

Technical session IX

“Basics of Veterinary Vaccinology and Immunization: Protecting Animal Health in Bhutan”

Speaker

Dr Tshering Choden

Senior Veterinary Officer
National Centre for Animal Health

JOIN US

Venue: NVH Conference Hall
Date and time: 09/01/26 at 3:15pm



Scan to join us
for a live session



Vaccine and vaccination in Livestock

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National Center for Animal Health, Serbithang

17/November/2025



Agenda/Expectations

Terminology

Principle of vaccination

Type of Vaccine

Adverse Events Following Vaccination (AEFI)

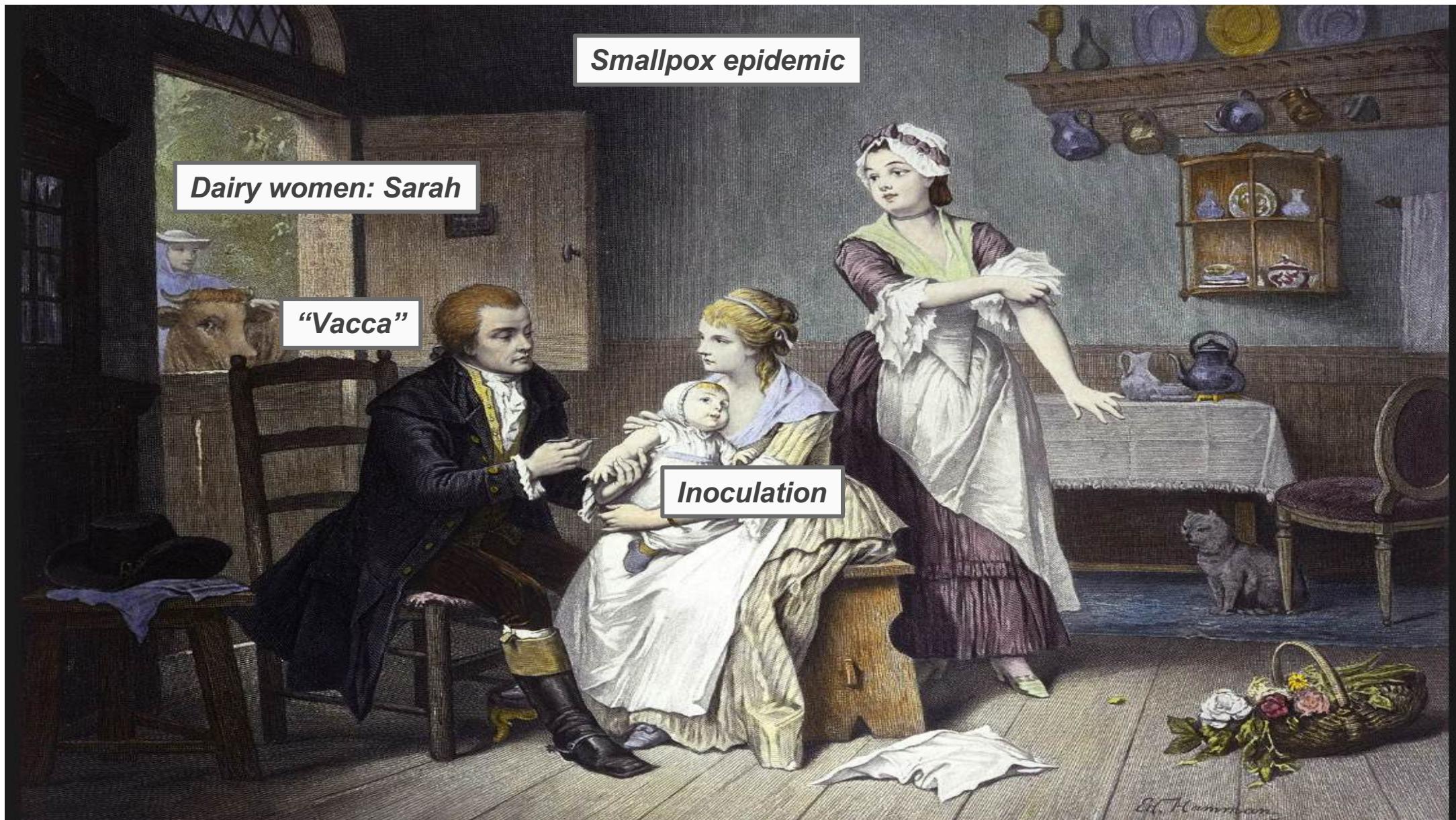
Vaccine Storage, Transport and Cold chain

Smallpox epidemic

Dairy women: Sarah

“Vacca”

