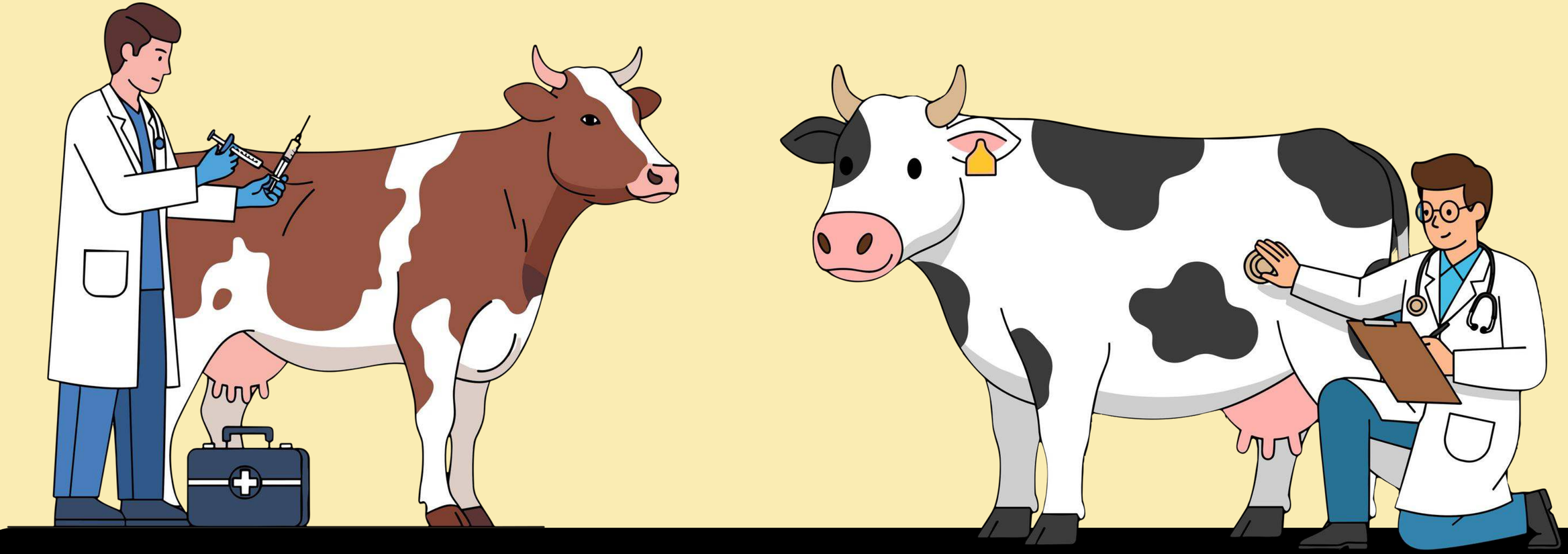
THE TRINITY CHALLENGE

CSIR-IMTECH

CSIR-Institute of Microbial Technology
Ministry of Science & Technology,
Govt. of India

SUPERHEROES AGAINST SUPERBUGS



Resisting AMR: One Farm at a Time!

Together We Can Stop the Rise of #AntimicrobialResistance

SUPERHEROES AGAINST SUPERBUGS

Superheroes Against Superbugs (SaS) is an educational and public engagement initiative to raise awareness and promote public and policy action on Antimicrobial Resistance (AMR) in India.

SaS was launched in 2018 with support from the DBT/Wellcome Trust India Alliance.

General notes for the users of this deck

This deck, developed by Superheroes Against Superbugs (SaS), provides a basic outline for conducting a day-long, interactive workshop for UG/PG students enrolled in veterinary sciences and allied fields, including suggested activities and potential guest speakers. To maximise engagement and learning, keep the workshop dynamic and participatory. Each slide has notes for the workshop facilitator. Refer to the agenda and activities on the SaS website to understand how to use this deck effectively.

Setting the tone for the session/workshop:

- Begin by clearly explaining the workshop's objectives, emphasizing the importance of understanding and tackling AMR in the animal sector.
- Establish ground rules for respectful communication and active participation to create a safe and inclusive learning environment.
- Encourage students to ask questions and share their experiences to enhance collaborative learning.
- Ensure you introduce various terms, such as AMR, Superbugs, and Antibiotics, clearly at the start of the workshop.

General notes for the users of this deck

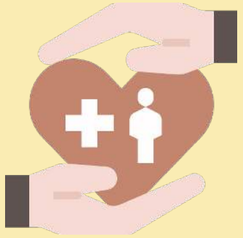
Interactive format:

- Incorporate ice-breakers and short group discussions to make students comfortable and encourage interaction. Examples of these have been provided in this deck.
- Use a mix of case studies, role-plays, and problem-solving exercises to stimulate critical thinking and practical application of knowledge.
- Facilitate Q&A sessions with invited experts to provide up-to-date insights and real-world perspectives on AMR.

