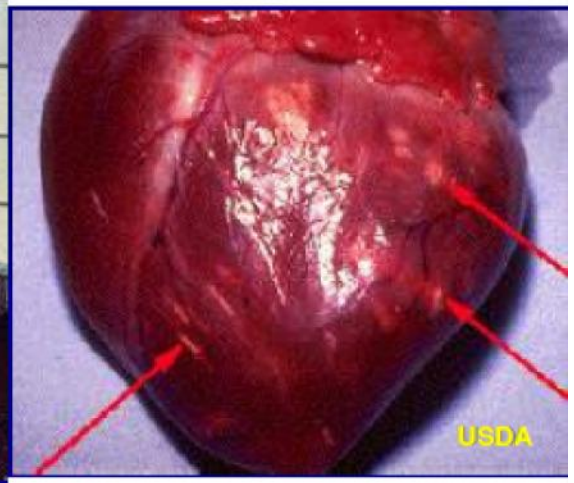
HOG CHOLERA OR SWINE FEVER

FOOT AND MOUTH DISEASE





PRRS

Lungs – consolidation and pneumonia

Litter – normal looking – but virus positive

Lobular oedema

Litter – dead in utero – virus positive

Control

- Vaccination
- Depopulation / repopulation
- Multiple site production

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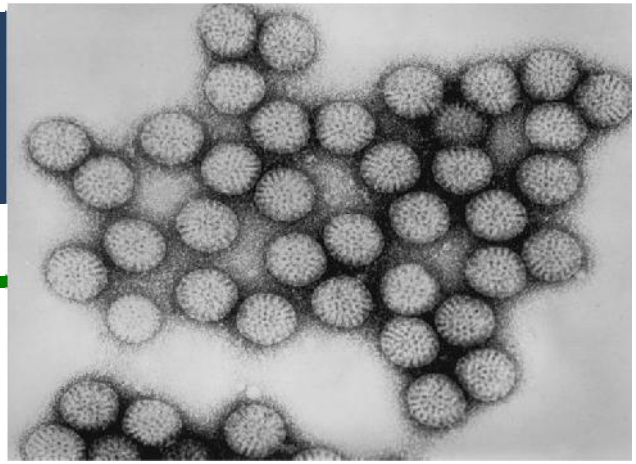
ROTAVIRUS



- Virus of the Reoviridae family of the genus Rotavirus
- Very common in nature; many serotypes
- 12-24 h incubation period; nursing pigs most affected; can be high mortality or a mild scours; weanlings may show signs
- Expose sows to give piglets immunity

PPR In Goat

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Goat Pox

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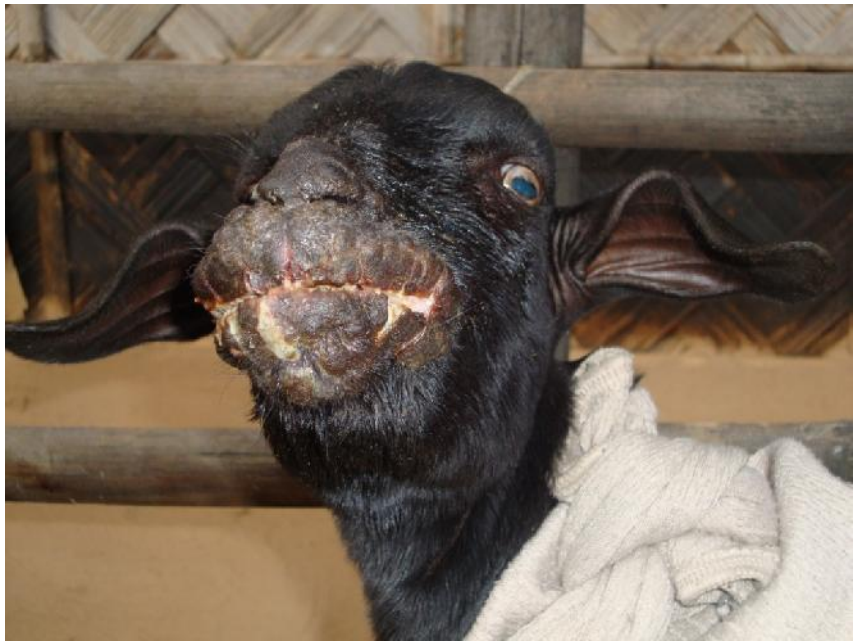
ORF in Goat



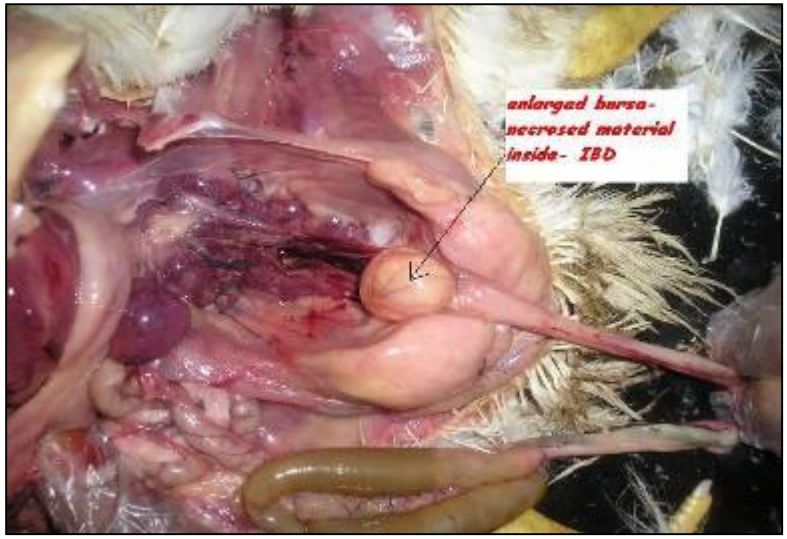
Avian Influenza

Oedamatous cyanotic comb and wattle of a chicken.

oedamatous wattles

Ranikhet Disease

Infectious Bursal Disease



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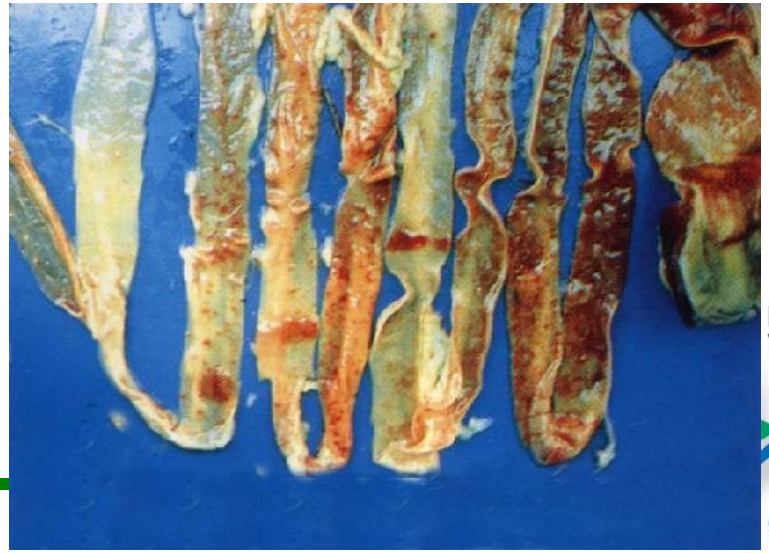
Duck Plague



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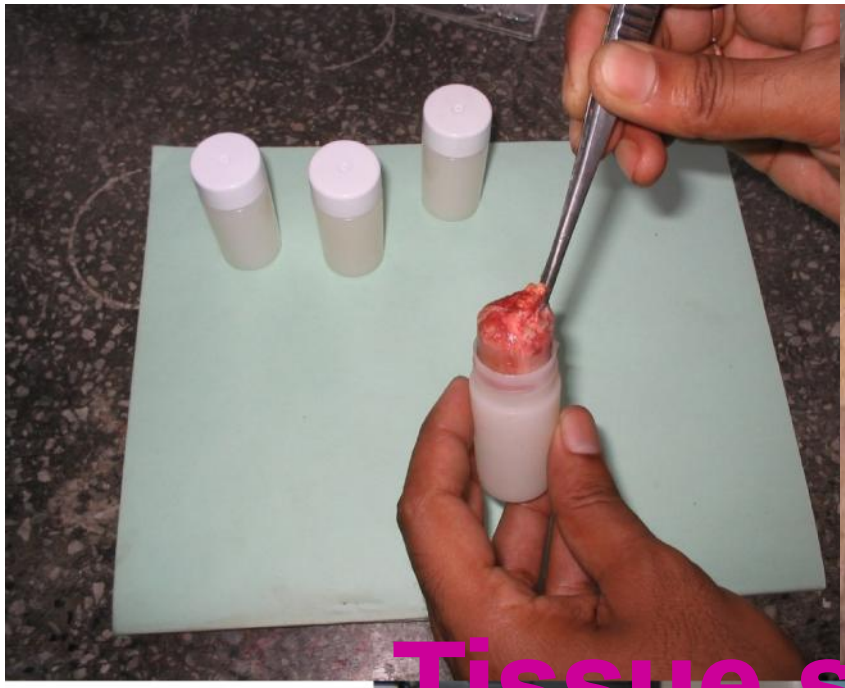

Tissue samples

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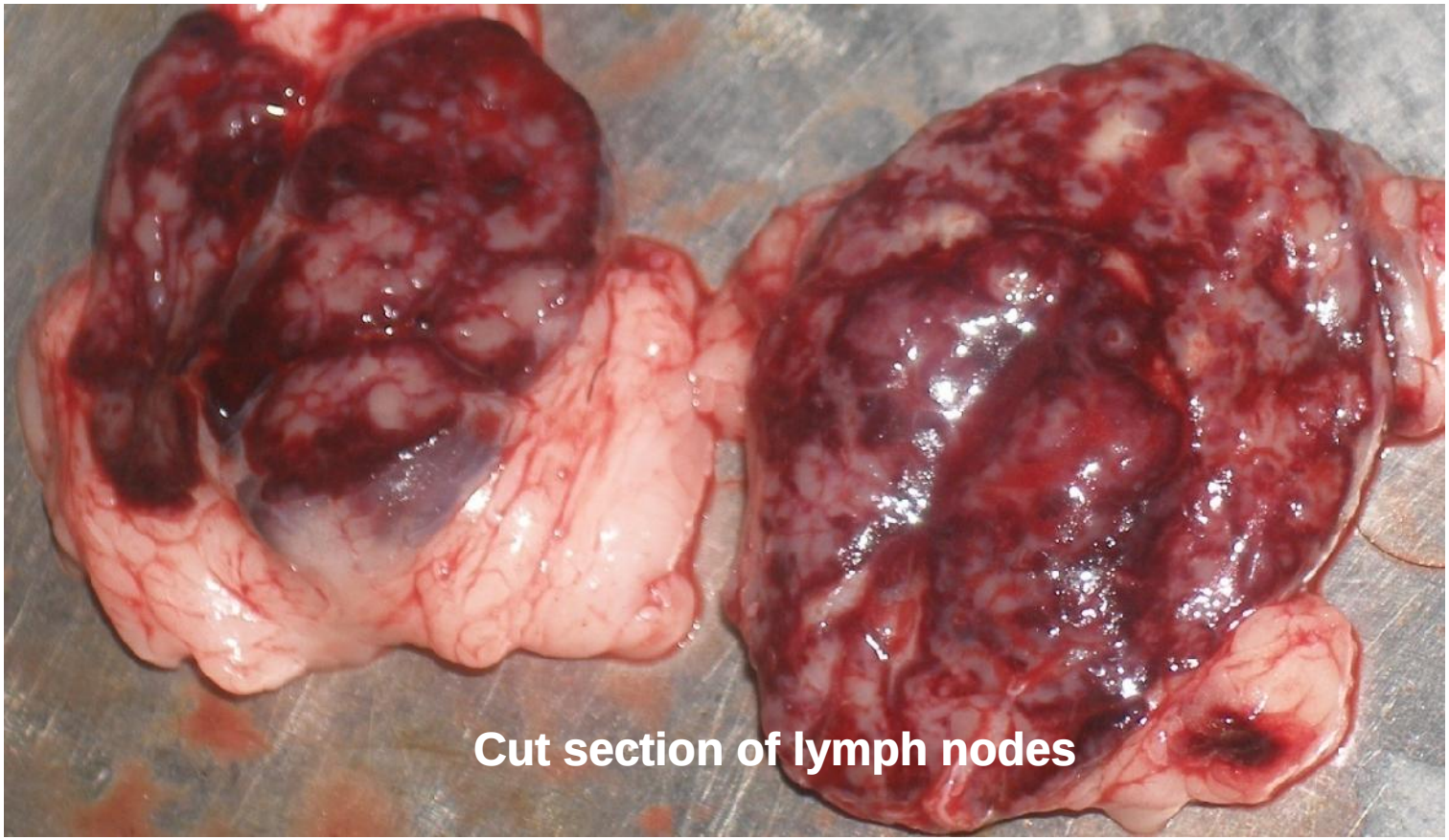
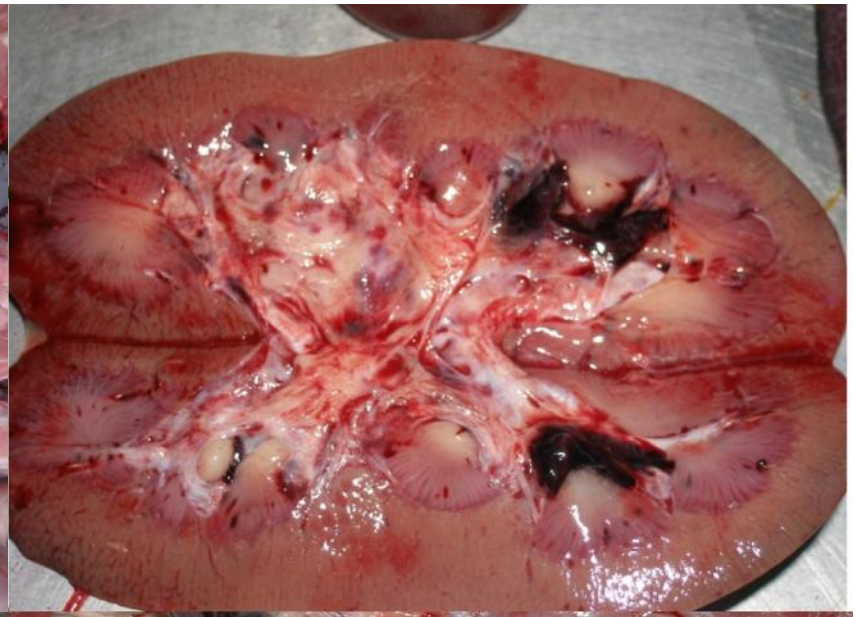
Pathological lesions