Inoculation



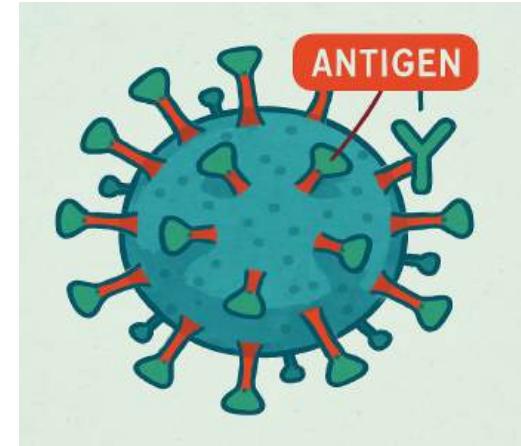
—Terminology

Antigen:

Foreign substance

Triggers an immune response in the body

Proteins on the surface of pathogens

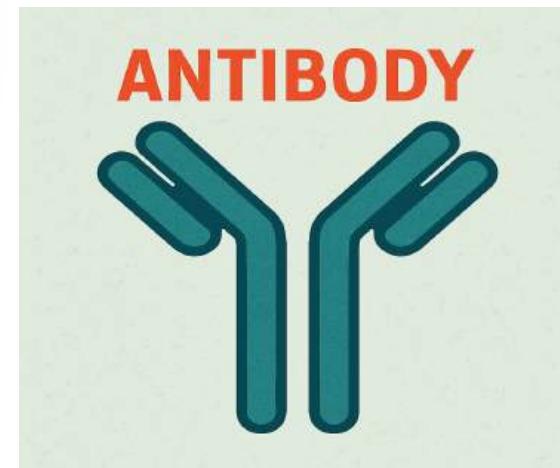


Antigen = “Intruder”

Antibody:

Memory B cells

produced by the immune system



Antibody = “Defender”

Type of Immunity

Passive Immunity

- **Naturally:** antibodies (placenta/colostrum), IgG and IgA
- **Artificially:** serum globulin that contains antibodies formed against the virus (RabiesIgG)

These antibodies are obtained from serum taken from animal donors who previously were infected by or immunized against the virus.

Immediate, but not long-lasting protection

Maternal Antibodies

Active Immunity

Stimulates the immune system to produce antibodies against a particular infectious agent

- **Naturally:** Exposed to a non-fatal pathogens
- Survive/recovers from a first case of the LSD (antibodies that specifically recognize and neutralize the pathogen)
- **Artificially:** Vaccination
Induce memory B Cells (long lasting)

Non-fatal infection OR
Vaccination

Vaccine



- *Microorganisms*
- *Toxins*
- *biological*

Stimulate the immune system

Microorganisms:
*weakened, inactivated, or
proteins or genetic
material of the
microorganism*

Vaccination: Ensure
enough antibodies against a
specific pathogen or toxin
are available
(activated immune system)

How Vaccine Works?

- Outside Body

weakened, inactivated, or
proteins or genetic material of
the microorganism

- Inside Host/body
- Stimulate the immune system
- Stays in System
- Produce **ANTIBODIES**
(Memory Cells)
- Neutralize Ag upon infection

