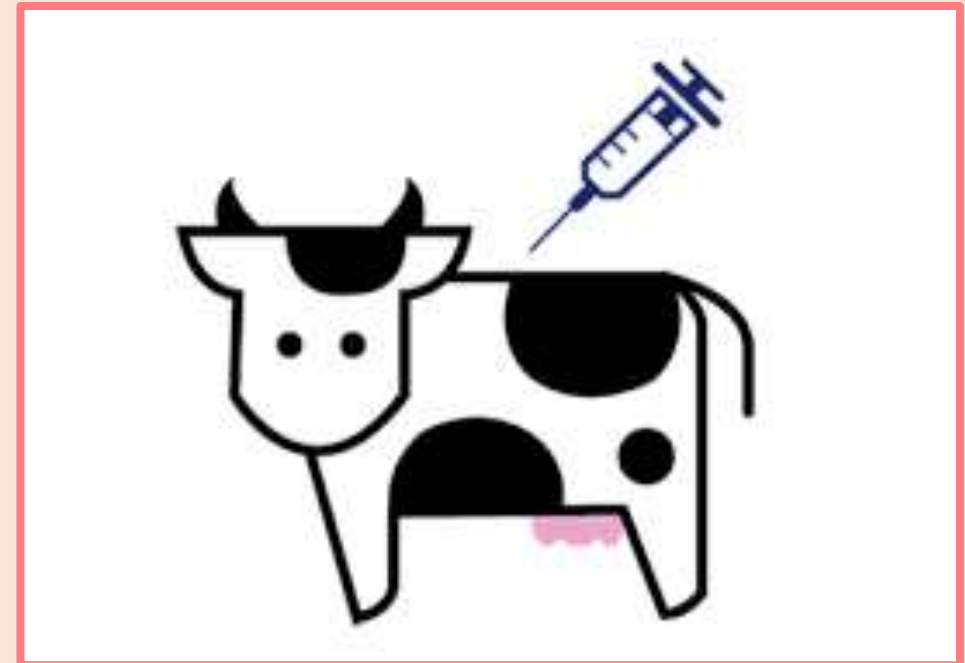


# VACCINATION SCHEDULE AND PLANNING (Level 3)

Topic	Training & information Content
9.1	Introduction to Animal health (Prevention vs curative health care)
9.2	Health signals
9.3	Biosecurity of dairy farms
9.4	Tick born diseases (Prevention and treatment)
9.5	Worm infections (Prevention and treatment)
9.6	Vaccination schedule and planning
9.7	Mastitis prevention and treatment
9.8	California Mastitis Test
9.9	Usage and storage of veterinary medicines on dairy farms
9.10	Administering of medicines to dairy cows
9.11	Instruction use of injectors into teat canal
9.12	Key performance indicators (KPIs) for monitoring health status of dairy herd



## 1. You will learn about (learning objectives):

- What is a vaccine?
- How does it work?
- When to use it?
- Which diseases?



Anthrax and black quarter vaccination in Rwanda



## 2. What is a vaccine?

A **vaccine** is a medicine that provides immunity to a particular infectious disease\*.

- A vaccine contains a substance looking like a germ or virus and is often made from weakened or killed forms of the microbe, its toxins, or one of its surface proteins.
- A vaccine stimulates the body's immune system\*\* to recognize the germ or virus as a threat, destroy it, and to further recognize and destroy any of the germs and viruses it may encounter in the future.
- Vaccines can be prophylactic (to prevent or ameliorate the effects of a future infection by a natural or "wild" pathogen), or therapeutic (to fight a disease that has already occurred).
- Some vaccines offer full immunity, in which infection is prevented completely.



French picture celebrating that Jenner, an English scientist, made the first vaccine against small pox by the end of the 18<sup>th</sup> century, by injecting people with cow pox extracted from the hand of a milk maid.

### 3. What is an infectious disease?

According to the world health organization:

- Infectious diseases are caused by sick making microorganisms, such as bacteria, viruses, parasites or fungi; the diseases can be spread, directly or indirectly, from one animal to another.