Tonsil

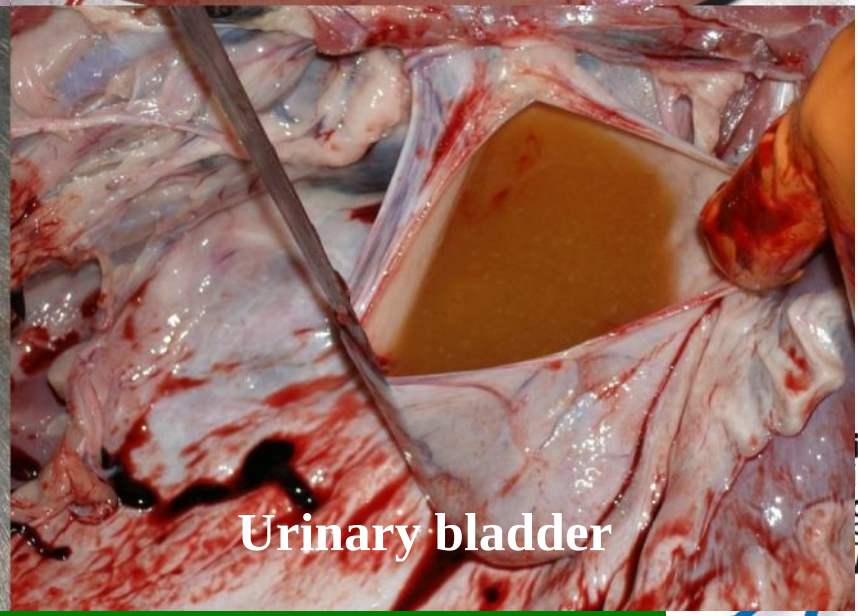


Cut section of lymph nodes

Spleen showing infarcts



RKEY- EGG ?? KIDNEYS



Urinary bladder

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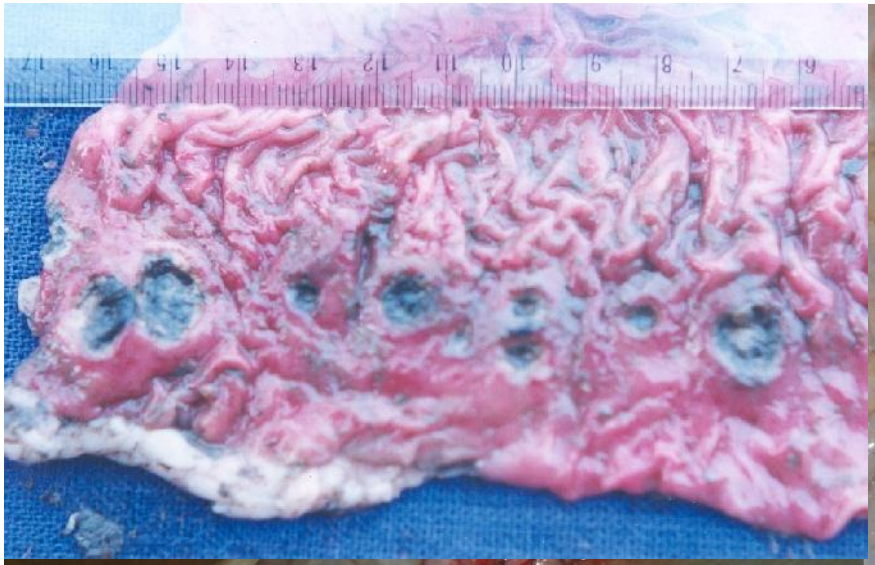
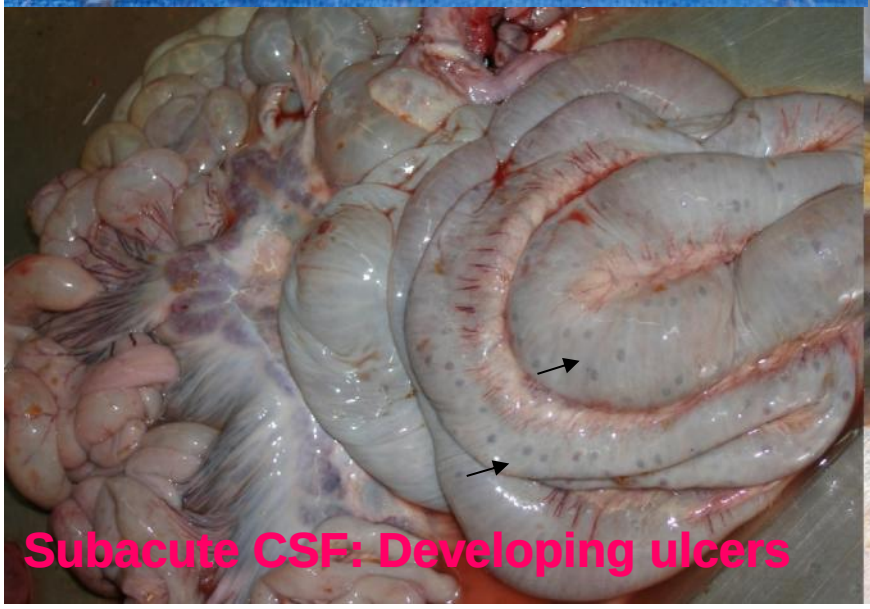



Spiral colon-Haemorrhages


Subacute CSF: Developing ulcers


Buttons in the large intestine
Chronic CSF in a 4 month old pig

Market Samples

Pork Market

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Collection from Live Animals and Birds

A) Blood: The jugular vein or a caudal vein is selected

Vena cava (ear vein) in pigs and wing vein in birds

Smear of fresh blood on slide; both thick and thin.

Drop of blood on to filter paper, dried be shipped unrefrigerated

- Heparin 20 IU heparin/ml blood or
- Sodium Citrate (3.85%) 1ml/10ml of blood or
- EDTA (2%) 1ml/10ml of blood or
- Sodium oxalate (10%) 0.1ml/10 ml of blood.

B) Serum:

Blood in a sterilized tube without anticoagulant and left to stand at ambient temp. for 1–2 hours till clot begins to contract. The clot ringed round with rod and placed at 4°C overnight, Serum is separated , centrifuged at 5000 rpm for 5 min.

E) Skin Lesion scrapings:

- Vesicular fluid aspirate with a syringe or collect 2 g of vesicular lesions in 5 ml 50% PBS –glycerine.

- Plucked hair or wool samples are useful for surface-feeding mites, lice and fungal infections.

- Deep skin scrapings in in the transport medium for bacterial infections.

F) Genital tract and semen samples:

- Sample swabs from vaginal , cervix or urethra by swabbing.
- Preputial washing, or by the use of suitable swabs.
- Semen are best obtained using an artificial vagina

G) Milk samples:

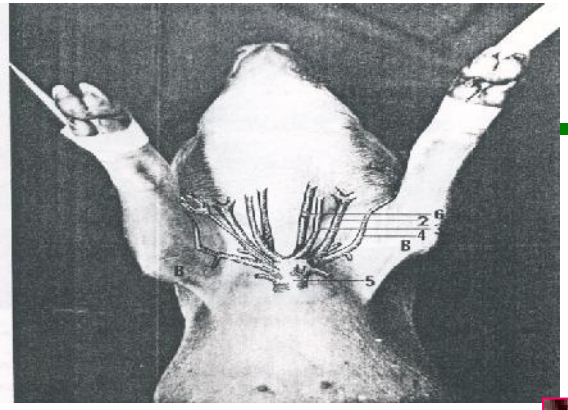
- ✓ Milk for serological tests should not be frozen.
- ✓ Milk for bacterial examination can be frozen.

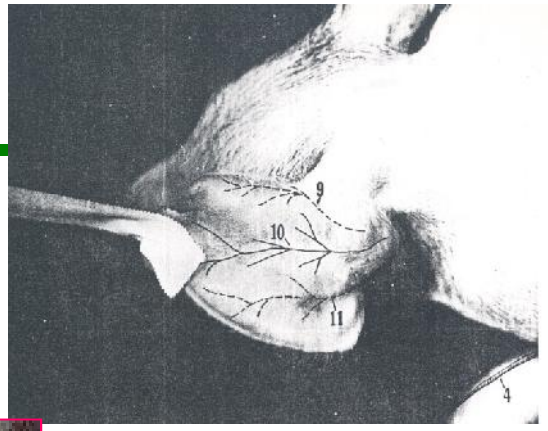
H) Rectal and faecal samples:

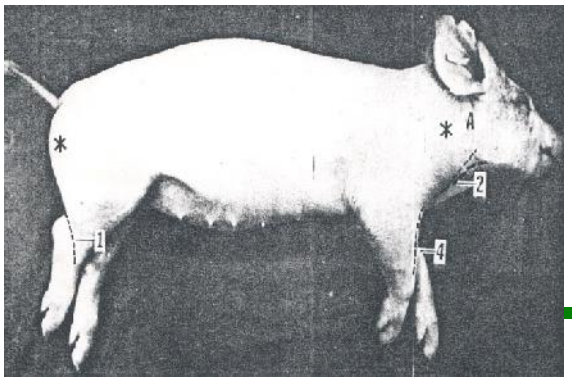
- ✓ Freshly samples 10gms collected, stored and transported at 4°C within 24 hours.
- ✓ Preferable method: use rectum or cloacal swabs .
- ✓ Screw top containers or sterile plastic bags for shipment.

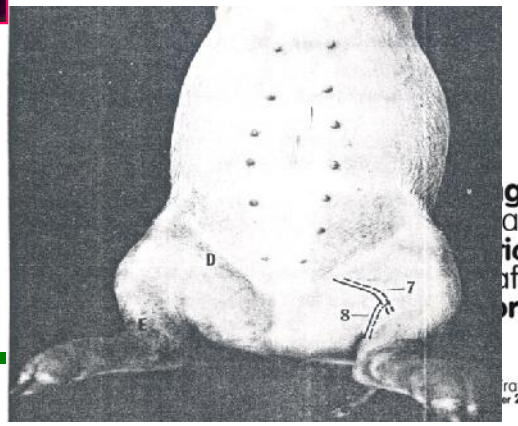
Collection from Adult Pig

Collection of blood

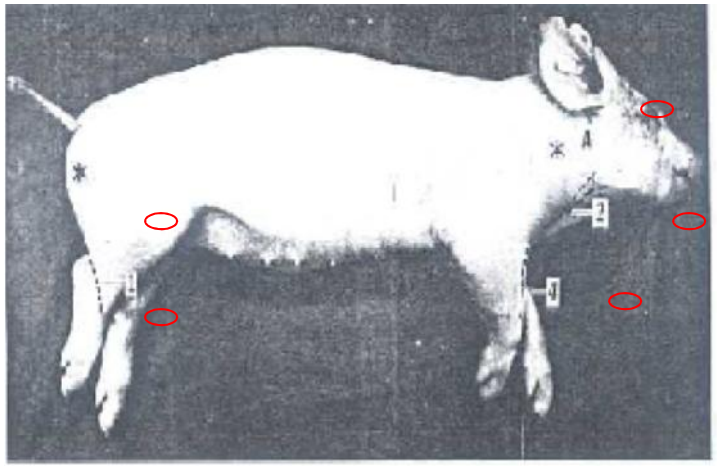


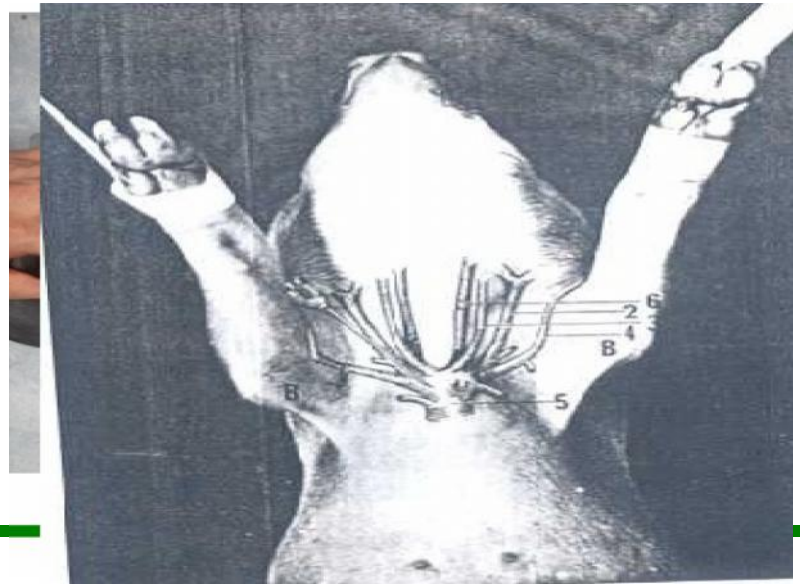






Collection of Blood





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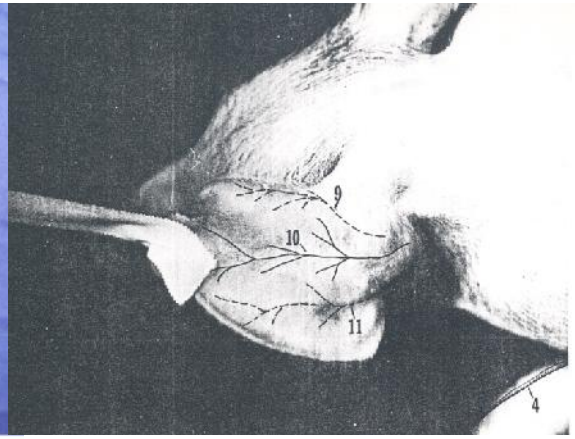
Collection of blood