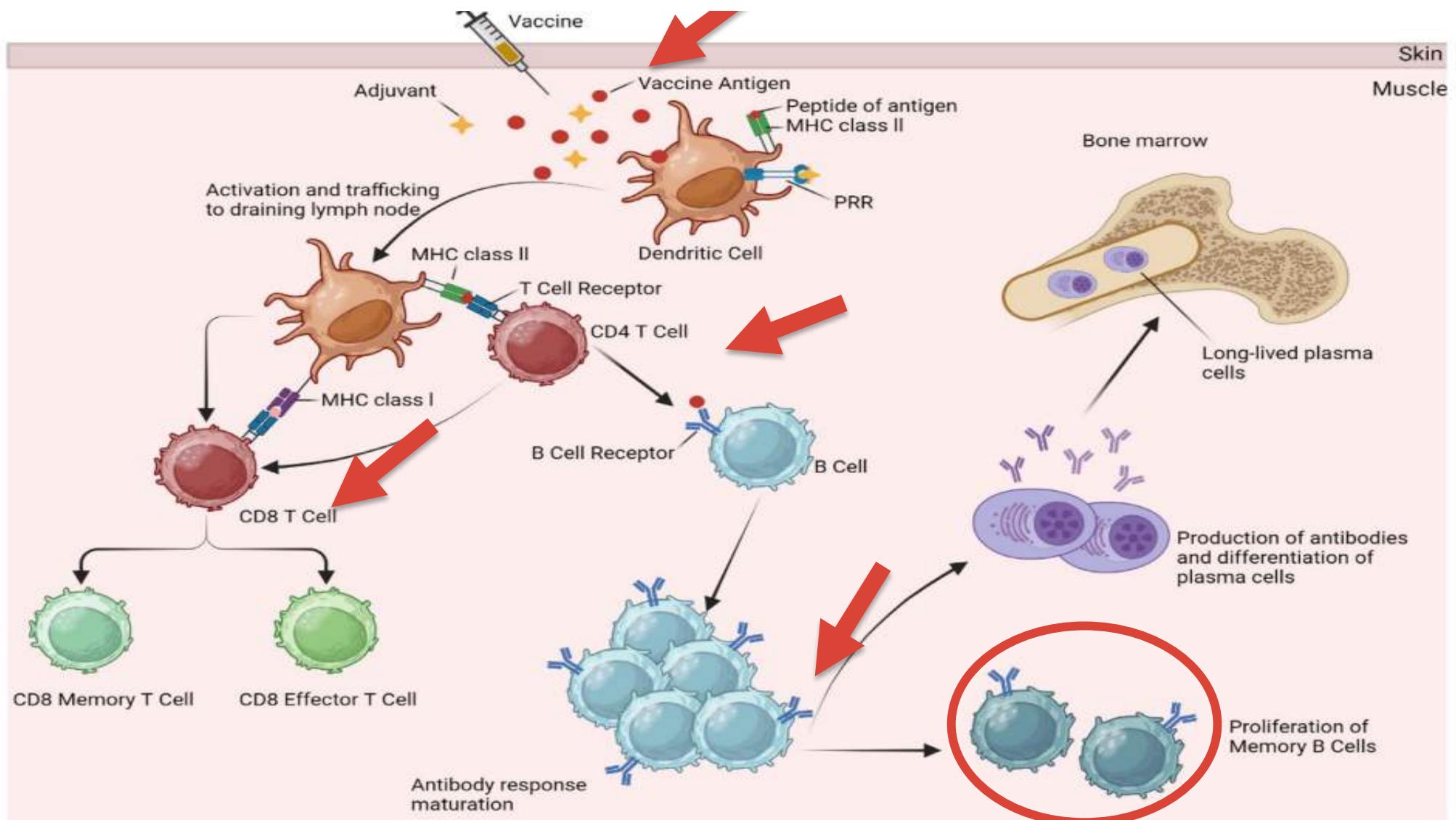
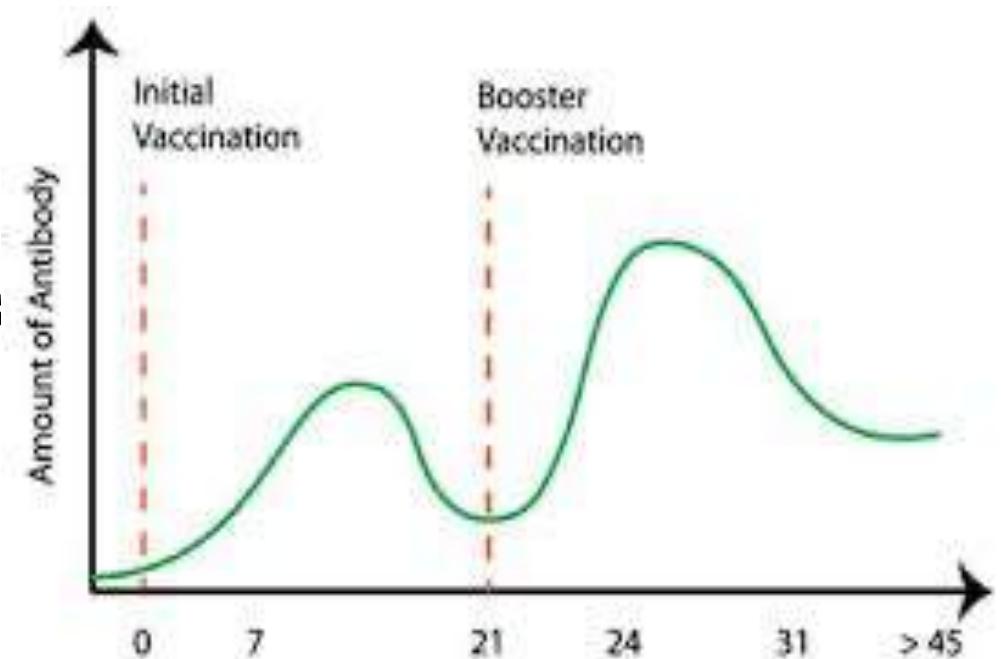