Sick making organisms

- Bacteria
- Viruses
- Parasites (protozoa, worms, ticks, etc.)
- Fungi



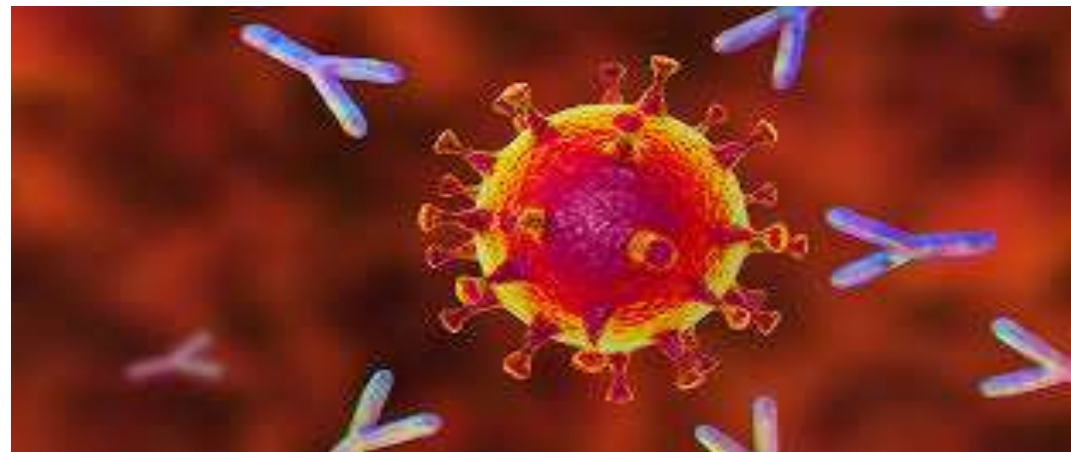
## 4. The Immune system

- The immune system is a complex network of organs, cells and proteins that defends the body against infection, whilst protecting the body's own cells.
- The immune system keeps a record of every germ or virus it has ever defeated so it can recognise and destroy it quickly if it enters the body again.

Source Australian Government



The system recognizes surface of viruses as foreign



These foreign molecules (antigen) will be attacked by antibodies.  
Like the corona virus In this picture

## 5. Parts of the immune system

The main parts of the immune system are:

- ✓ White blood cells
- ✓ Antibodies
- ✓ Bone marrow
- ✓ Lymphatic system
- ✓ Spleen
- ✓ Bone marrow
- ✓ Thymus



Different types of white blood cells

Source Australian Government



## 6. White blood cells

- White blood cells are the key players in the immune system. They are made in bone marrow.
- White blood cells move through blood and tissue throughout your body, looking for foreign invaders (microbes) such as bacteria, viruses, parasites and fungi. When they find them, they launch an immune attack.
- White blood cells include lymphocytes (such as B-cells, T-cells and natural killer cells), and many other types of immune cells.

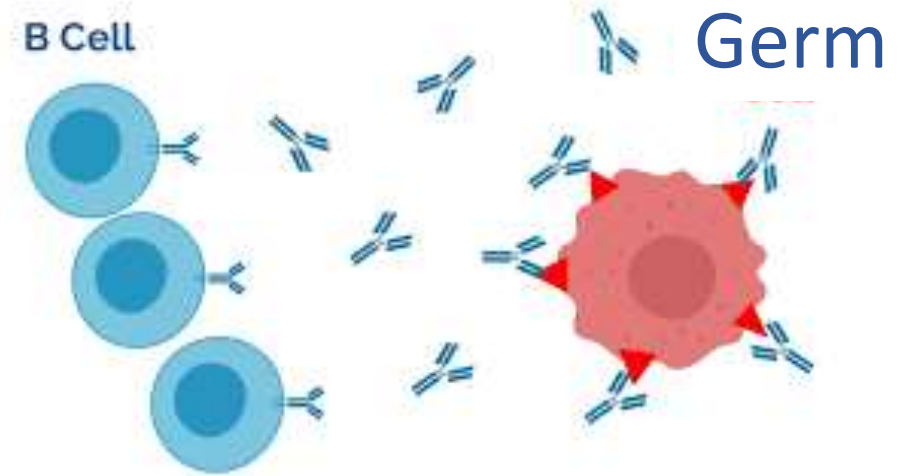
Source Australian Government



## 7. Antibodies

- Antibodies help the body to fight microbes or the toxins (poisons) they produce.
- They do this by recognising substances called antigens on the surface of the microbe, or in the toxins they produce, which mark the microbe or toxin as being foreign.
- The antibodies then mark these antigens for destruction. There are many cells, proteins and chemicals involved in this attack.

Source Australian Government



Lymphocytes make antibodies, who connect to germs, so other cells can 'kill' them