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Porcine Oral Fluid

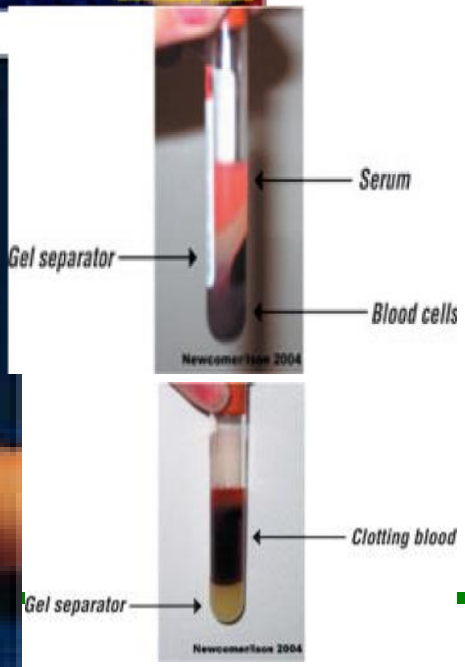
- Oral fluids defined:
  - Saliva
  - Oral mucosal transudate
    - Fluid from blood capillaries
- Oral fluids contain:
  - Pathogens: viruses and bacteria
  - Antibodies
- Oral fluids in humans
  - HIV, Measles, etc.

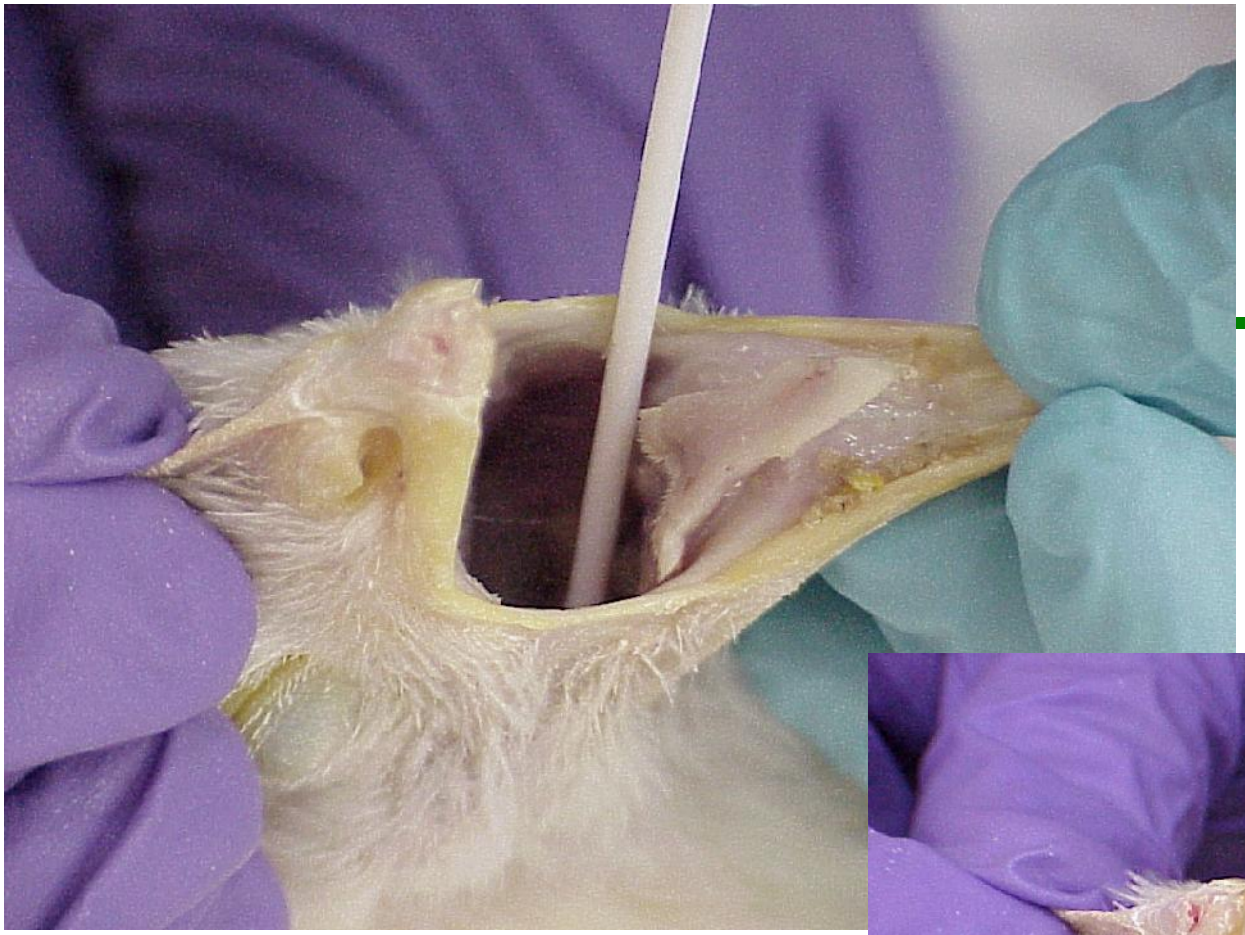
Sampling Technique of Oral Fluid

- Tie the rope in an area that is easily accessible for all pigs at the height of pigs' mouth.
- Away from drinkers or troughs.
- More than one rope fix them as far apart as possible.
- Leave the rope in position for 30 minutes.
- Extend the time to 1 hour when pigs are less active.
- Carefully remove the rope and inserting the lower end into a clean plastic bag . Cut the end and then squeeze the rope in one corner of the bag.
- Cut one of the bottom corners of the plastic and drain the oral fluids into a collection tube. A minimum of 2 mL is required for further analysis.

Collection of Mammary Secretion

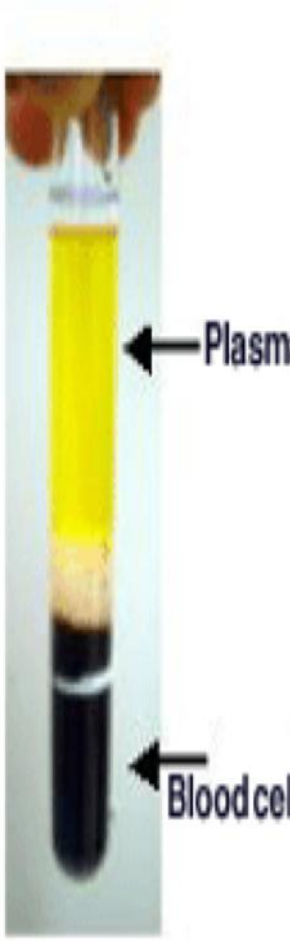
Collection of Blood from Birds

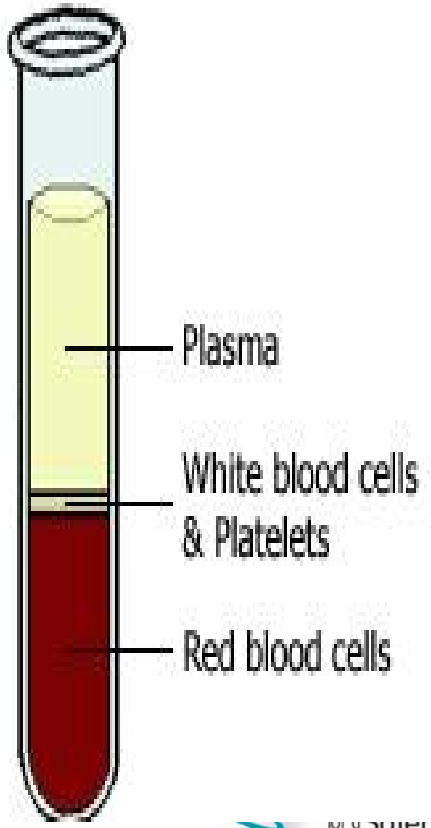




Oropharyngeal Swab

Blood after centrifugation





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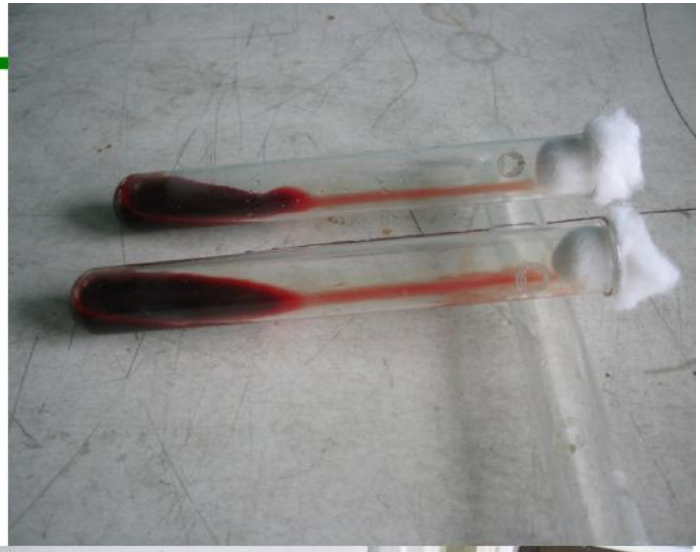
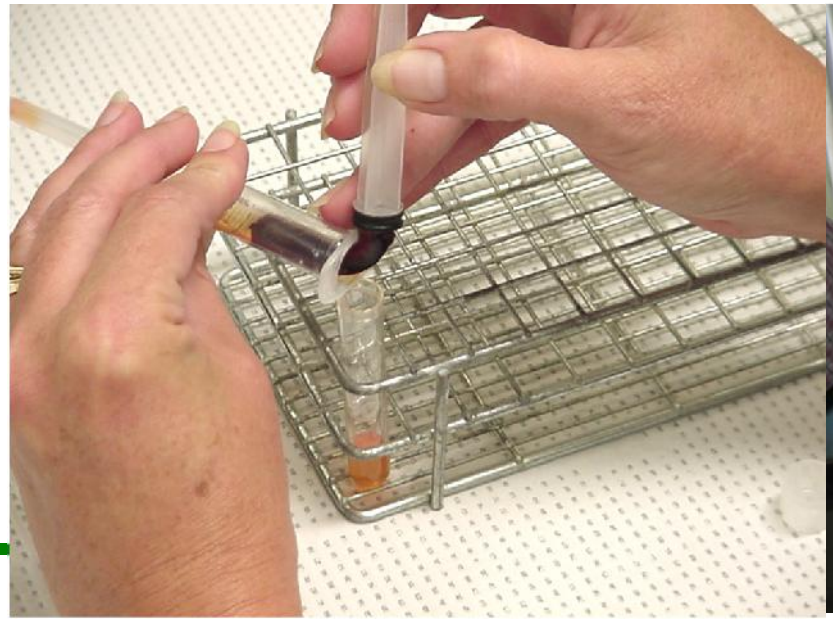
Serum:

- Collect 4-5ml blood,allow to clot at room temp. at slanting position for 1 hour.