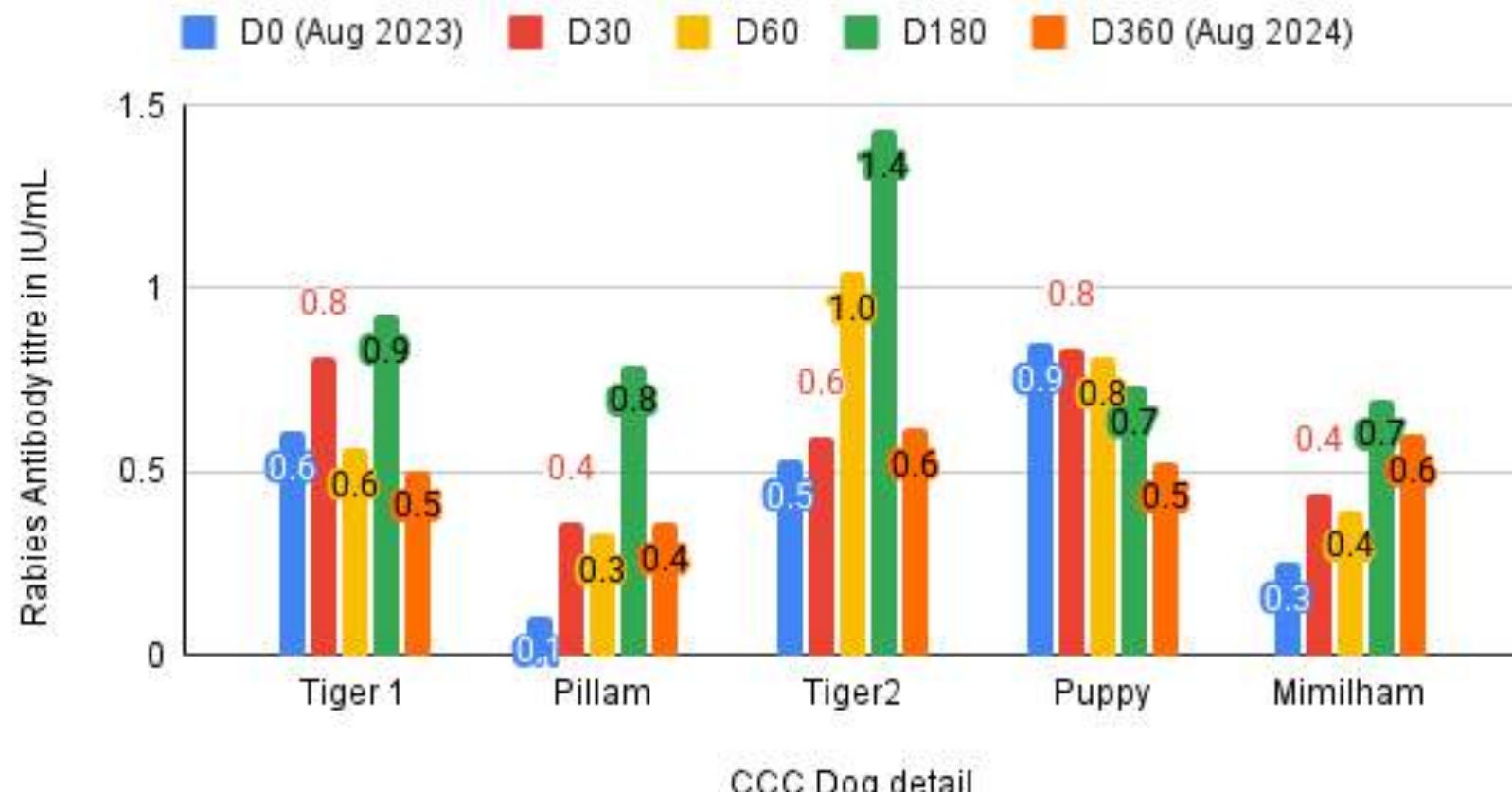
Fig. 1. Generation of an immune response. Created with Biorender.com.

IMMUNITY

- **2 to 4 weeks** after vaccination
- Complete protection by **30 days of vaccination**