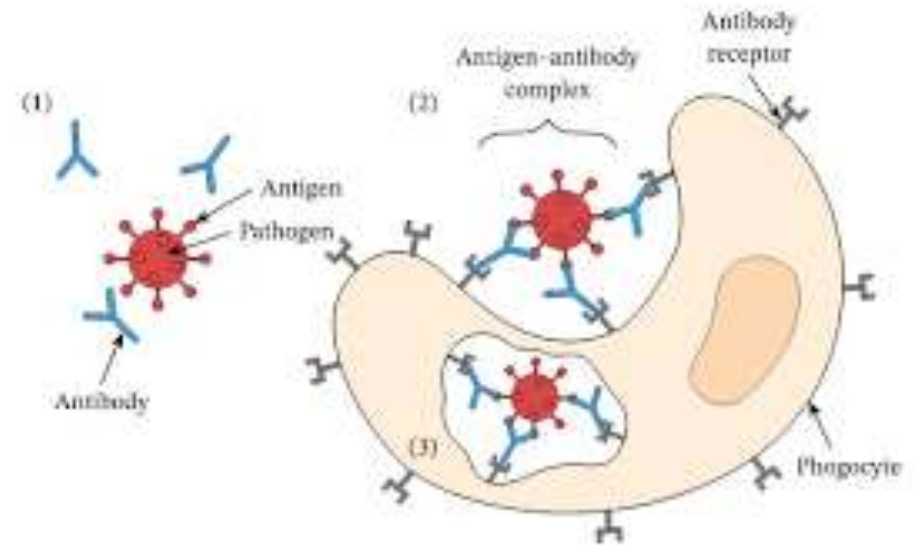
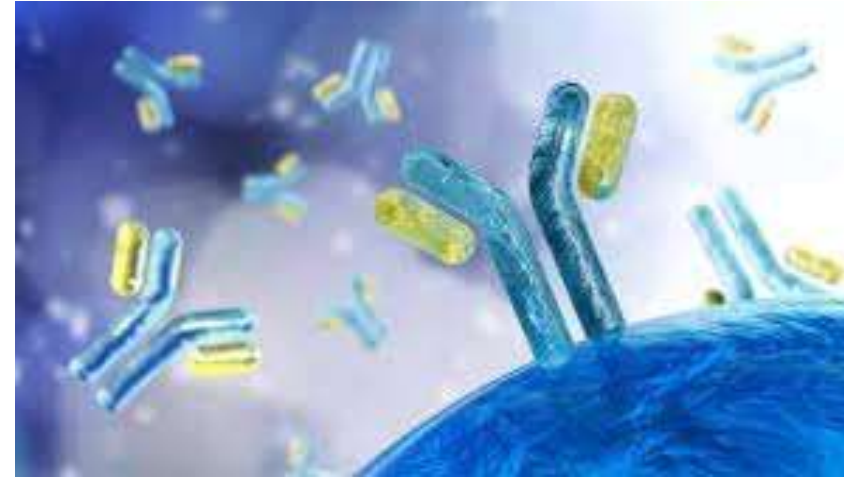




## 8. About vaccines...

- Vaccines help to building immunity against infectious diseases, without causing the illness.
- Usually, a dead or weakened version of the disease-causing germ or virus is introduced to our immune system. In some cases, inactivated toxins produced by the germ are used in the vaccine to develop immunity We call these antigens and they are the most important ingredient of all vaccines.
- Once cattle have been vaccinated and the immune system encounters the 'real' disease-causing germ, it responds quickly and creates antibodies and memory cells to give the body protection.

Vaccination is the most effective preventative measure against serious diseases. Some vaccines offer lifelong immunity. In other cases, 'catch-ups' are booster shots are needed.



## 9. When were vaccines developed?

- Vaccines are not new – immunisation techniques were pioneered over 200 years ago, when smallpox was a feared and deadly disease.
- An eighteenth-century doctor named Edward Jenner noted that workers on farms who contracted the mild cowpox disease were immune to smallpox.
- Jenner guessed that the germ responsible for cowpox was similar enough to the smallpox germ to 'train' the immune system to defeat both diseases. He was correct. Immunisation today relies on similar principles.

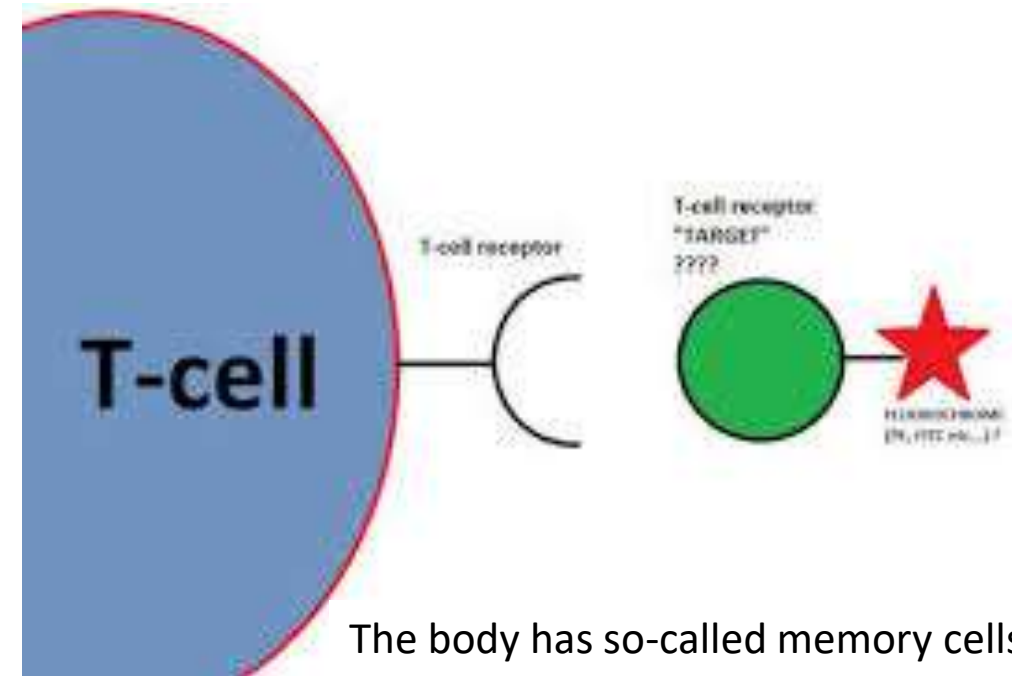
Source Australian Government



## 10. How do vaccines help our immunity?

- The immune system is like a library – it stores information about every germ or virus ever defeated. We sometimes call this immunological memory.
- Some antibodies remain ‘on patrol’ in our bloodstream. So if the cow ever encounters the real germ or virus in the future, the immune system can quickly trigger the memory cells and produce antibodies to defeat it. This often occurs before the cow experiences any symptoms of illness.