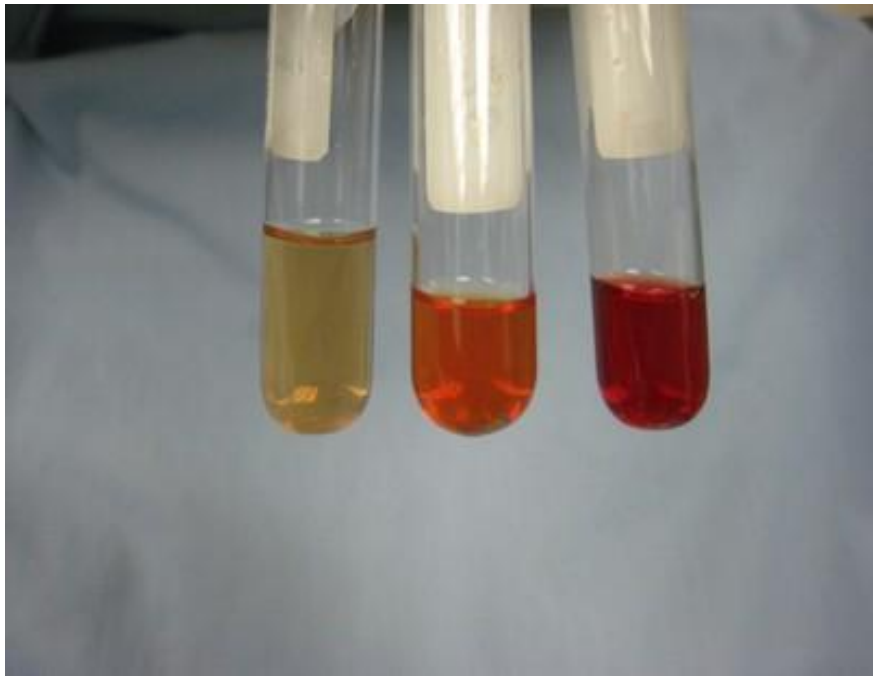


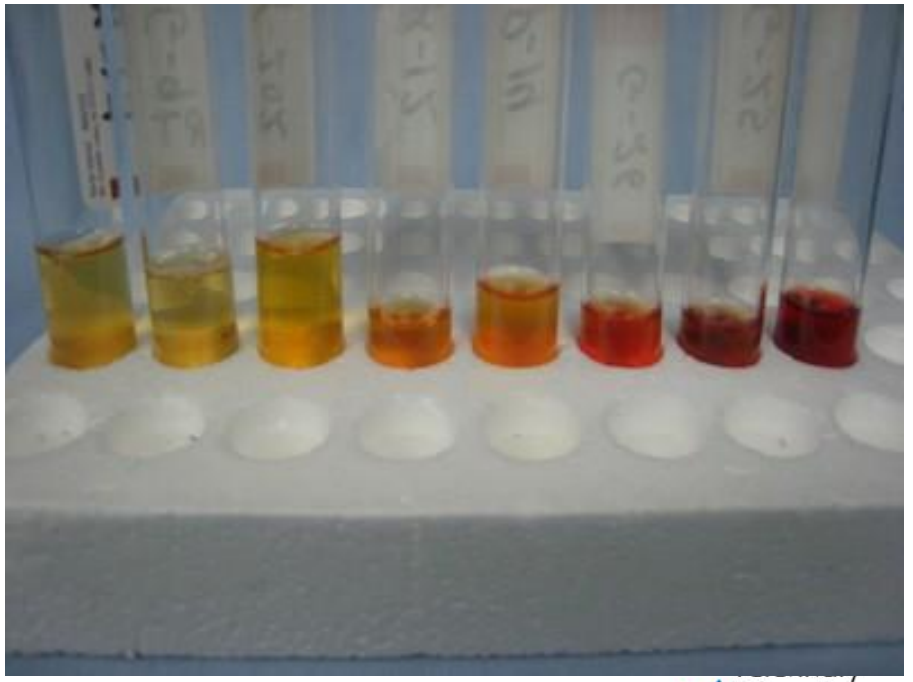


- Separate serum

- Transport immediately to the lab in ice or keep at –20 ^{0}C

VARIOUS STAGES OF HEMOLYSIS IN SERUM SAMPLES





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Labeling Specimens

Use pre-printed barcode labels:

- On specimen container
- On field data collection form
- In log book

Label each specimen with:

- Subject's unique identification number

Owner's name
Clinical specimen
Unique ID number (Research/Outbreak)
Specimen type
Date, time and place of collection
Name/ initials of collector

Packing Specimens for Transportation

Goal: protect specimens during transportation

- Use three packaging layers
- Use water tight first layer
- Use absorbent material in all layers
- <500mL of liquid in specimen collection container
- If transporting specimens a long distance, send on dry ice. If transporting a short distance, ice is acceptable

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SAMPLE PACKAGING

Samples must be packaged to withstand: –

- ✓ Shocks and vibrations, Pressure changes, Other conditions encountered during transport, Weather, Temperature and Rough handling

Packaging Basics:

- ❖ Prevent breakage – Pad and protect from rough handling
- ❖ Prevent spills/leaks – Double waterproof barriers
- ❖ Use Absorbent material for the absorption of spilled liquids .
- ❖ Maintain cold chain
- ❖ Labeling of Potentially hazardous materials is compulsary

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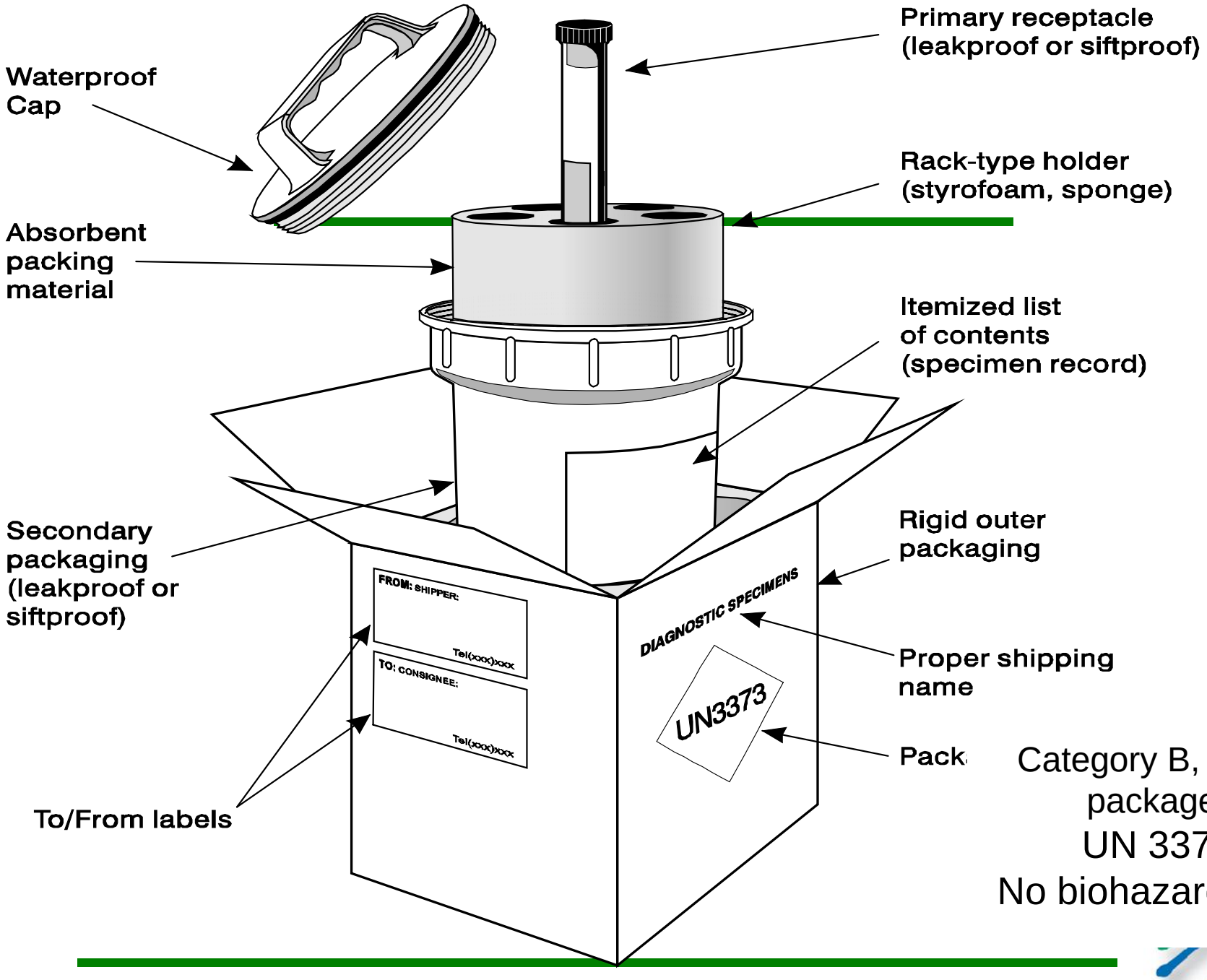

Category B, "650 package"
UN 3373
No biohazard label

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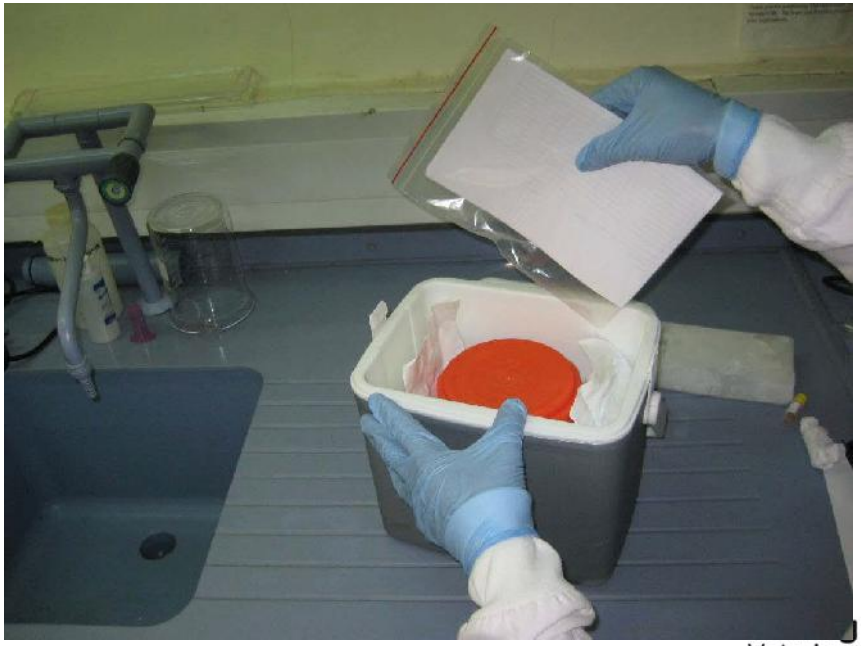

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Diagnostic Sample (ice pack)

Storage & Shipment at Ambient Temp

BLOOD FILTER PAPER METHOD

Conventional samples :

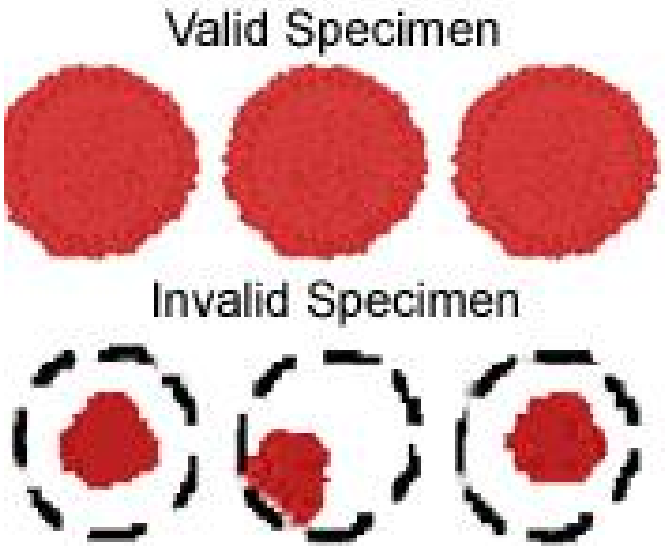
Tissues and blood samples, viral nucleic acids were prepared and stored at 80°C

In Whatman 3-MM filter papers were cut into 5 x 0.5 cm strips.
The strips were soaked in whole blood , tissue suspension, allowed to dry., stored at room temperature (22–25°C) or at 37°C

Antibodies from 3-MM filter papers eluted in a volume of 100 µl ELISA buffer for 2 hr

African Swine Fever Diagnosis Adapted to Tropical Conditions by the Use of Dried-blood Filter Papers

. V. Kouakou[2,*], V. Michaud[3,4], J. Fernández-Pinero[5], C. Gallardo[5], narivahiny[1], E. Couacy-Hymann[7], M. Raherimandimby[8] and E. Albina[4,9]



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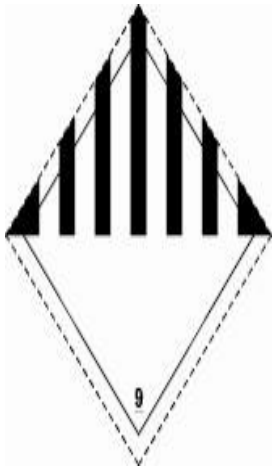
MARKING AND LABELING OF PARCEL