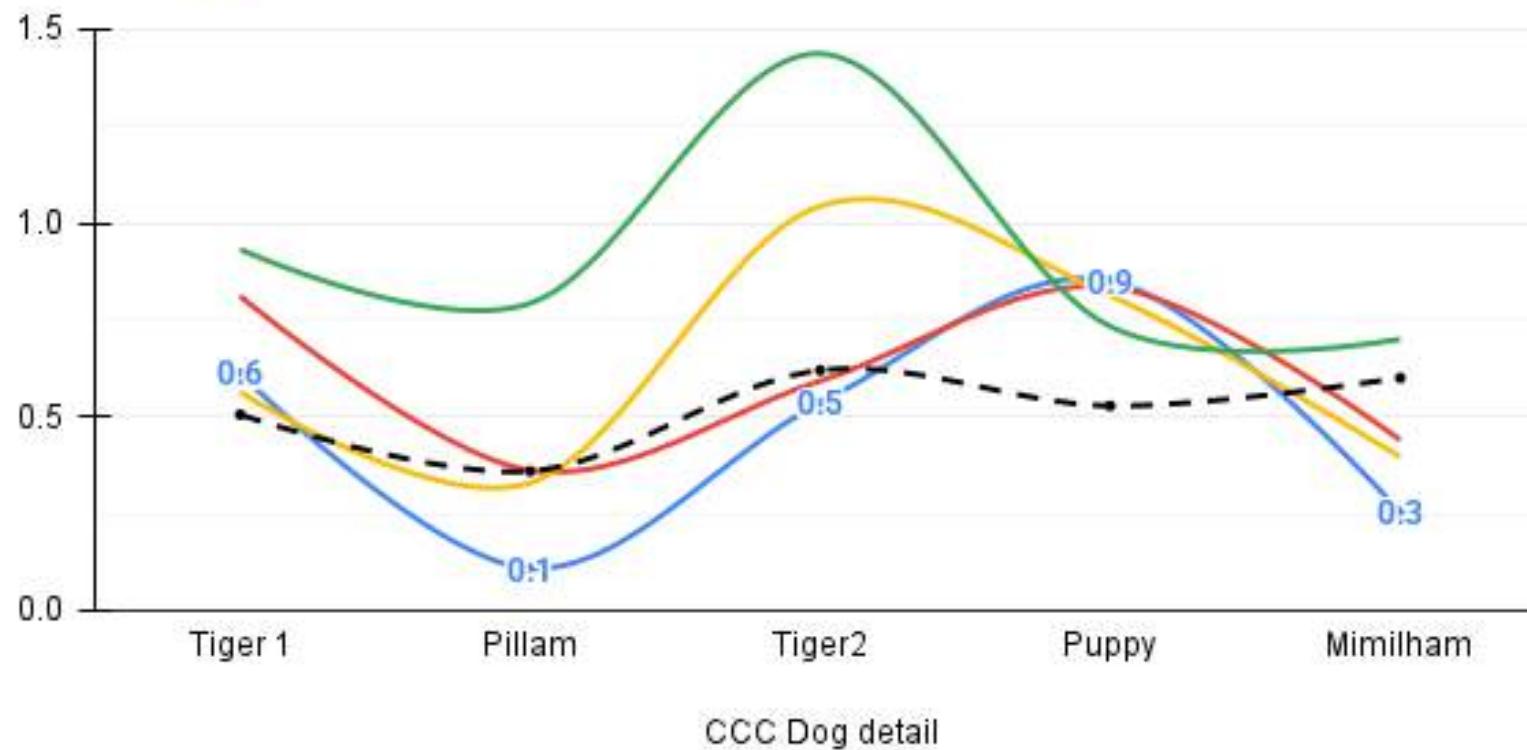
Antibody Titre Measurement of Dogs from CCC Yusipang



>0.5 (IU/mL) is acceptable range

Antibody trendline for CCC dogs

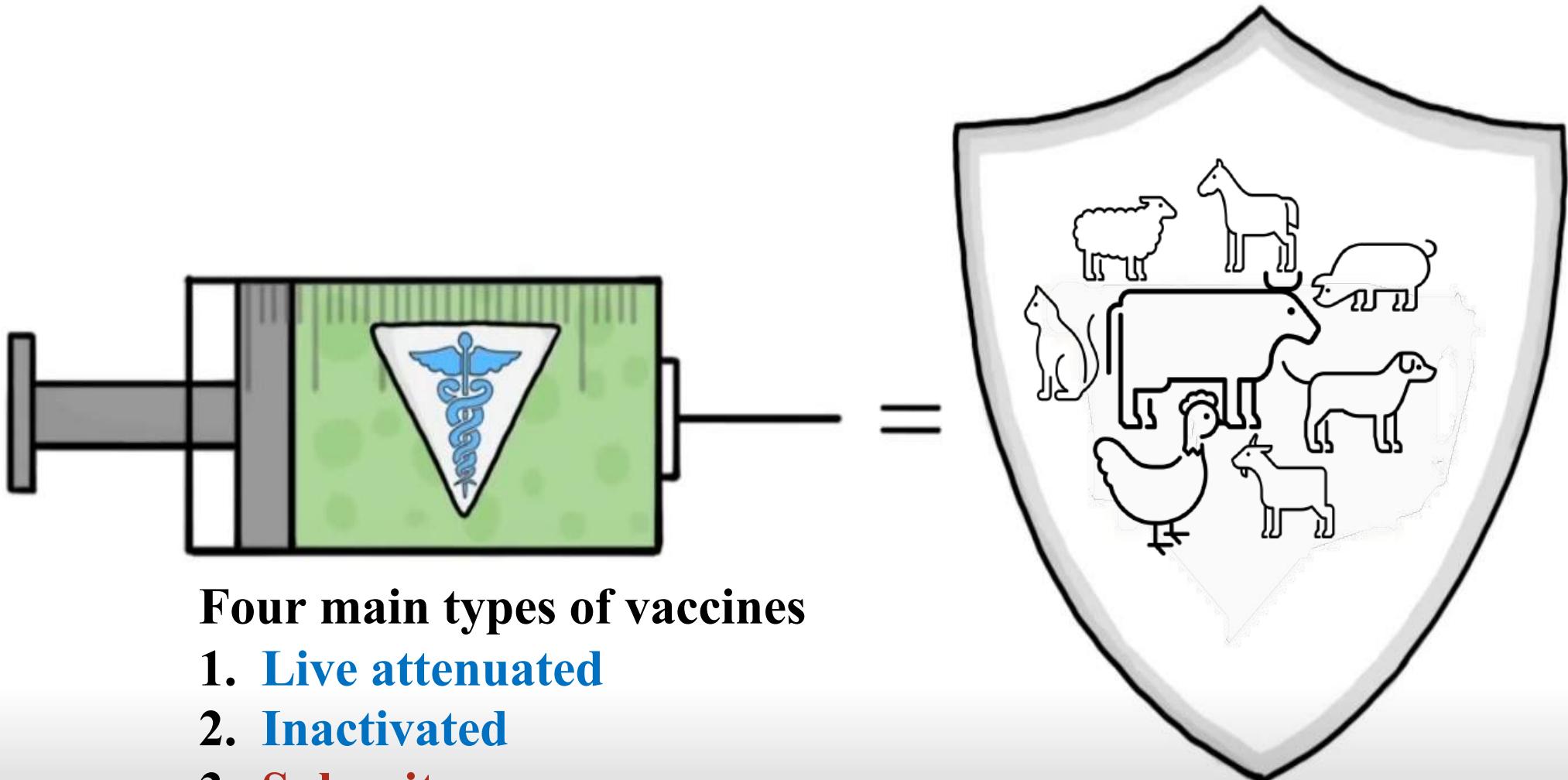
● D0 (Aug 2023) — D30 — D60 — D180 ● D360 (Aug 2024)