Managing the workshop:

- Keep sessions interactive by frequently inviting feedback and reflections from participants.
- Time management is crucial – stick to the agenda but allow flexibility for meaningful discussions.
- Summarize key learnings at the end of each session and the workshop to reinforce understanding and encourage reflection.
- Share relevant resources and reading materials to help them explore AMR in more depth.

Workshop at a glance



What is Antimicrobial Resistance (AMR)?

How bugs become resistant to antibiotics — a look at bacteria, antibiotics, and superbugs.

Why has AMR become a public health challenge?

Key drivers of AMR and why it's a growing threat to global health.

The role of Veterinarians in addressing AMR

How veterinarians can promote responsible antibiotic use and community awareness.

Expert Talks

Learning through Case Studies

Fun Games and Group Activities

7

5

AMR EDITION

PICTIONARY

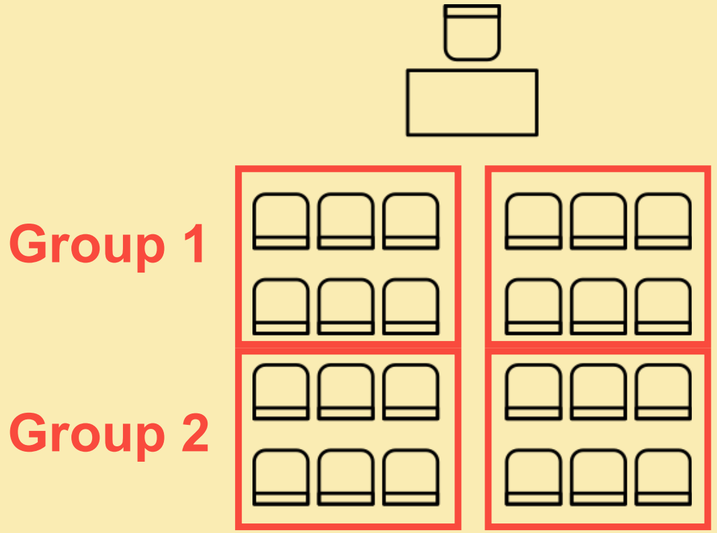
Let’s Play Pictonary!

- Each group nominates one member for each Round. The hint-giver from the first group comes forward and draws an AMR-related cue card.

- The hint-giver provides a pictorial descriptions to help the team guess the word within 15 seconds. Saying the word, its exact meaning in hindi, gestures, sounds, or rhyming hints is not allowed!

- If the team guesses the correct word within the given time frame, they get one balloon which represents 10 points. If they fail to do so, they get zero points and the game proceeds with the next group.

- The game proceeds for three rounds and the team with the maximum number of balloons wins.