Hazard label for dry ice



Hazard label for Category A infectious substances

Orientation label to be placed on two opposite side

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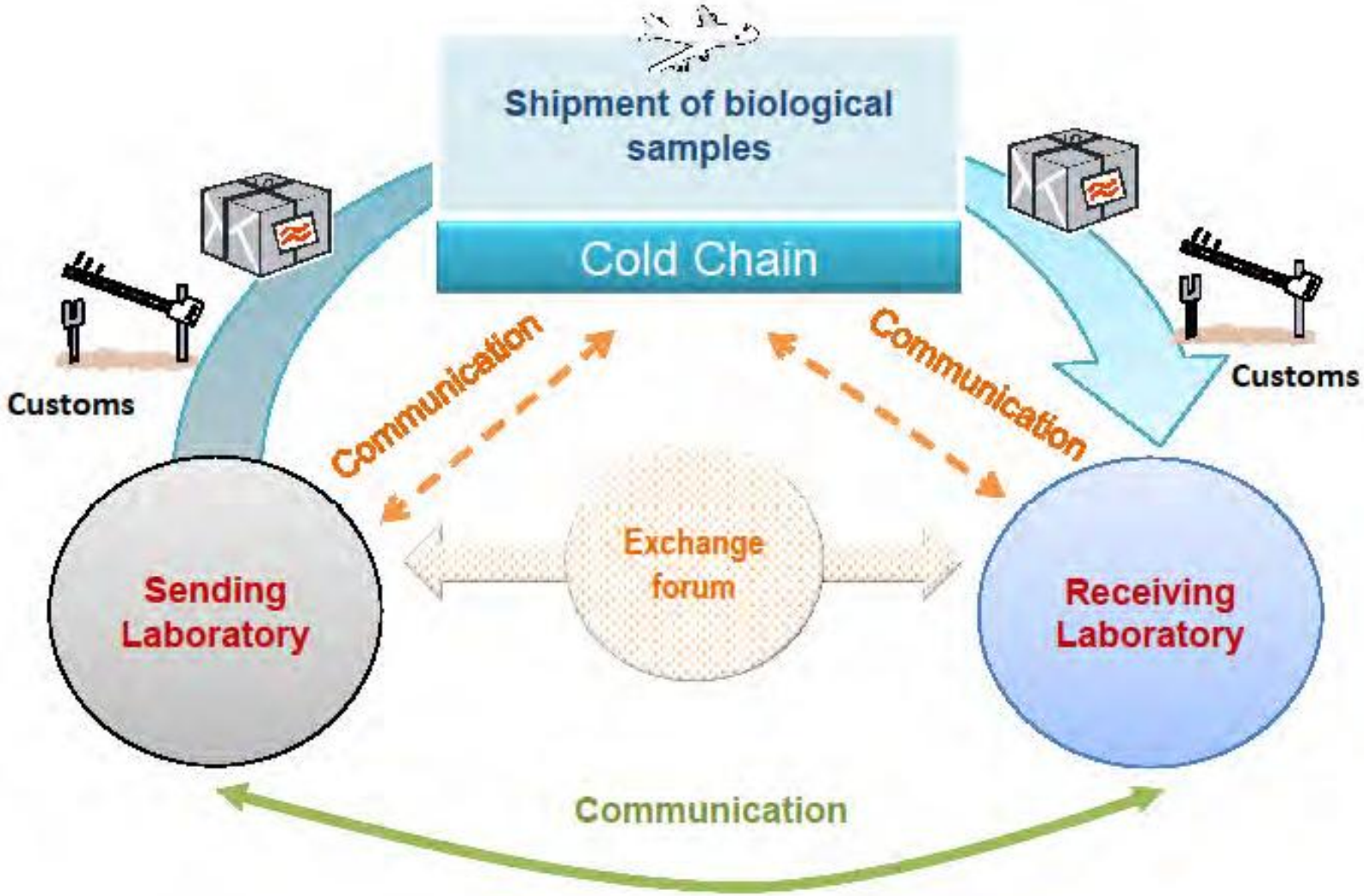
Shipment of Samples



Sample Preservation

- **Serum:**
  - 4 ° C
  - -20 ° C for storage
- **Tissue/swabs/virus:**
  - 4 ° C (up to 72-96 hours)
  - -70 ° C – long term storage
  - -20 ° C not recommended

Laboratory Safety

Dr. Terrence Tumpey examines reconstructed 1918 Pandemic Influenza Virus inside a specimen vial in a Biosafety Level 3-enhanced laboratory setting. Courtesy CDC/James Gathany.

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BIOSAFETY CONTAINMENT LEVELS

Risk Group 2

Risk Group 3

Risk Group 4

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Personal Protective Equipment for Caring for H5N1 Patients

- Masks (N-95 or N/P/R-100)
- Gloves
- Protective eye wear (goggles)
- Hair covers
- Boot or shoe covers
- Protective clothing (gown or apron)


Disease Eradication and
Control through
Immunization

Right diagnosis is contingent upon type of sample collected, timely dispatch, proper storage and the management of results generated by the laboratory

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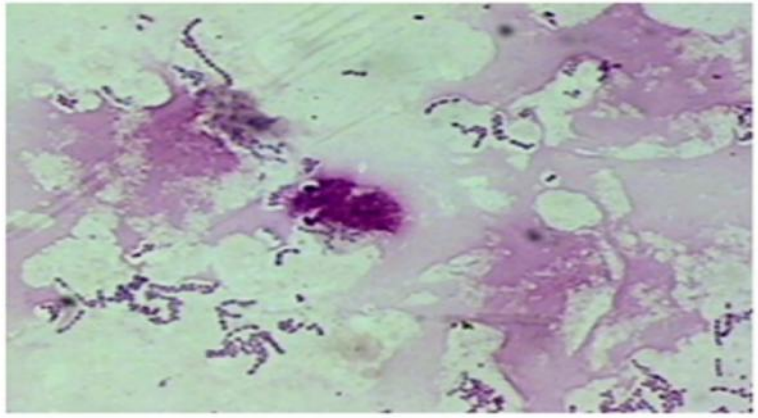


Fig. 3. Acute septic inflammation-Calf-Streptococci organism free and in the cytoplasm of neutrophil (Phagocytosed)

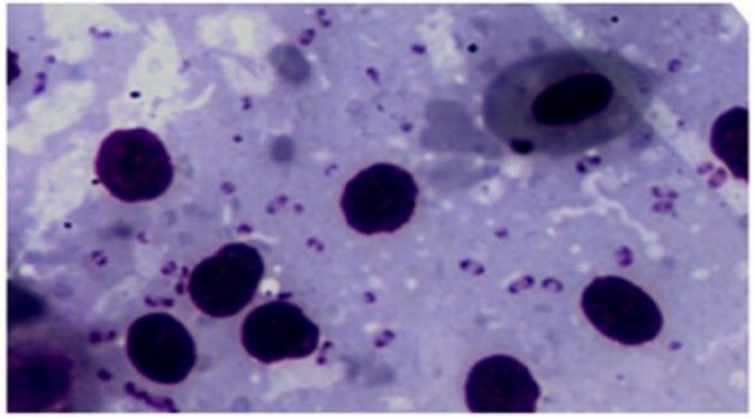


Fig. 4. Fowl cholera-Necropsy-Liver impression smear-Bipolar organisms (arrow). Note a nucleated avian RBC

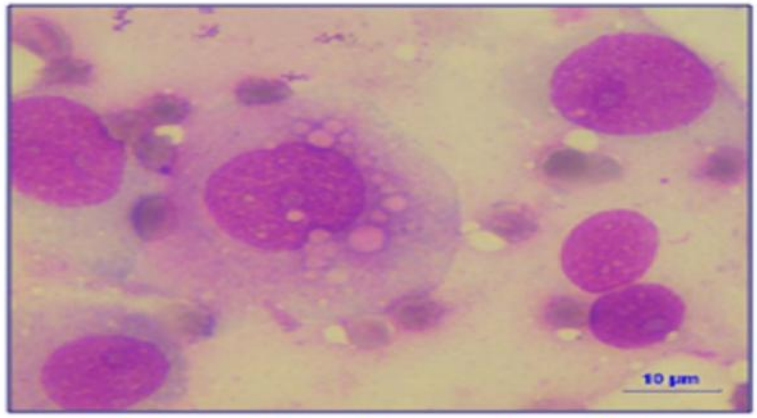


Fig. 5. Canine distemper-Necropsy-Urinary bladder smear-Intracytoplasmic & intranuclear inclusions (arrow) in epithelial cell

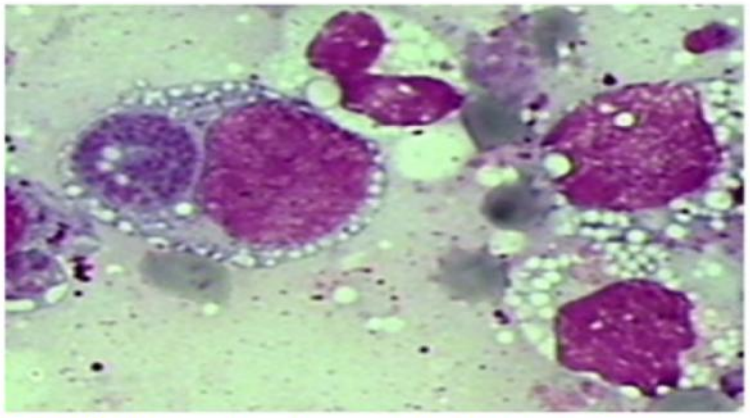


Fig 6. Cattle-Lymph node smear-Koch's blue bodies (arrow) in the cytoplasm of lymphocyte of Theileria infected cattle

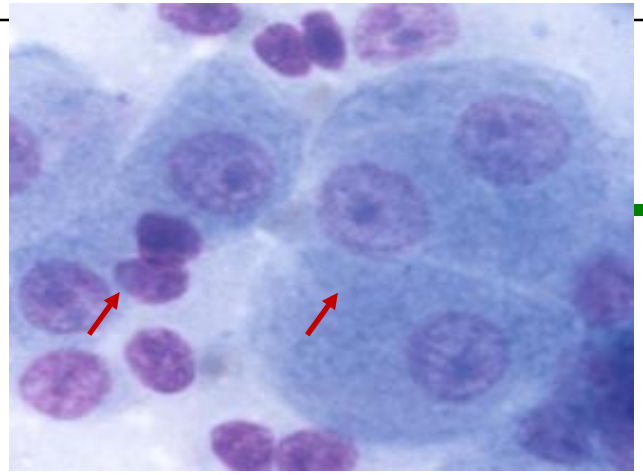


Fig.13. Dog-Perianal adenocarcinoma-Variable sized hepatoid cells and nucleoli (arrow)

Fig.14. Dog-Skin-Fibroma-Note spindle shaped cells

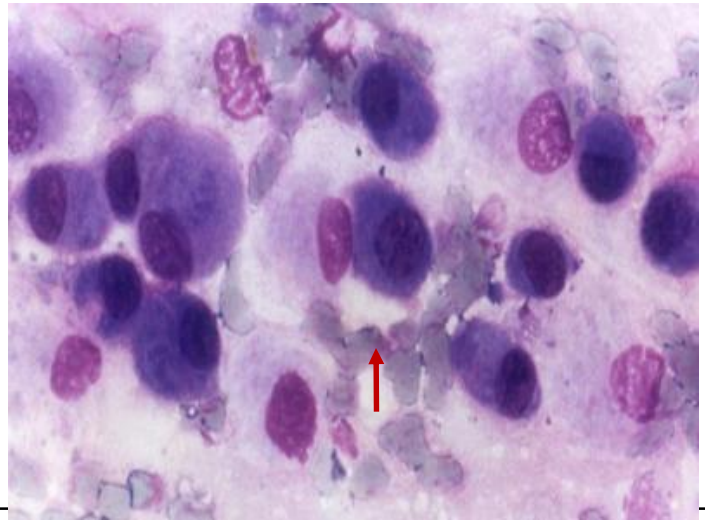


Fig.15. Dog-Bone-Osteosarcoma-Variable sized oval cells, eccentric nuclei, highly basophilic cytoplasm (arrow)

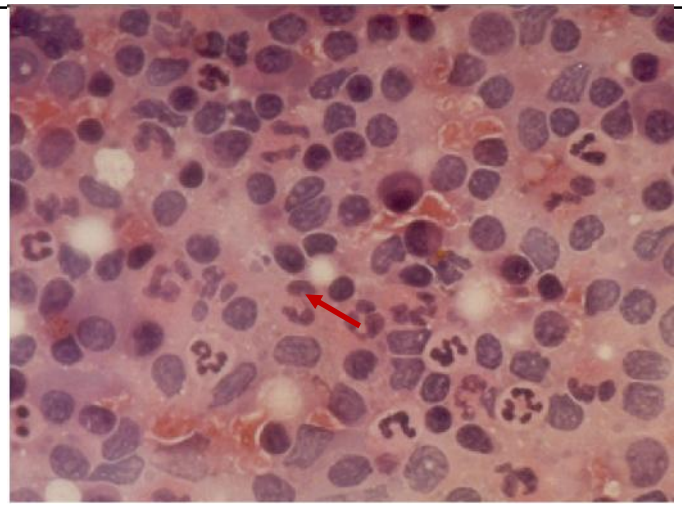
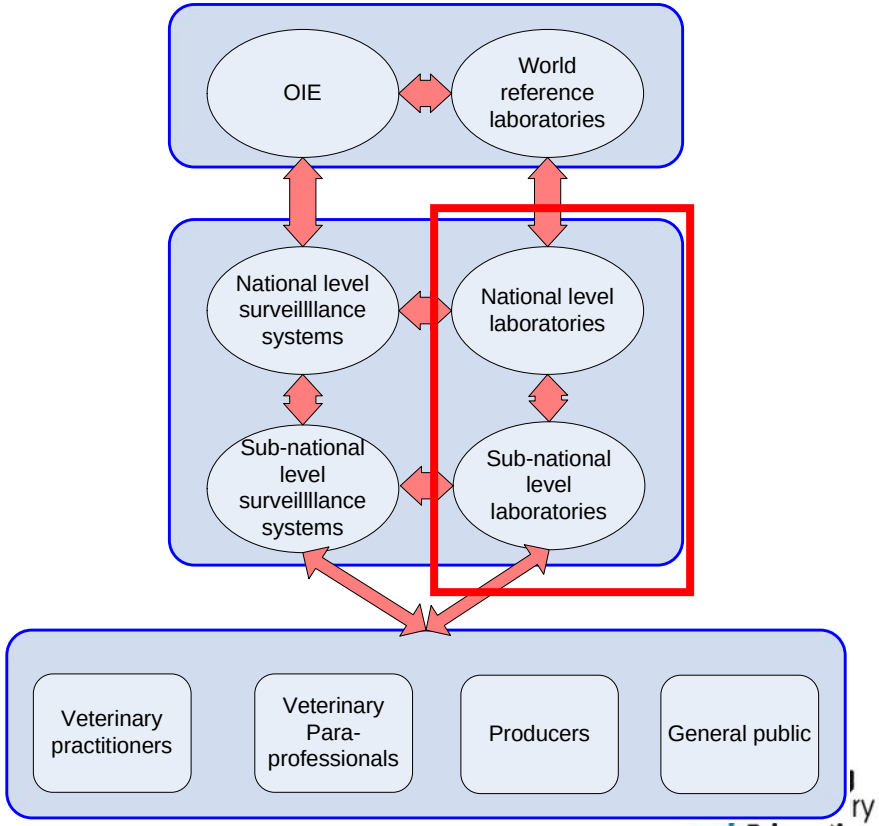