- Vaccination and Booster vaccine and retesting (usually 14-30 days)
- Booster vaccination target when Ab titer is below acceptable level NOT Zero
- Vaccination prior to travelling will not induce enough Antibody titer Protection

Why vaccination?

- Individual: produce enough **memory B cells**
- Population level: **herd immunity**
- Prevents **disease outbreaks** (losses due to mortality and morbidity)
- Reduces **antibiotic use**, addressing antimicrobial resistance (AMR)
- Supports **public health** and safety



Four main types of vaccines

1. **Live attenuated**
2. **Inactivated**
3. **Subunit**
4. **Toxoid vaccines**

Live attenuated & inactivated Whole-cell vaccines

Live Attenuated Vaccines (weakened)

- Pathogen Weakened, but still replicates
- Lost ability to cause serious illness but retain the ability to **stimulate immunity**
- Provide strong and long-lasting immunity.
- Examples: *LSDV*
Peste des Petits Ruminants (PPR)

Inactivated vaccines (killed)

- Pathogen killed or **inactivated** with heat or chemicals (formalin)
- Require **booster doses** for effective immunity
 - Examples:
Foot-and-Mouth Disease (FMD) vaccine
Rabies vaccine

Response: Attenuated vaccines > Inactivated vaccines

Subunit and toxoid vaccines

fractionated vaccines

Subunit and Recombinant Vaccines

- Contain specific parts of the pathogen (e.g., proteins, sugars) to trigger immunity.
- Safer with fewer side effects
- Memory Cells never formed, Booster
- Examples:
Rinderpest vaccine

Toxoid Vaccines

- Contain inactivated toxins produced by bacteria.
- Provide immunity against diseases caused by bacterial toxins.
- Examples:
Tetanus toxoid (for horses, cattle, sheep, goats)
Clostridial vaccines (Blackleg, Enterotoxemia)

Vaccine	Specification
Rabies vaccine	Inactivated Rabies virus antigen (strain PV11)
FMD Vaccine	Inactivated Tissue Culture FMD strain (O,A,Asia-1)
HS-BQ Combined Vaccine	Inactivated Pasteurella multocida & Clostridium Chauvoei
Lumpy Skin Vaccine	Live attenuated free dried vaccine of Neethling Strain
Peste des petits ruminant's vaccine	Live vero cell culture based viral lyophilized (freeze-dried) from sungri/6 strain

IBD Vaccine	Live Intermediate type strain
Marek's Vaccine	Live MD vaccine virus serotype 3(HVT FC-126) strain,
Classical swine Fever Vaccine	Live Freeze dried (CSFV-Weybridge strain)
Newcastle Disease vaccine (R2B)	Live , Mesogenic (R2B strain)
NCD(B1) Vaccine	Live B1 strain of Newcastle Disease virus
Fowl Pox Vaccine	Live Fowl Pox Virus Freeze dried pallets