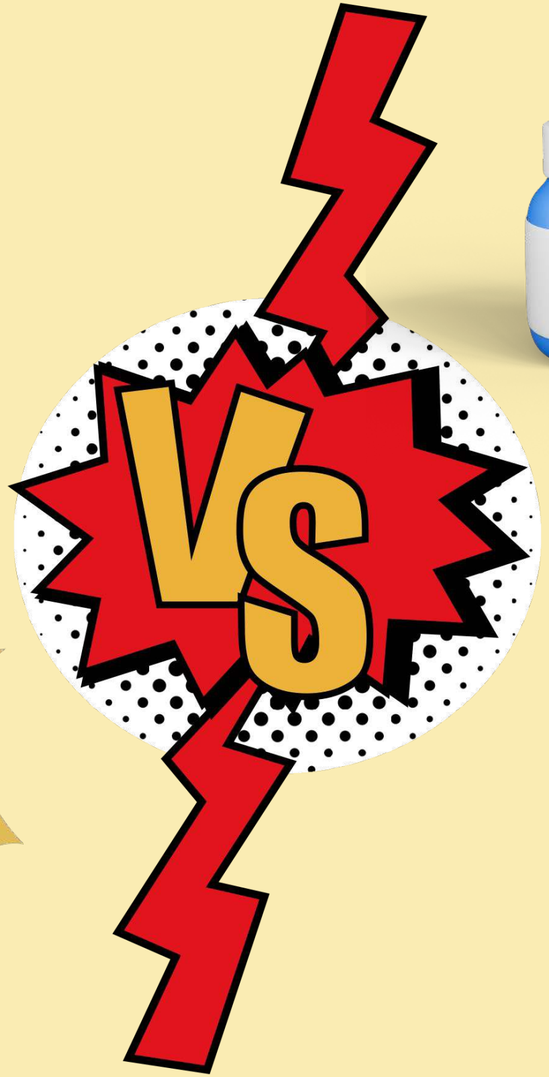


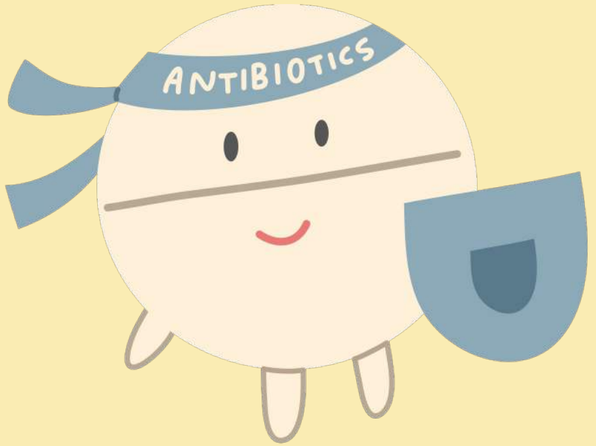
Understanding Bugs, Drugs & Superbugs

BUGS

DRUGS

SUPERBUGS



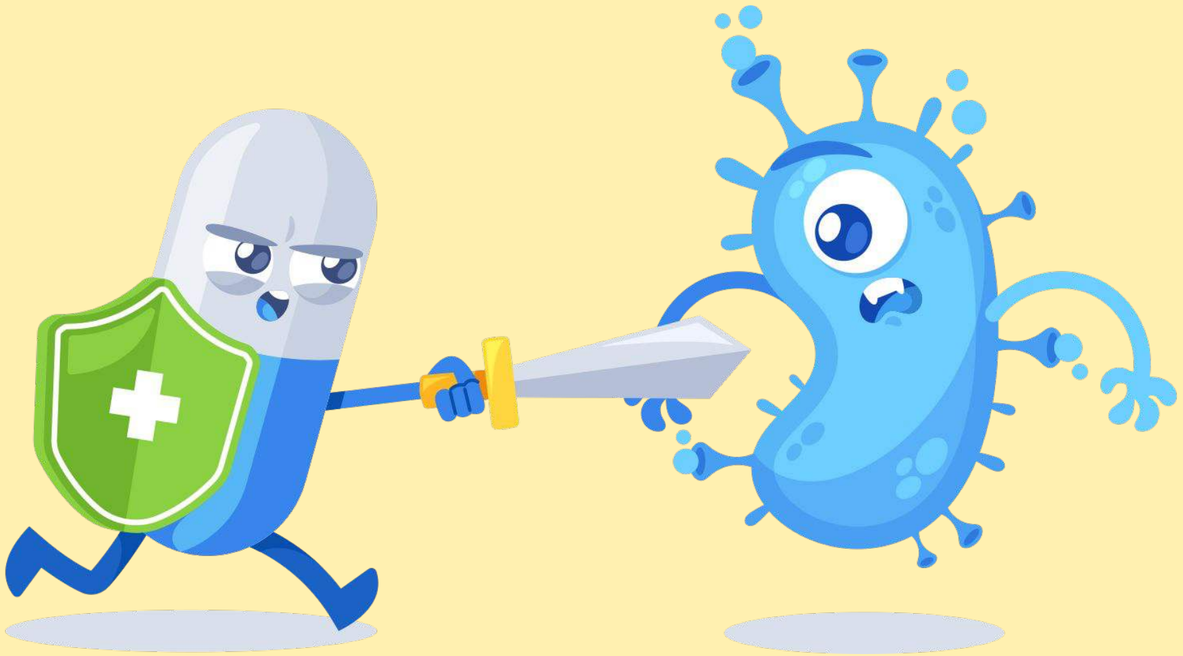


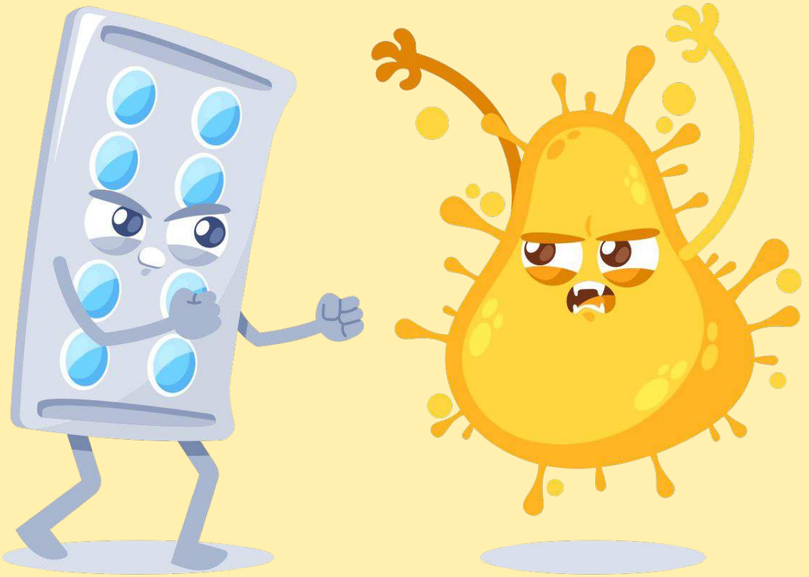
How many of us have scraped our knees while playing outdoor games?