Source Australian Government



## 11. What is in a Vaccine?

- ✓ A live (but weakened) germ or virus
- ✓ Dead germs
- ✓ Small parts of germs or viruses (for example, a molecule from the surface of a germ)
- ✓ Inactivated toxins produced by bacteria
- ✓ Antibiotics or preservatives to stop the vaccine from becoming contaminated or going off
- ✓ Diluents (such as sterile water or saline).

Source Australian Government



## 12. Are vaccines safe?

- Millions of animals, people – many of them babies and young children – are immunised every year, with no side effects.
- Vaccines are much safer than getting sick from a disease. Diseases that can be prevented by vaccines can cause lifelong complications or death – even in normally healthy people.
- From time to time, the safety of vaccines has been questioned. Most reactions are mild and usually last one to 2 days. Like any other medication, vaccines carry a small degree of risk, but serious side effects are rare.

Source Australian Government

**Vaccines are Safe and Effective**

**What's in a vaccine?**

**Water**  
The main ingredient

**Active ingredient**  
A very small amount of a harmless form of the bacteria or virus you are immunising against.

**Adjuvants**  
Create a stronger immune response to the vaccine. There is no significant risk to health in the very small quantities used.  
Example: Aluminium, naturally found in drinking water at higher levels.

**Preservatives and stabilisers**  
Maintain vaccine quality, safe storage and prevent contamination.  
Example: Antibiotic, naturally found in fruit in larger amounts.

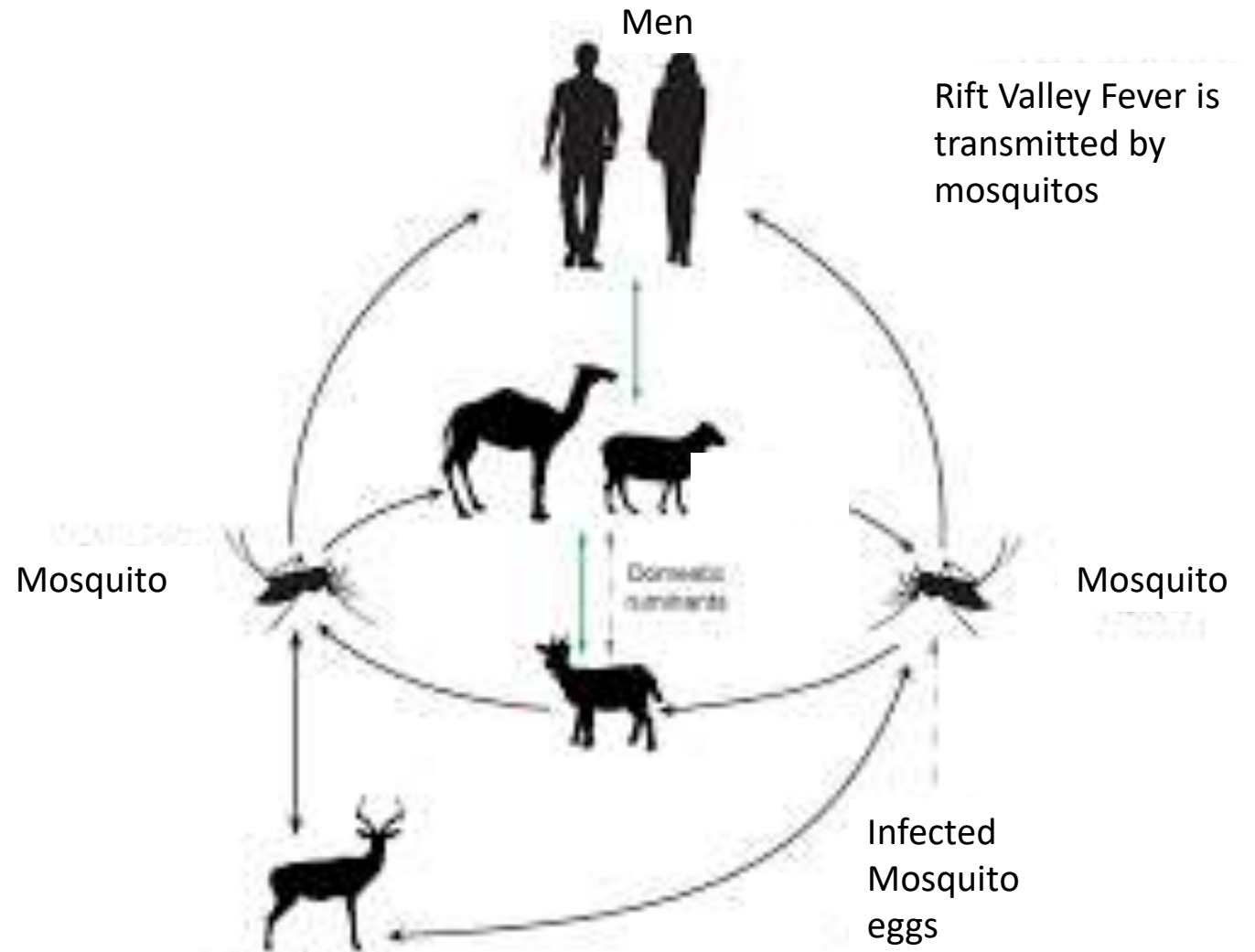
**Residual traces** of substances that have been used during vaccine manufacturing, measured in parts per million or billion in the final vaccine.  
Example: Formaldehyde, naturally found in human body.