Fig. 16. Dog-Lymph node-Acute lymph adenitis-Note many neutrophils (arrow) are present. H&E stain

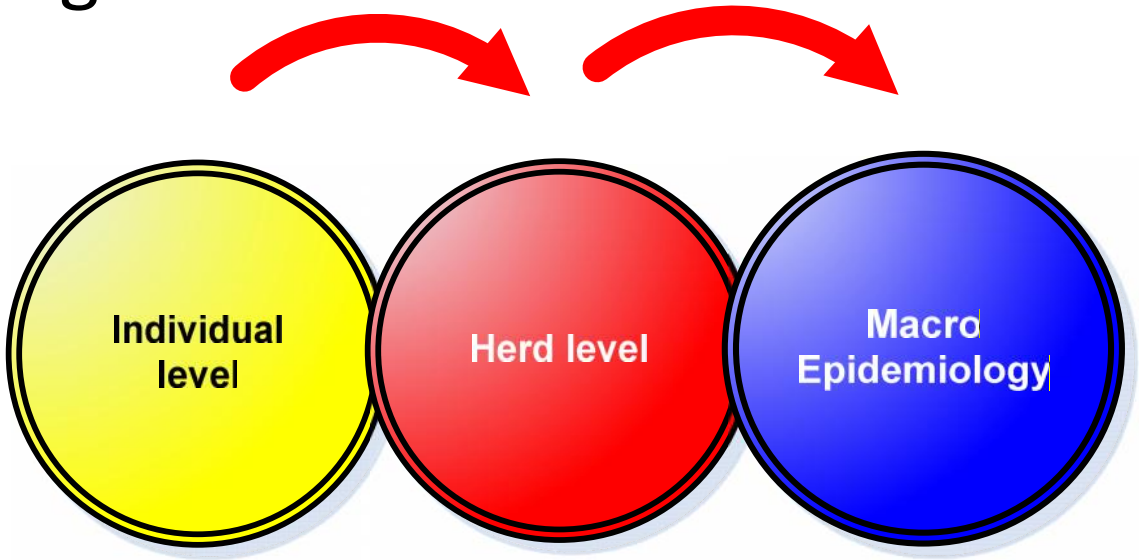
Diagnostic capabilities

- Fewer veterinarians have an interest
- What is the role of the veterinarian in the lab?
  - Provide the “big picture”
- Increased dialogue between epidemiologists and the lab
  - Eliminate the “us and them” mentality



Population based approaches

- Need to shift from individual clinical case emphasis to broader population-based thinking



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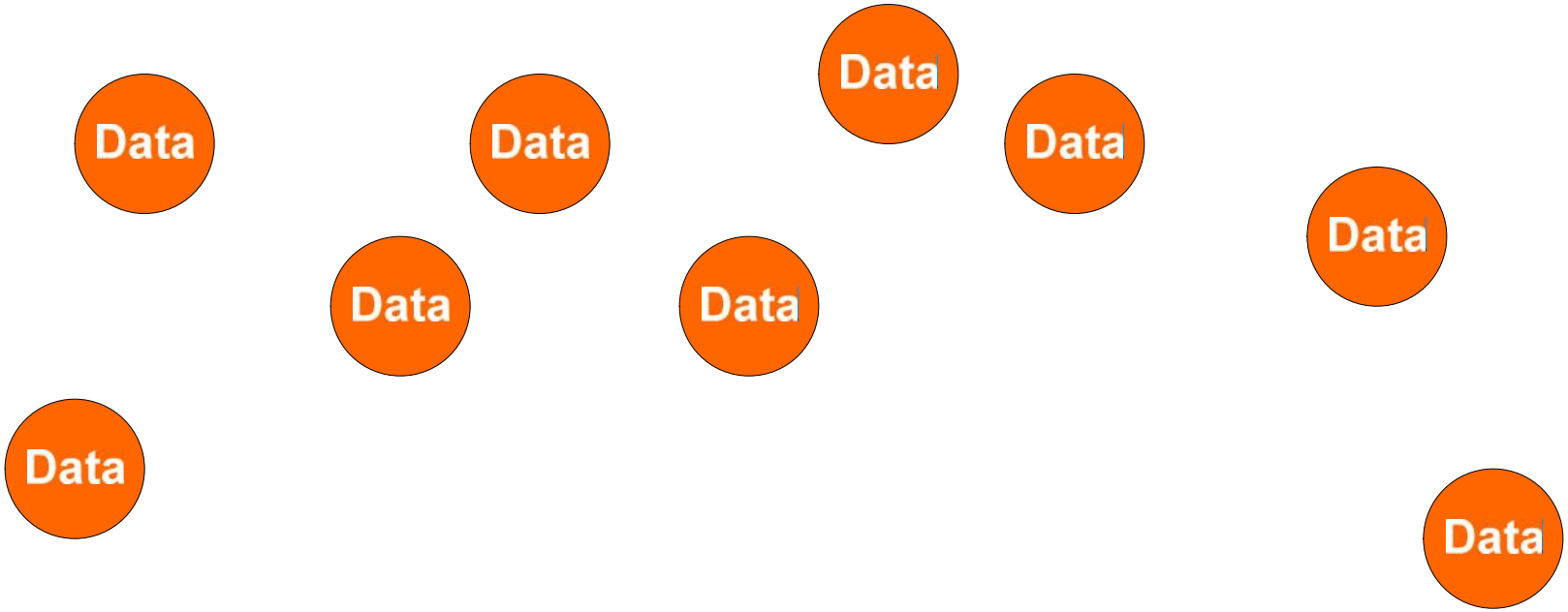
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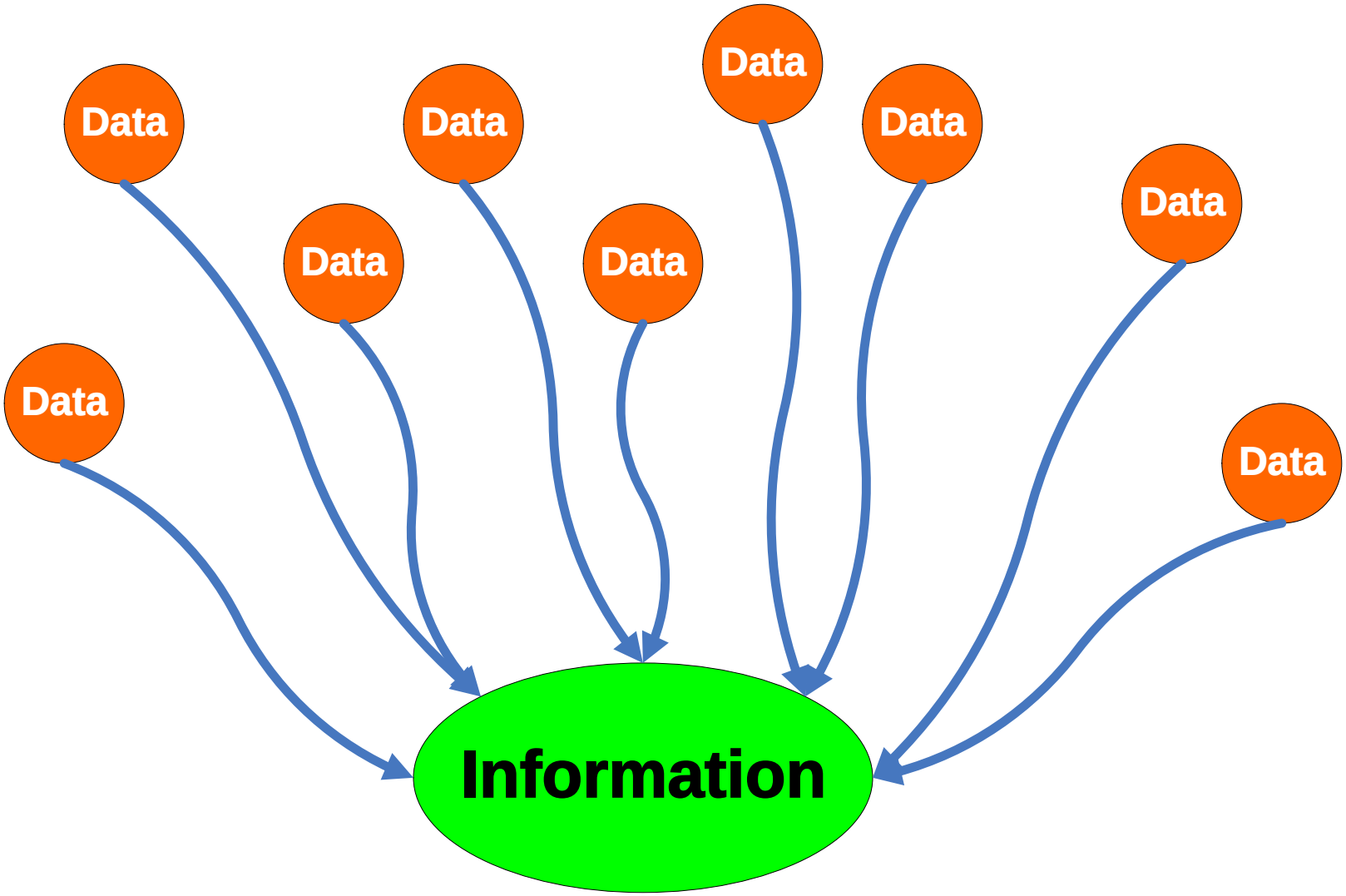
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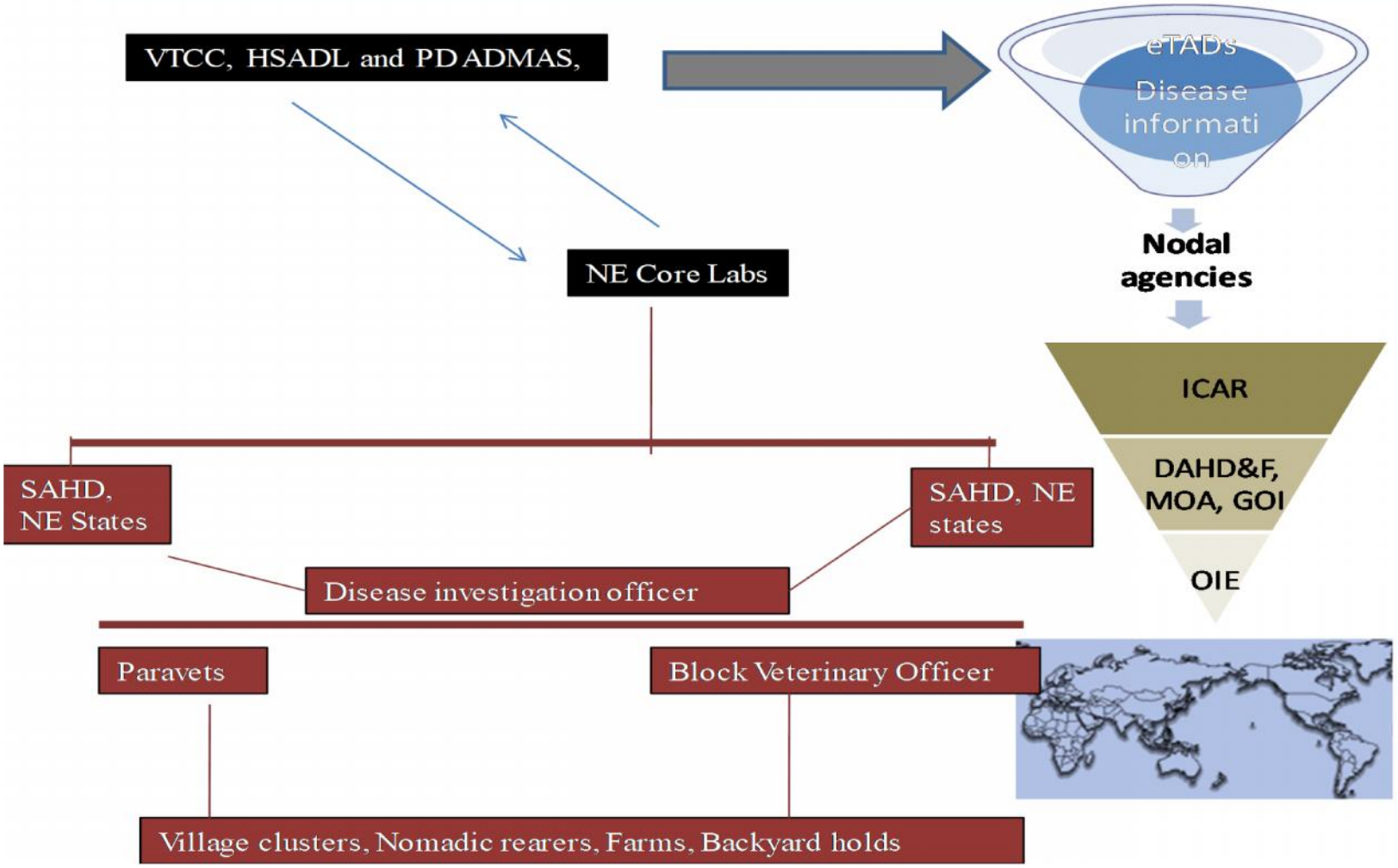
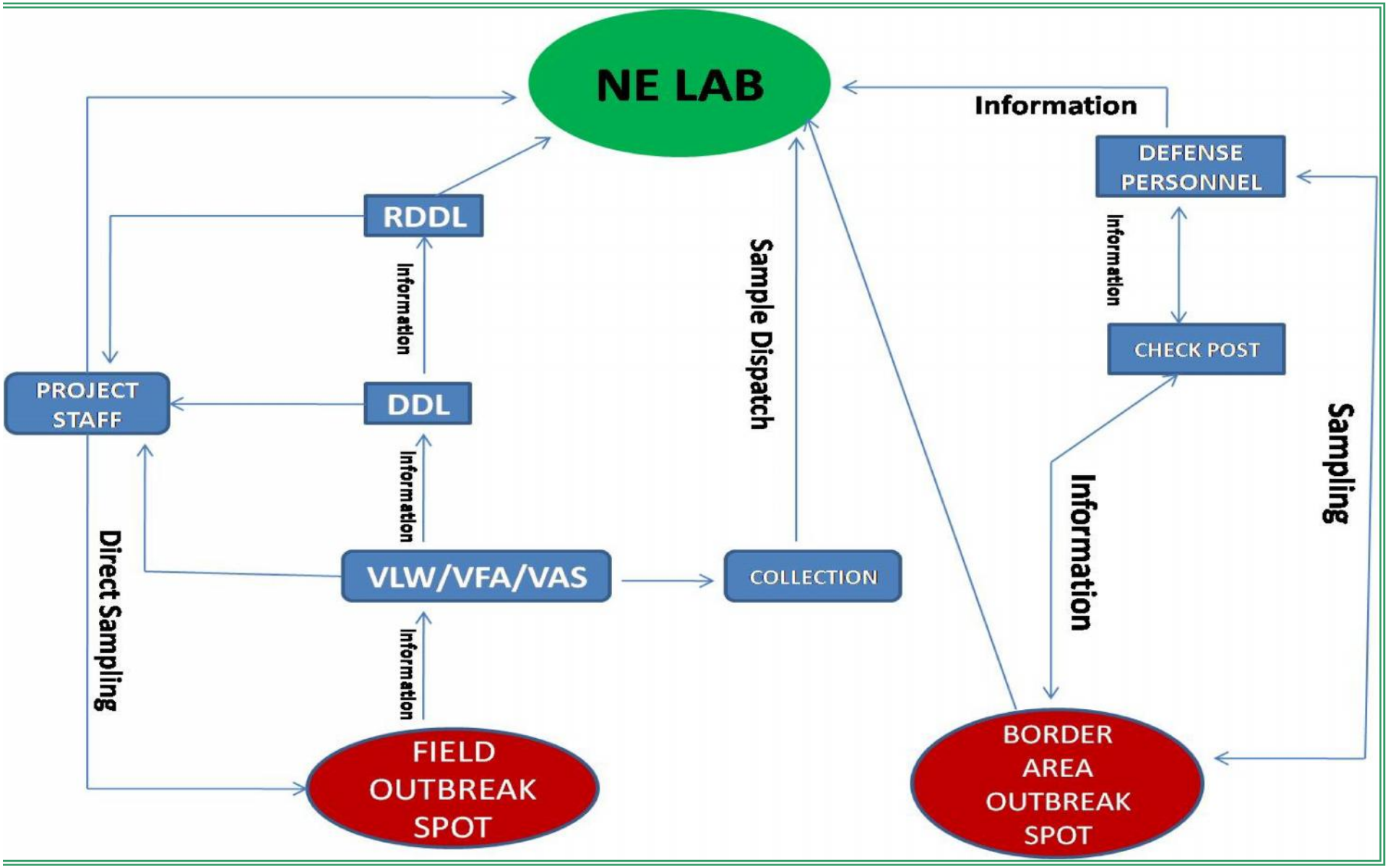
BASIC WORKING PLAN AND LINKAGES