LIVESTOCK AND POULTRY VACCINES USED FREE OF COST IN THE COUNTRY



HS-BQ

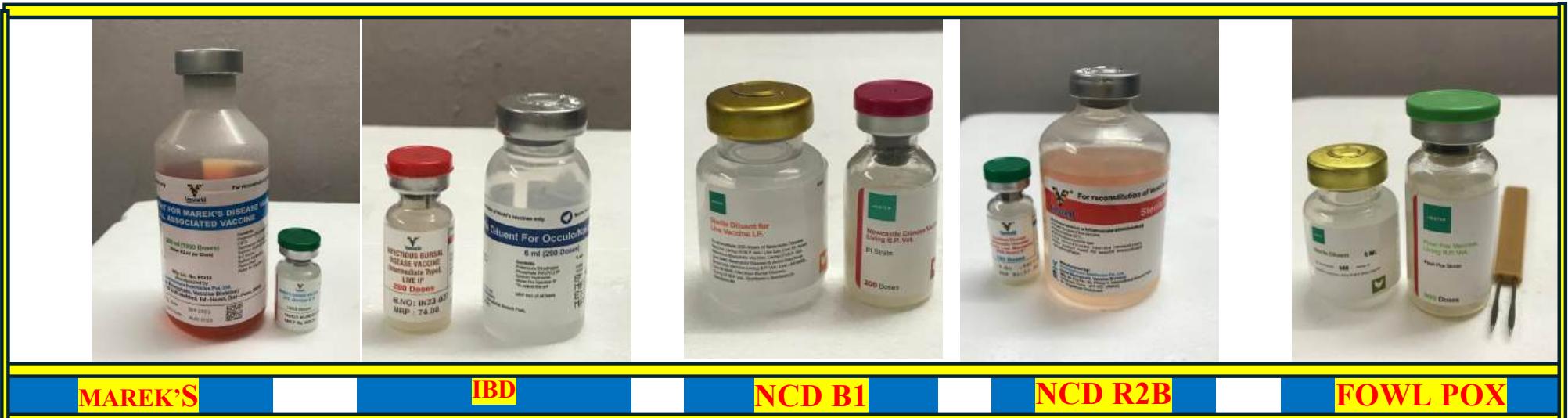
FMD

LSD

PPR

CSF

RABIES



MAREK'S

IBD

NCD B1

NCD R2B

FOWL POX

PET ANIMAL VACCINES PURCHASED BY THE CLIENTS IN THE COUNTRY



DHPPi for dogs

TRICAT TRIO



Contraindications

- Moderate/severe Illness
- Severe Allergy (Anaphylaxis) to previous vaccination
- Compromised Immune system
- Pregnancy (Live attenuated vaccine)



Adverse Event Following Immunization (AEFI)

- **Rare and very mild:** Redness and soreness around the vaccination site(short lived), reduced production
- **severe adverse reactions:** vomiting, high fever, seizure, brain damage, or death, are possible for some vaccines (exceptionally rare, occurring in less than one in a million people for most vaccines)
- Severe reactions also tend to affect only certain populations **whose immune systems are compromised** by preexisting disease

Cold Storage & Transportation

What is the Cold Chain?