**Celebrate Vaccines**

**Immunology**  
www.immunology.org

## 13. Which Vaccines are available?

1. Brucellosis\*
2. Anthrax\* & Blackquarter
3. Contagious Bovine Pleuropneumonia (CBPP)
4. East Cost Fever
5. Foot & Mouth Disease\* (FMD)
6. Rabies\*
7. Rift Valley Fever\*
8. Lumpy Skin Disease
9. \* Zoonoses



## 14. Who vaccinates?

- All vaccines should be given by a licensed veterinarian. (This is obligatory for good reasons).
- Always consult a veterinarian if planning a vaccination.
- The veterinarian can advise
  - ✓ If a vaccination is necessary
  - ✓ When to apply it
  - ✓ Which animals
  - ✓ Cost effectiveness



## 15. Brucellosis

- Once in a lifetime (S19 vaccine) and normally administered around weaning time. Adult cattle should be vaccinated annually with dead *B. abortus* vaccine (45/20), or with a reduced dose (one twentieth) of S19 vaccine.
- As a zoonotic disease, brucellosis is of serious public health concern. If an animal is infected, vaccination will not cure the infection.
- **Bulls SHOULD NOT** be vaccinated as the vaccine may result in the organism appearing in the semen .
- Vaccination from age of 5-8 months for only female calves
- How? Sub cutaneous (under the skin)



Brucella is transferred by sex.  
AI decreases the risk on it



Brucella gives abortion and can't be cured. Also not in men.  
Bacteria lives in low oxygen environment, where medicines cannot reach.

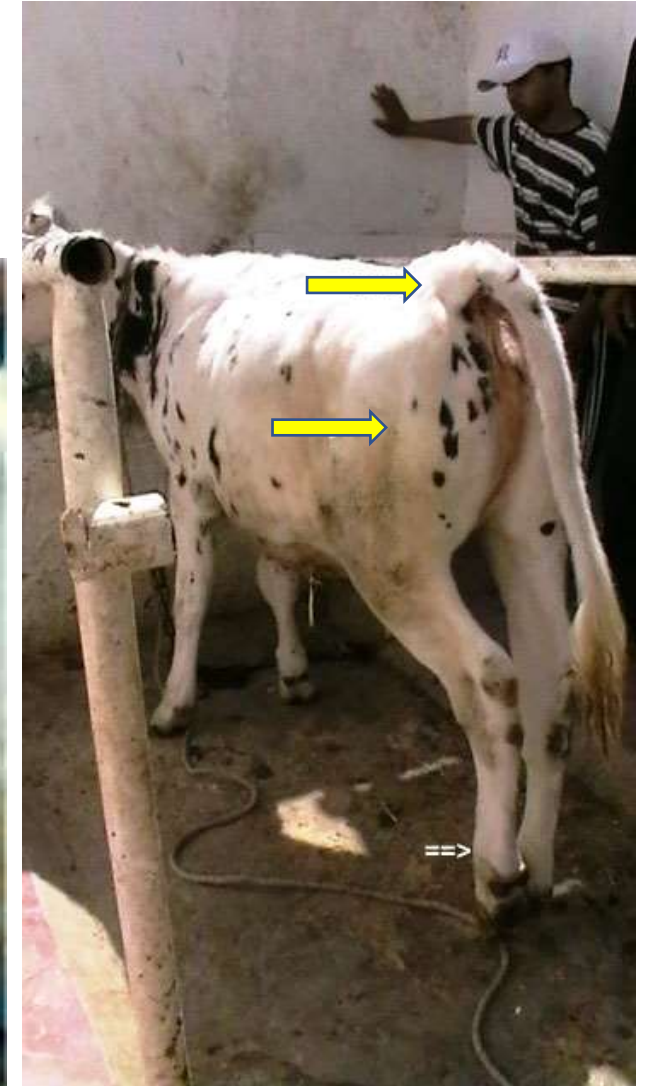


## 16. Anthrax & Blackquarter

- This vaccine will be effective against two diseases.
- In endemic areas, vaccination every six months is advisable. Under normal conditions annual revaccination will suffice.
- Anthrax is deadly for humans and animals. Blackquarter gives at some farms a lot of sick and dead animals. Vaccines are cheap. **SO USE IT.**
- In Kenya a commercially available product called "Blanthax" is used for the annual vaccinations against Black quarter and Anthrax.
- Vaccination from age of 3 months and above.
- How? Sub cutaneous (under the skin)

Black quarter is also called blackleg and gives swelling of the thigh.