Year 1928, an incident leads to the serendipitous discovery of a special compound.

Compound: Penicillin

Discoverer: Sir Alexander Fleming

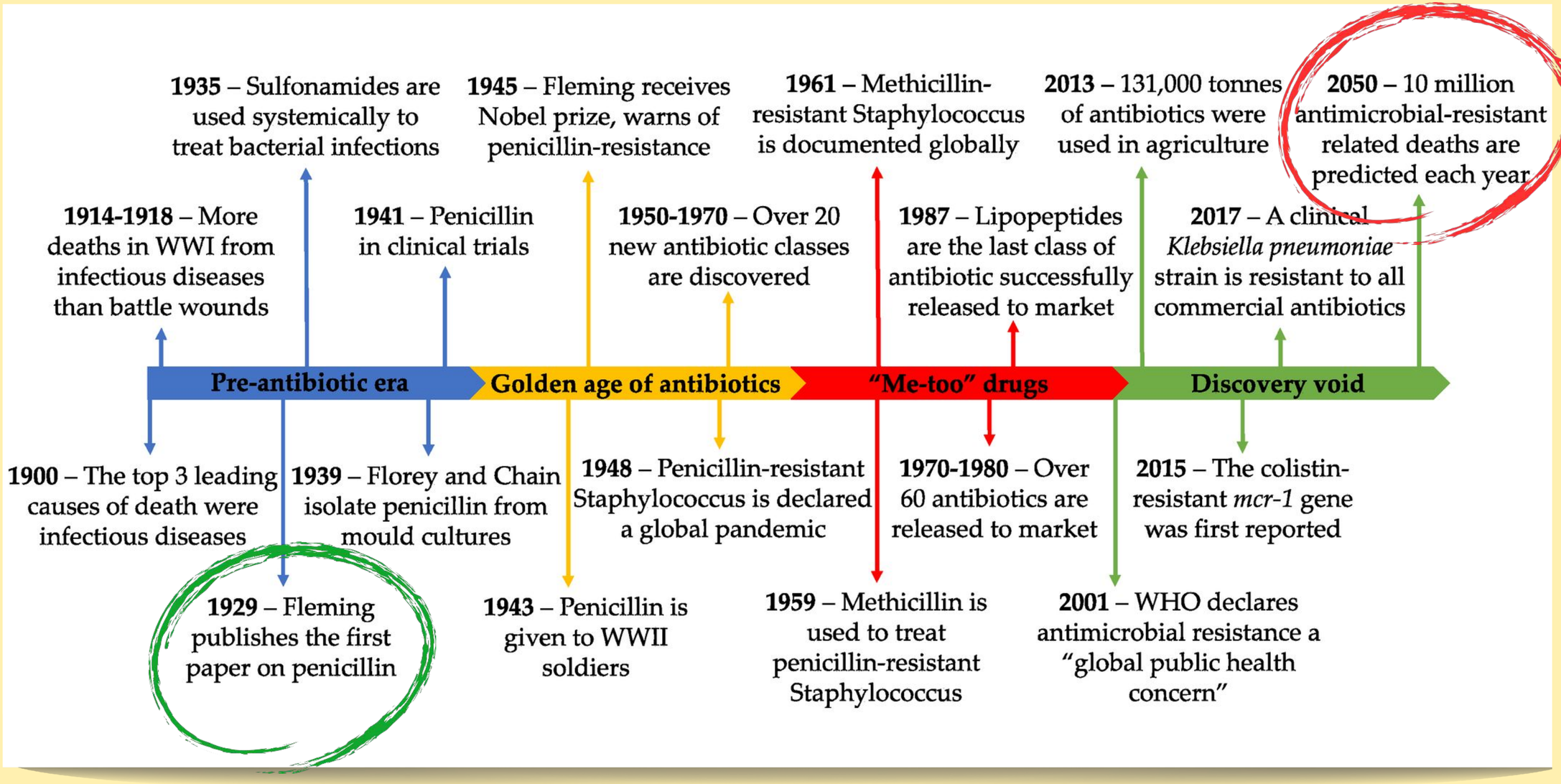




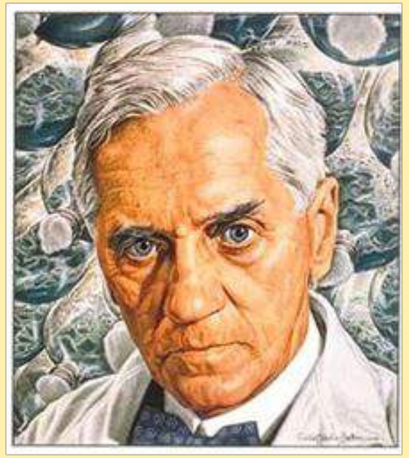
Year 1944, first case of infection caused by Penicillin Resistant bacteria was reported.