Continuous temperature-controlled system

Various stages

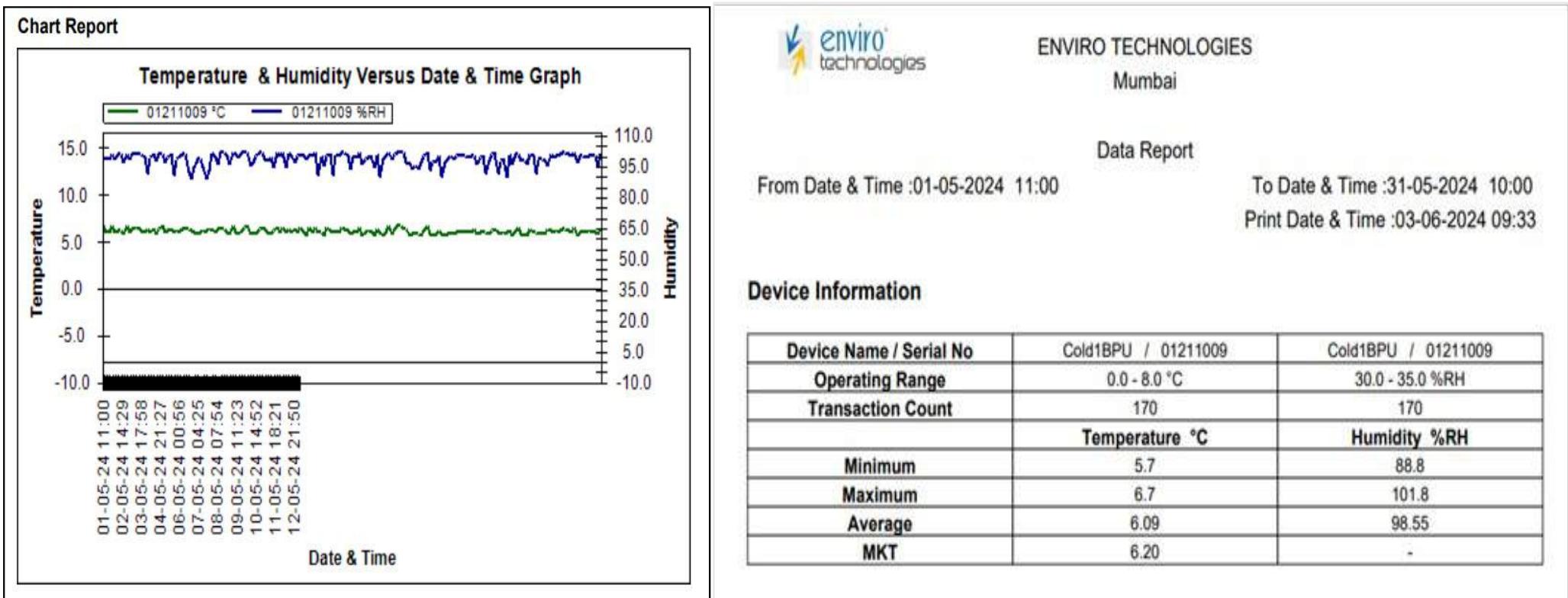
- Manufacturing
- Transportation
- Storage in central stores (NCAH)
- Health facility refrigerators (Regional/DVH)
- Transport to outreach clinics (Geog)
- During vaccination until administration (Campaign)



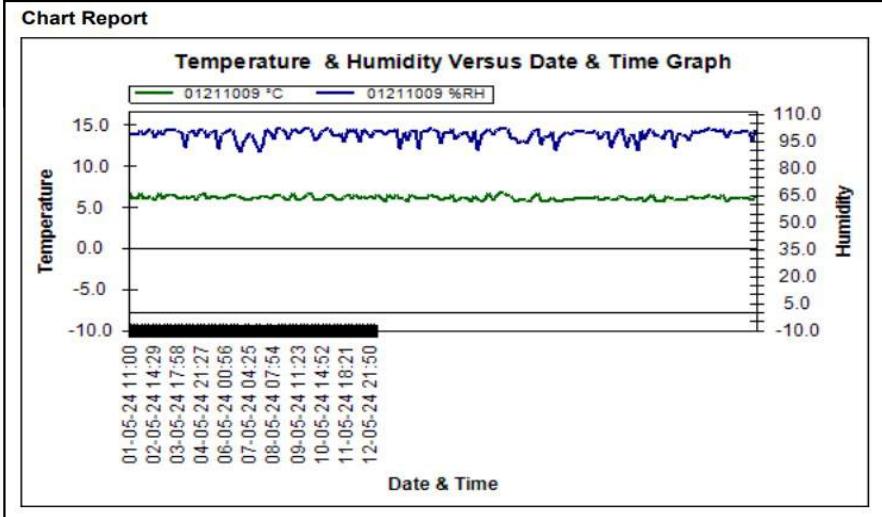
**2 to 8 degree
centigrade**

STORAGE

Consignment to BPU, NCAH



VACCINE STORAGE ROOM AT BPU/NCAH



enviro technologies

ENVIRO TECHNOLOGIES
Mumbai

Data Report
From Date & Time :01-05-2024 11:00
To Date & Time :31-05-2024 10:00
Print Date & Time :03-06-2024 09:33

Device Information

Device Name / Serial No	Cold1BPU / 01211009	Cold1BPU / 01211009
Operating Range	0.0 - 8.0 °C	30.0 - 35.0 %RH
Transaction Count	170	170
	Temperature °C	Humidity %RH
Minimum	5.7	88.8
Maximum	6.7	101.8
Average	6.09	98.55
MKT	6.20	-

VACCINE TRANSPORT TO CENTERS





VACCINE TRANSPORT FROM CENTERS

Standard Cold Box:

2°C to 8°C

12 to up to 72 hours

Monitor with data logger or thermometer



Importance of Cold Storage?

High Temperature (>8)

- Heat **denature** proteins (change their shape), and speeds up **chemical degradation**, reducing potency
- Poor/No Immune response
- Live attenuated Vaccines

Freeze Temperature (<4)

- Adjuvants can **form clumps** when frozen
- Can rupture emulsion or break the molecular structure
- Cannot stimulate immunity properly
- Inactivated/Sub unit vaccines

Common Queries?

1. *Can you use two vaccine at a time?*
2. *Can you do microchipping while vaccination?*
3. *Importance of health status during vaccination?*

Cold Chain and incorrect temperature damage is irreversible

Thank you...