Bacteria live in swampy peat lands.



## 17. Contagious Bovine Pleuropneumonia (CBPP)

- It is caused by a bacteria, and the symptoms are pneumonia and inflammation of the lung membranes
- Also called lung plague.
- Yearly vaccination in endemic areas.
- Routine vaccination should be carried out only in cattle over 6 months of age, but in the face of an outbreak all age groups can be vaccinated. Vaccinated into the tip of the tail.
- Do not vaccinate unhealthy animals.
- Vaccination from age of 6 months and above.
- How? Sub cutaneous (under the skin)



Cow out of breath due to damaged lungs.



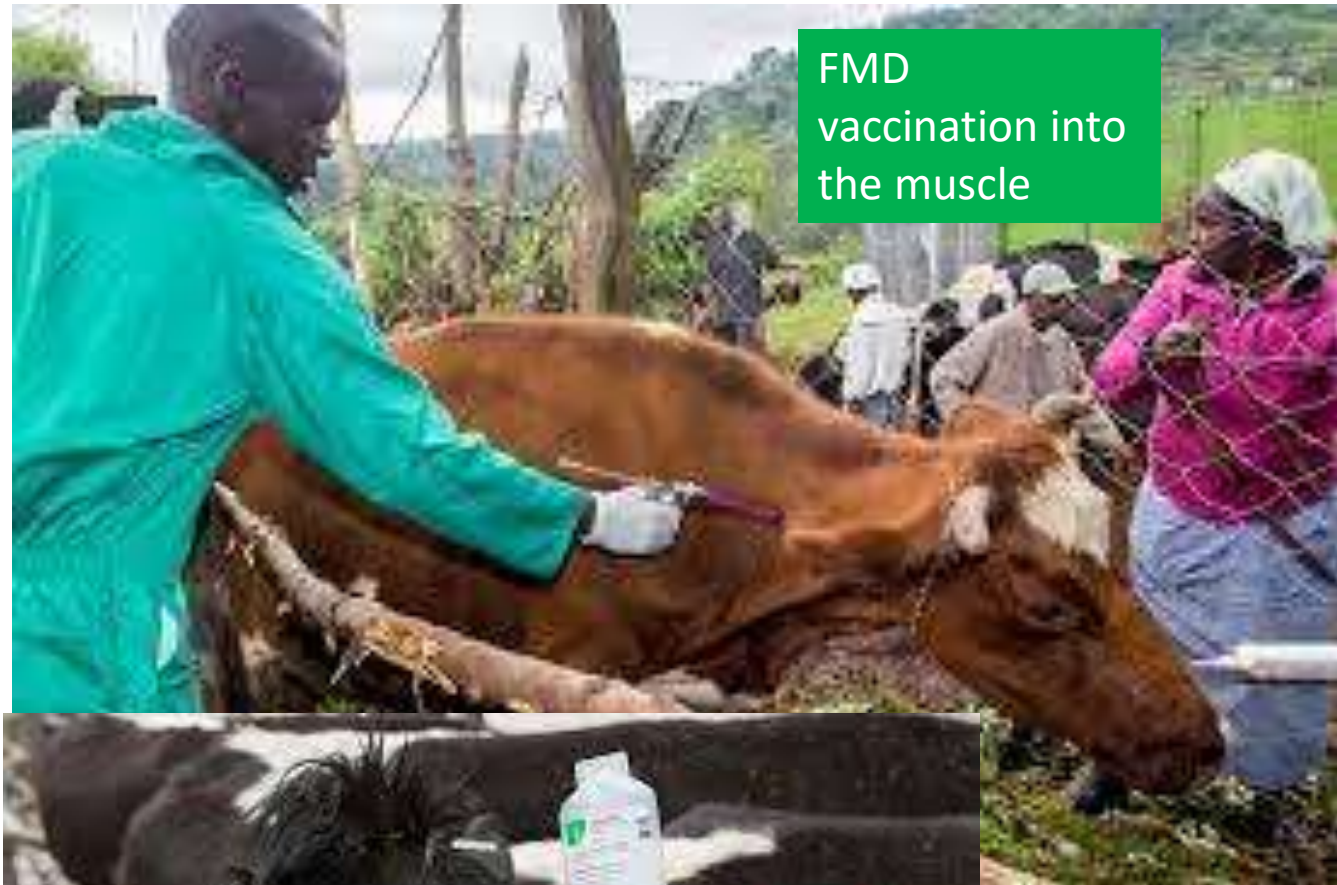
## 18. East Coast Fever (ECF)