https://www.sciencedirect.com/science/article/abs/pii/B9780323045797001659

The Antibiotic Timeline: From Discovery to AMR Crisis



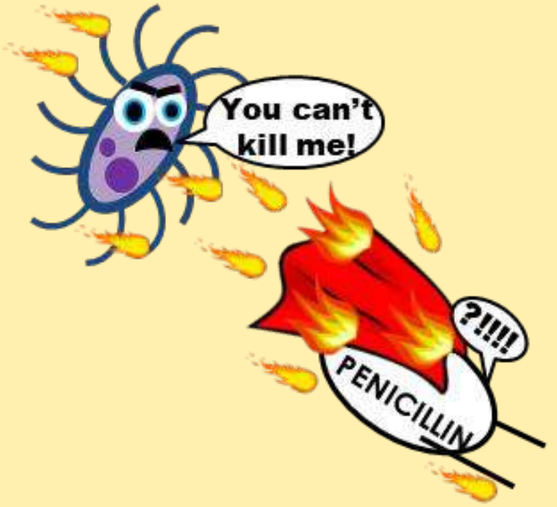
SIR ALEXANDER FLEMING



Shared the Nobel Prize (1945) with Ernst Chain and Sir Howard Florey for his discovery of penicillin, the first naturally occurring antibiotic

"It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body... Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to non-lethal quantities of the drug make them resistant."

- Nobel Lecture (11 December 1945)



What is AMR and why you should care?

What is AMR and why you should care?

- AMR occurs when disease-causing microorganisms like bacteria, viruses, fungi, and parasites develop resistance to the drugs that were once effective against them, thus making the infections harder to treat.

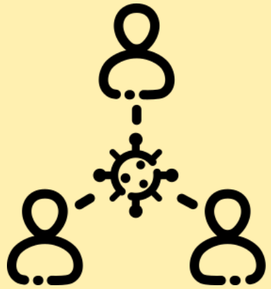
- Antimicrobial-resistant infections are on the rise due to the irresponsible human use and disposal of antimicrobials such as antibiotics, as well as a lack of new drugs to fight drug-resistant strains.

- AMR or drug-resistant infections know no boundaries. Everyone is affected, everyone needs to act!

What is AMR and why you should care?

Global Threat

causing 700,000 deaths annually worldwide



The Silent Pandemic

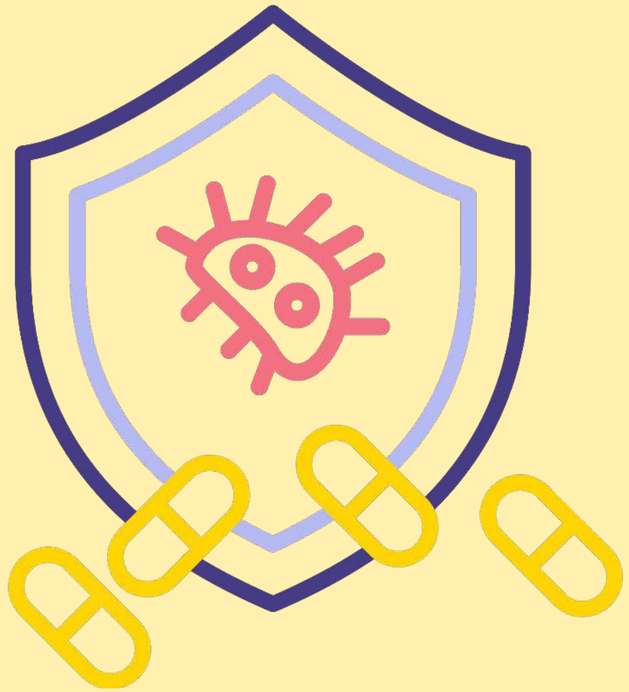
projected to cause 2 million deaths in India by 2050

Economic burden

could cost the global economy USD 100 trillion by 2050

Compromised health

limits treatments & undermines medical advances and worsens health inequities



The Making of Superbugs: How AMR Happens

AMR is an evolutionary phenomenon...