Network & Work Flow Diagram



WORK PLAN - SAMPLING



Role of Paravets in Disease Surveillance and control

- Livestock are a major asset for rural households throughout the developing world and are increasingly regarded as a means of reducing poverty.

- However, many rural areas are characterised by limited or no accessibility to veterinary services.

- Economic theory indicates that primary level services can be provided by paraveterinary professionals at different capacities.

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How Paravets can support in Disease Surveillance and control programmes

Paravets involve in sample collection from tertiary part.

Regular and timely dispatch of samples to the core labs .

Incorporating disease related information in the state disease database and monthly outbreak reports.

Enforcing disease restriction/quarantine measures if deemed fit from time to time.

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How to enhance efficiency

Training issues and the technical competence of community-based animal health workers

For many veterinarians who make or influence policy, the ability of CAHWs to correctly diagnose diseases and administer drugs is a key issue. In part, these concerns relate to the short duration of training of these workers and in some areas, the use of illiterate CAHWs. Justifiably, policy makers need to feel confident that the use of CAHWs will not lead to drug resistance or food safety problems.

Changes in veterinary curricula

- Increased training in **applied** epidemiology at the undergraduate level
  - Practical applications
- Emphasis on the human-livestock-wildlife interface
- Increased awareness on the importance of surveillance at graduate programs in epidemiology
  - National and international obligations
  - Exposure to animal health officials

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Graduate level programs

- Increased offer in graduate-level programs
- Expensive
  - Funding sources are critical
- Long term commitment
- Problem to secure the current position when the trainee returns

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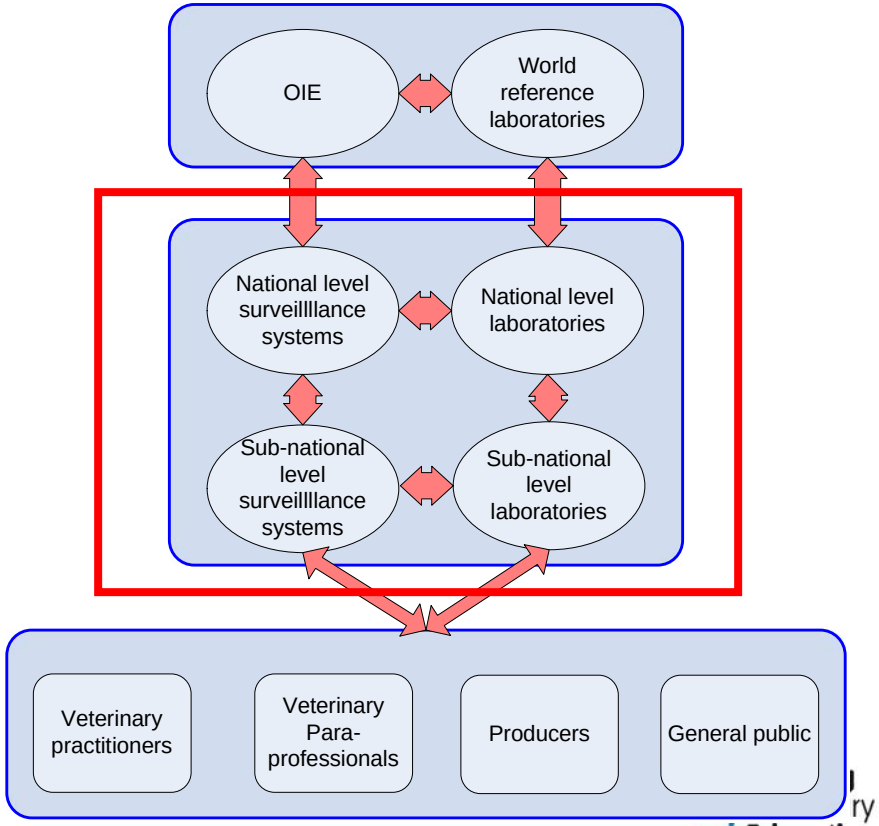
Possible approaches

- Modular approaches
  - Diploma and MSc
- Distance education
- Mixed delivery modes
- Possibility to accumulate credits from multiple institutions
  - Across international borders



Short courses

- Very useful
- Targeted to a specific objective(s)
  - e.g. surveillance, biosecurity, risk analysis
- Allow participants to return to their work and apply new knowledge

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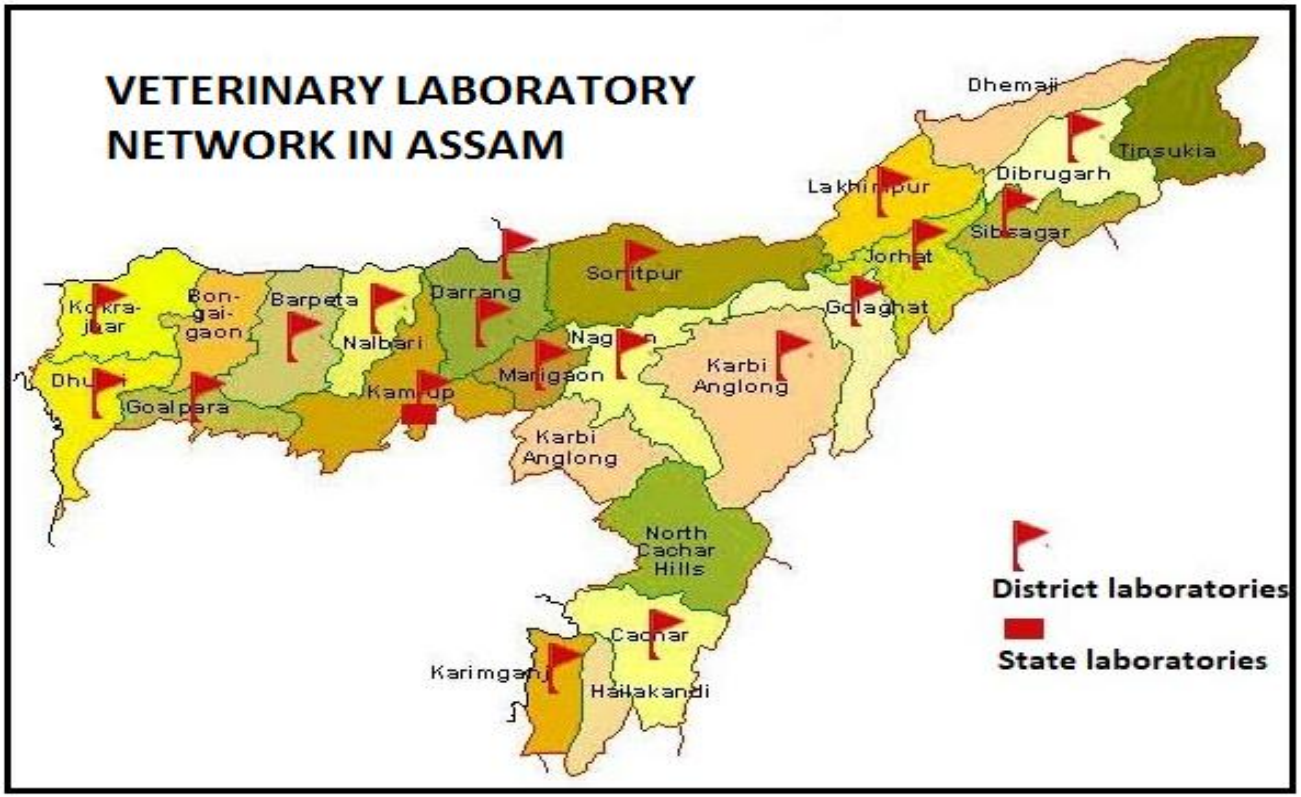
Examples of names, tasks and duration of training for community-based veterinary workers *

Name	Project and country	Tasks and duration of training
Barefoot Veterinary Technician	Action for Food Production, India (5)	Deworming, vaccination, first aid and use of ethnoveterinary medicine. Trained for twenty days plus refresher training
Village Animal Health Worker	Animal Health Improvement Training Programme, United Mission to Nepal, Nepal (85, 92)	Various curative and preventive services, including use of anthelmintics, antibiotics, acaricides and vaccines. Trained for two weeks with four- to five-day refresher courses
Basic Veterinary Worker	Dutch Committee for Afghanistan, Afghanistan (83)	Focus on vaccination campaigns and the use of anthelmintics; some curative treatments. Trained for one month
Veterinary Livestock Specialist; Village Poultry Specialist	Aga Khan Rural Support Programme, Pakistan (9)	Focus on preventive measures, particularly vaccination and extension; disease surveillance. Village Livestock Specialists are mainly men, whereas Village Poultry Specialists are all women. Trained for three to four weeks
Village Livestock Promoter	VETAID, Mozambique (70)	Prevention and treatment including use of antibiotics, anti-protozoals, anthelmintics and acaricides; organisation of Newcastle disease vaccination, extension advice on nutrition and reproduction, disease surveillance. Trained for three weeks
Veterinary Auxiliary	Vétérinaires sans frontières, Senegal (97)	Vaccination of poultry, small ruminants and cattle; use of anthelmintics, trypanocides and other drugs. Trained for twenty-three days in four separate courses
Community Livestock Auxiliary	Various, Zambia (44)	Use of anthelmintics, acaricides, long-acting oxytetracycline and non-prescription medicines; castration, hoof trimming, dehorning; disease surveillance. Trained for two to four weeks
Community-based Animal Health Worker	Pan African Rinderpest Campaign, Ethiopia (4)	Prevention and treatment of helminthiasis, fascioliasis, tick infestation, trypanosomiasis, miscellaneous infections; use of heat-stable rinderpest vaccine; disease surveillance. Trained for ten days plus refresher training
Promoteurs d'élevage	Vétérinaires sans frontières, Guatemala (77)	Basic preventive and curative measures, including vaccination. Initial basic training of four weeks followed by additional training periods of three to sixteen days
Village Keyman	German Agency for Technical Co-operation, Malawi (44)	Focus on worm and tick control; vaccination against Newcastle disease and blackquarter. Trained for four days