- One vaccination shot protects your animal against ECF for Life.
- Cattle should NOT be vaccinated in the following circumstances:
  - ✓ Cattle incubating or showing symptoms of ECF, these cattle should be treated.
  - ✓ Cattle in the last three months of pregnancy
  - ✓ Cattle treated with levamisole within one month of planned immunisation
  - ✓ Cattle in poor condition and/or suffering from other disease.
- Controlled spraying or dipping against ticks is necessary to maintain immunity and control other tick-borne diseases.
- Vaccination from age of 1 month and above.
- How? Sub cutaneous (under the skin)



## 19. Foot and Mouth disease (FMD)

- Revaccination should be carried out every 6 months or for better protection every 4 months or intramuscular - only at the neck or hind limb for the oil-based vaccine
- Consult your veterinarian on the choice of vaccine.
- A new oil-based vaccine exists in Kenya (available from KEVEVAPI) and cattle that are below 2 years of age, they should be revaccinated twice a year. Cattle above 2 year of age should be vaccinated once a year.
- Vaccination for all ages
- How? Sub cutaneous (under the skin) or intra muscular (into the muscle)



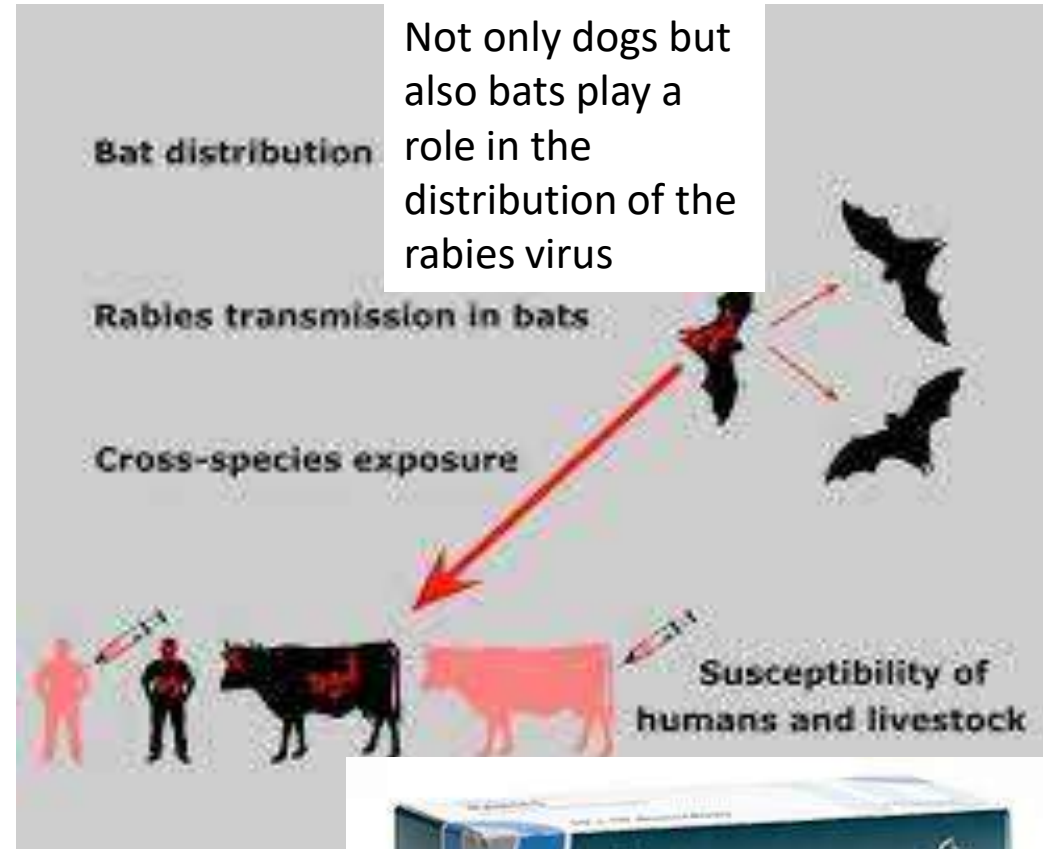
FMD  
vaccination into  
the muscle



FMD  
vaccination  
sub cutaneous  
under the skin

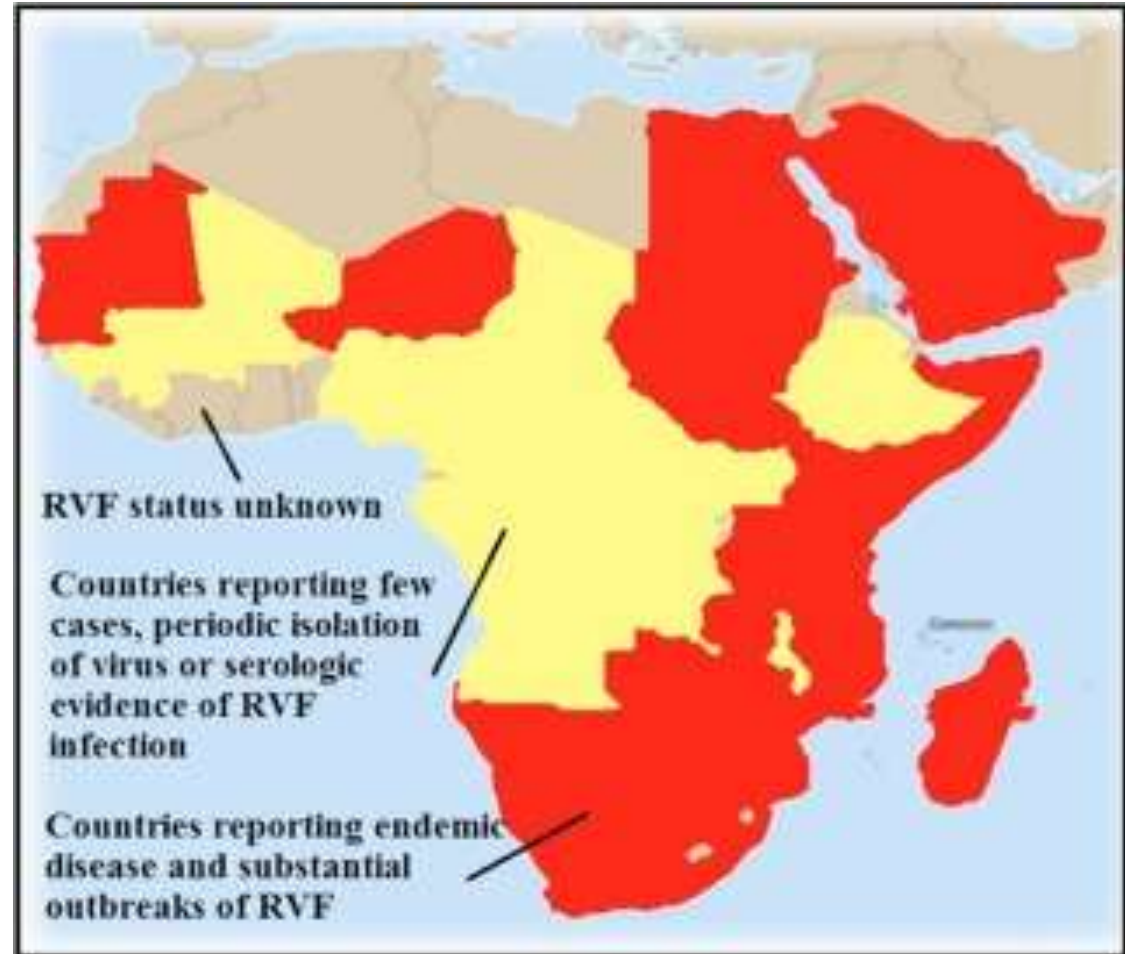
## 20. Rabies

- Cattle can be vaccinated annually and must be vaccinated when bitten by a suspect animal and a booster dose on the 4th day or given on day 7, 14, 28 and 90 (optional) day after first dose.
- This is a so-called therapeutic vaccination
- Vaccination is the ONLY method that can protect animals affected by rabies. Rabies is mostly introduced by bites from rabid dogs, therefore **VACCINATE** your DOG.
- Vaccinate after suspicious bite