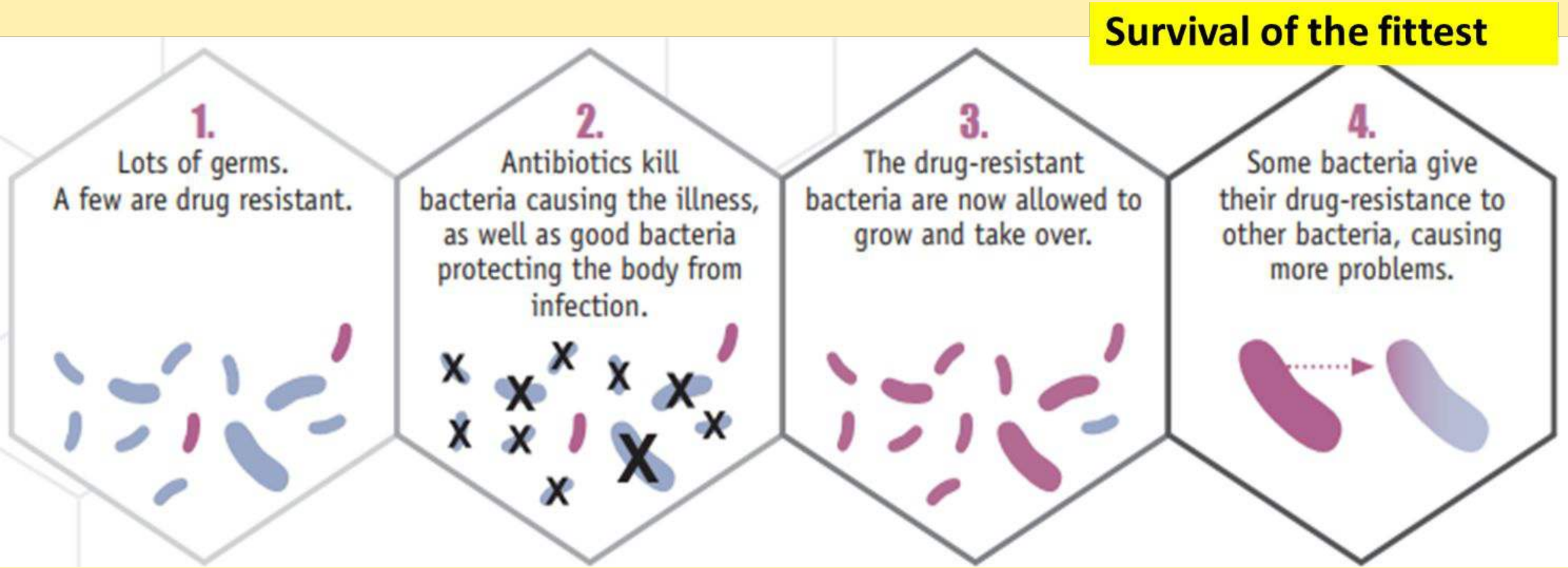
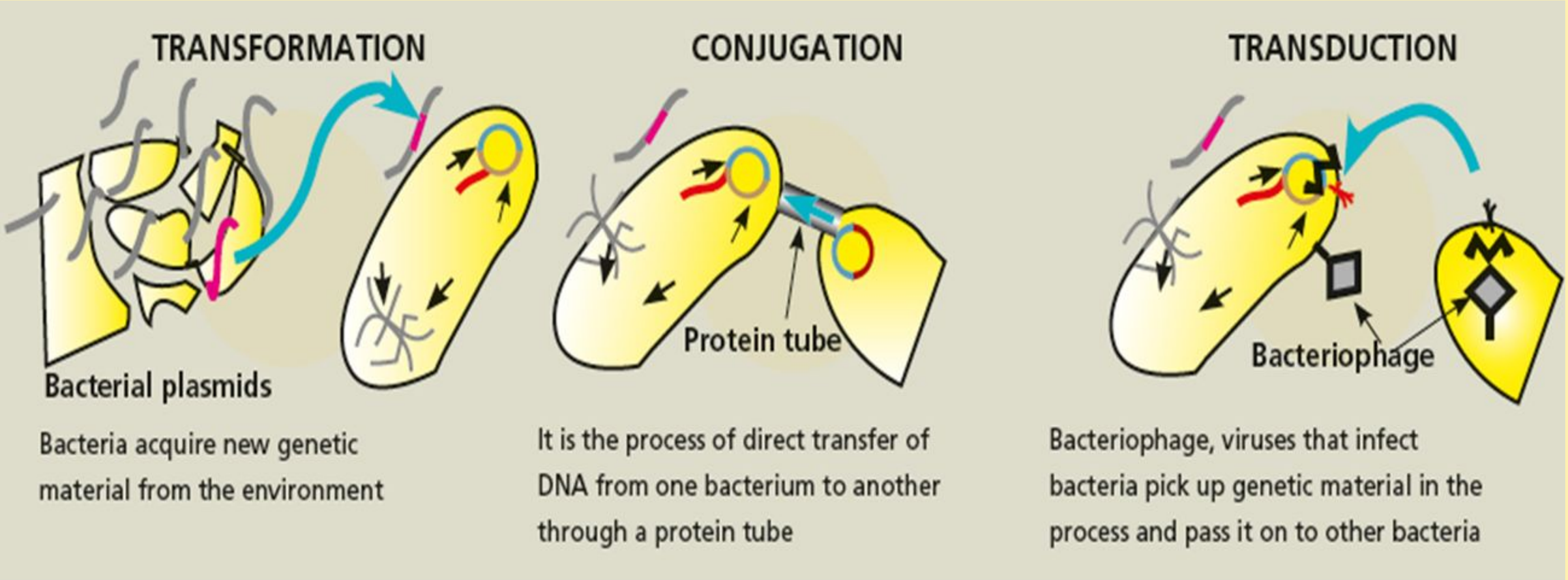