•Head of the laboratory (Assistant Research Officer)	-1
•Veterinary Officer	1
•Laboratory Assistant (Veterinary Field Assistant)	-1
• Laboratory Assistant (Graduate with Chemistry/ Bio Chemistry)	-1
•Grade IV	2

ADVANCED ANIMAL DISEASE DIAGNOSIS AND MANAGEMENT CONSORTIUM

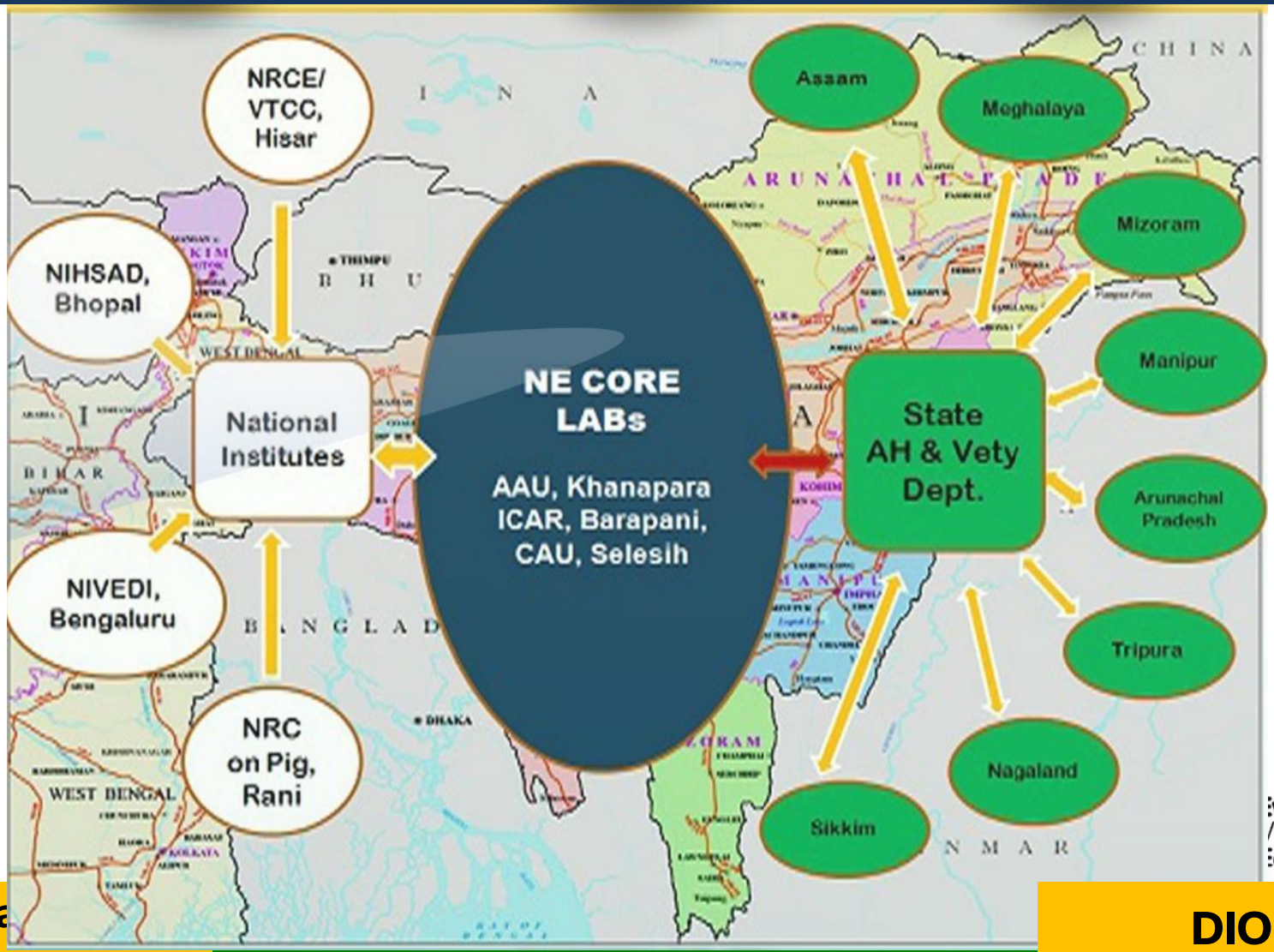
DBT Sanction Order No. & Date: NER/LIVS/11/2012 dtd.24.04.014

SIGNIFICANT ACHIEVEMENTS

Total Duration of tyhe Project : 5 years (April 2014-March 2019)

DEPARTMENT OF BIOTECHNOLOGY

ADMaC NETWORK PARTNERS

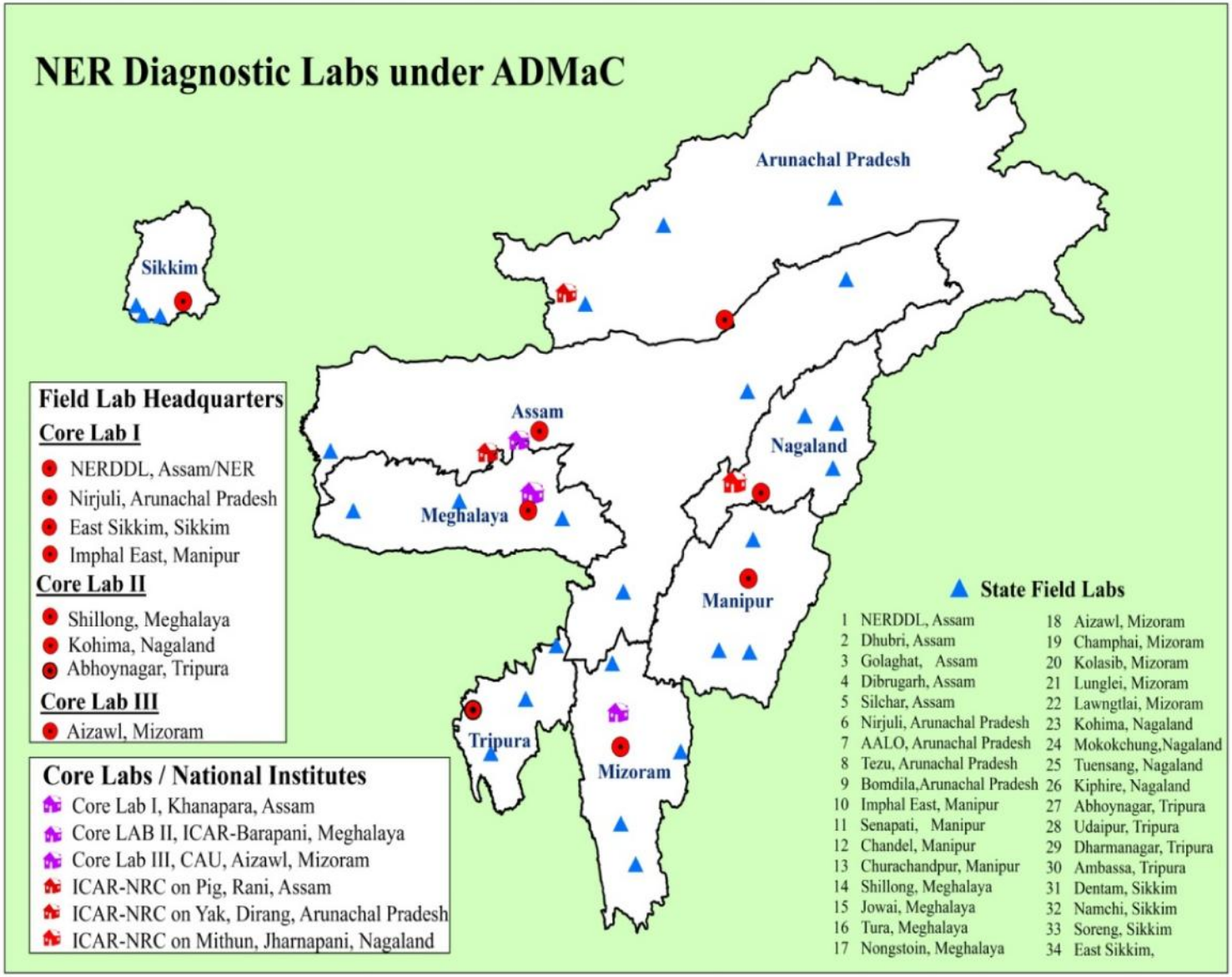


National La

NER Core Labs - 3

DIO Lab - 8

DISTRIBUTION OF ADMaC LABS IN NER



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Development of laboratory capability at field units

Facilities created	Type of SOPs/kits available*
Lab manual, Lab data entry register	A working manual for field labs is prepared. Lab technicians of all 7 states except Tripura were trained in the core Lab-I. For entry of disease and sample data a register was provided to all 3 states under Core Lab I.
Plastic, glass wares, and chemicals, Transport media	In the states of Assam, Arunachal Pradesh, Sikkim minimum utensils and appliances required for disease diagnosis are provided. Again all necessary chemicals for preparing reagents are also supplied.
Mastitis detection kit	Mastitis detection reagents and appliances are supplied to 12 field labs under core Lab-I.
Staining reagents	Gram's stain, Acid fast stain, Lactophenol cotton blue stain and Giemsa stain are supplied to above labs.
Screening of Tuberculosis	Tuberculin reagent with slide caliper is supplied.
Screening of Brucellosis	Brucella plate agglutination reagent and Milk ring test reagent are provided.
Detection of Parasitic eggs	Reagents required for floatation and sedimentation techniques for demonstration of parasitic eggs are supplied.
Detection of Haemoprotozoa	For demonstration of haemoprotozoa, staining reagents and positive slides are provided.

WORK PLAN – EDUCATION & TRAINING

Customized, need based training modules

Modules	Trainers	Trainees
• Sampling • Data entry • Transportation • Preliminary and advanced diagnosis • TAD importance • Epidemiology • Surveillance • Data analysis • Software management • Reposition • OIE protocols • Basic microbiology	• NE labs • NE Labs/PDADMAS • NE Labs/VTCC • NE Labs/ IVRI-HSADL • IVRI-HSADL/VTCC • North East labs/ State AH Deptt.	• State Animal Husbandry personnel • Contractual staff of core labs • North east scientists (Advanced overseas training) • State Animal Husbandry Disease investigation officers • Paravets

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Programme Organized For Veterinary Officer Training And Awareness And VFA

Year	Training Imparted to	Number of Participants
2014-18	Paravets/VFA	**All 8 states**
2014-18	Veterinary Officers	**All 8 states 2 times**
2014-18	SRF and JRF's Asst. Professor, Junior Scientists and SRF SRF and JRF's Junior Scientist	i. ICAR-NIVEDI -- **6no.s** ii. ICAR-NIHSAD-- **2 no.s** iii. NRC-Equine -- **2 no.s** iv. ICAR Deptt. of Pathology, GADVASU -- **1 no**.
2014-15	DIO, technician and paravet	**13**
2015-16	DIO, technician and paravet	**12**
2016-17	DIO, technician and paravet	**33**

Transfer of diagnostic kits to field labs


Handing over of Diagnostic Kits to Nagaland (07/11/2017)


Handing over of Diagnostic Kits to Meghalaya (07/11/2017)


Handing over of Diagnostic Kits to Tripura (07/11/2017)


Handing over of Diagnostic Kits to Mizoram (07/11/2017)

Handing over of Diagnostic Kits to Manipur (23/08/2017)

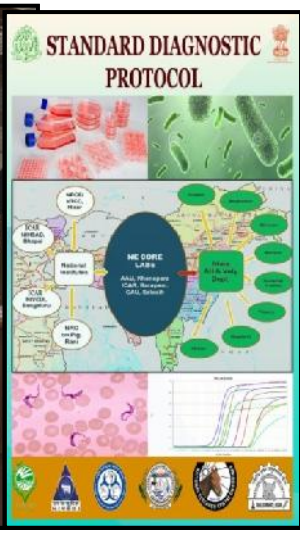

Handing over of Diagnostic Kits to Sikkim (13/09/2017)


Handing over of Diagnostic Kits to Arunachal Pradesh (06/10/2017)


Handing over of Diagnostic Kits to Assam (07/11/2017)

Release at 3rd Annual Review Meet

ADMaC



Overall, there is a need to shift from a veterinarian with a syringe to a veterinarian/paravets with a *strategy*

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