- How? Sub cutaneous (under the skin) or intra muscular (into the muscle)



## 21. Rift Valley Fever

- Annual revaccination is recommended.
- Rift Valley Fever is infectious to humans (zoonosis) and therefore the vaccine must be HANDLED WITH CARE.
- Do not vaccinate unhealthy animals.
- Pregnant animals may abort from the vaccination.
- A new live RVF vaccine which does not cause abortions in livestock has been developed but is not yet registered in Kenya.
- All ages can be vaccinated.
- How? Sub cutaneous (under the skin)



## 22. Lumpy skin disease

- Annual revaccination is recommended.
- New animals should be immunised before introduction to affected farms.
- Pregnant cows can be vaccinated.
- When using this live vaccine, separate cattle from sheep and goats, as the vaccine is derived from modified sheep pox virus. If sheep and goat come into close contact with freshly vaccinated cattle, the vaccine can cause acute pox disease in sheep and goats.
- Calves from vaccinated/naturally infected mothers should be immunised at the age of 3 to 4 months while calves from naïve mother can be vaccinated at any age
- How? Sub cutaneous (under the skin)



## 23. Other Vaccines

- The list of vaccines just described is an overview of the vaccines relevant and available in East Africa.
- There are worldwide more cattle vaccines against dozens of other diseases in cattle for example against:
  - ✓ Rabies
  - ✓ Calf scour
  - ✓ E. Coli
  - ✓ Bovine virus diarrhea
  - ✓ Infectious Bovine Rhinotracheitis





## 24. Summary (Take Home Messages)

- Against many, but not all, infectious cattle diseases vaccines are available.
- Vaccines are an excellent tool to prevent diseases.
- Vaccines when used according to label are safe.
- Side effects are rare.
- Only use them after consulting a veterinarian.
- Only registered veterinarians are allowed to administer vaccines