Figure source: CDC

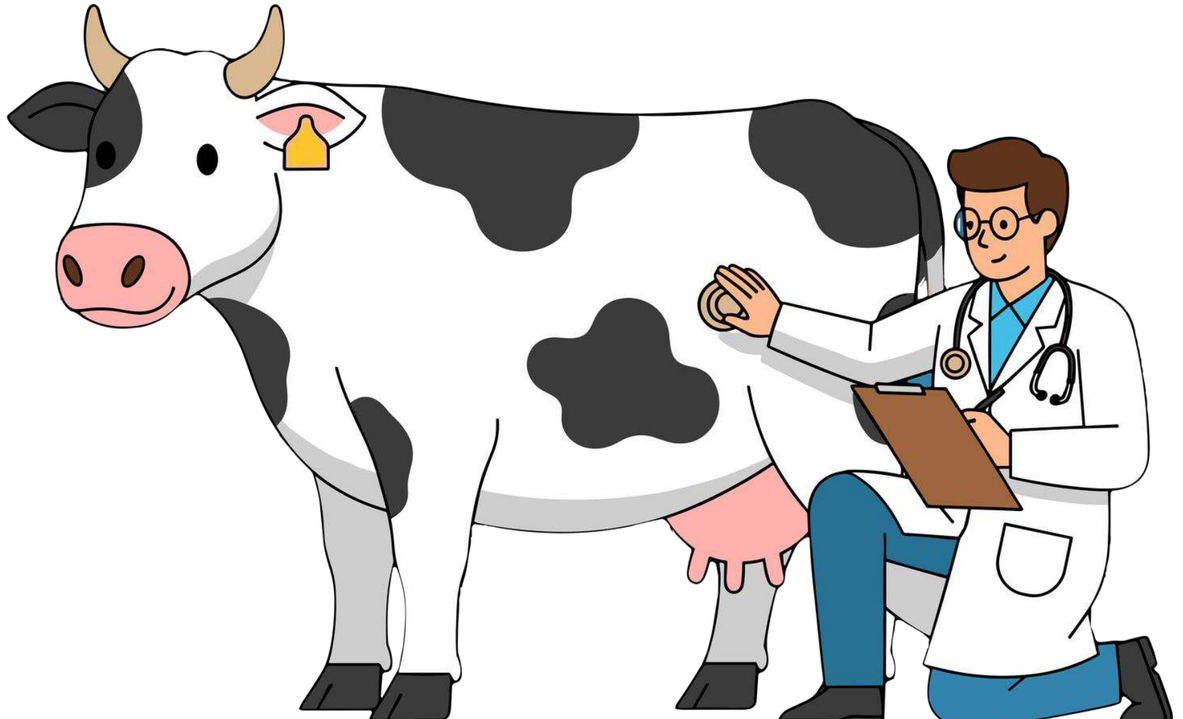
Survival Hack:

How Bacteria Outsmart Threats at the Cellular Level



Antibiotic Susceptibility Test

Role of Veterinarians in Tackling AMR



AMR in Indian Dairy Farming : A Critical Hotspot

India produces 230 million tonnes of milk annually (2023–24) making it one of the world's largest.

Mastitis Mismanagement

- Bovine mastitis is the #1 disease requiring antibiotic use in Indian dairies
- Blanket dry-cow therapy is common, often without culture tests
- Coagulase-negative *Staphylococci* showing high resistance to penicillin

Sub-therapeutic Use

- Non-therapeutic, preventive antibiotic use in calf-rearing remains a documented practice despite regulatory restrictions
- Low-dose, prolonged tetracycline use in feed linked to resistance in *E. coli* & *Salmonella*
- Inadequate withdrawal period compliance leads to antibiotic residues in milk

Regulatory Gaps

- Schedule H antibiotics sold OTC in many rural pharmacies without a prescription.
- FSSAI Maximum Residue Limit (MRL) norms for milk often not enforced at collection points
- Private practitioners are under pressure from dairy cooperatives to use broad-spectrum drugs

Source: ICAR-IVRI | FSSAI Milk Quality Reports | PLoS ONE (2022) AMR in Indian Dairy Cattle

Policy Landscape & One Health Framework in India

INDIA's AMR POLICY MILESTONES

2011 — Chennai Declaration : commitment to reduce antibiotic misuse in human & animal health

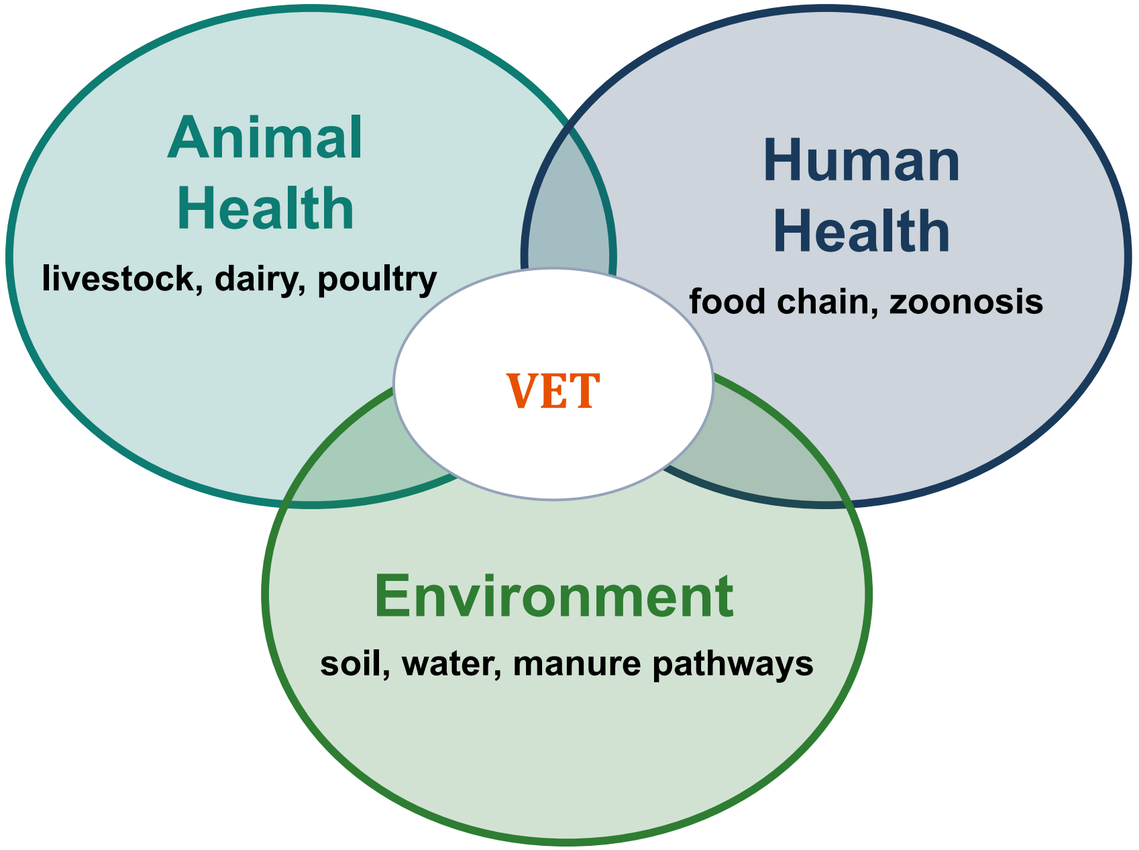
2017 — National Action Plan on AMR (NAP-AMR) launched with a 5-year multi-sectoral roadmap

2019 — FSSAI mandates maximum residue limits for antibiotics in milk & meat products

2021 — ICAR-NIVEDI establishes national AMR surveillance network in livestock

2023 — India joins WHO GLASS (Global AMR & Use Surveillance System) for animal sector

ONE HEALTH: VETS AT THE NEXUS



Source: India NAP-AMR 2017 | WHO One Health Joint Plan | ICAR-NIVEDI AMR Surveillance Report 2022

Why Veterinarians Are Central to AMR Control

THE AMR–ANIMAL LINK IN INDIA

1. Animal agriculture accounts for over half of India's total antibiotic consumption placing veterinarians at the front line of stewardship.
2. India's 536 million livestock (2019 census) create vast antibiotic use pressure across cattle, poultry & aquaculture.
3. Resistant bacteria move from animals to environment and then to humans via food, water & direct contact (One Health).
4. Dairy sector alone uses oxytetracycline, enrofloxacin & penicillin routinely, often without a prescription.

KEY VET ROLES IN AMR PREVENTION

Prescribe Responsibly

Evidence-based antibiotic use, culture & sensitivity testing

Farmer Education

Train dairy and poultry farmers on withdrawal periods & milk discard

Vaccination Advocacy

Promote FMD, HS, BQ vaccines to reduce antibiotic dependency

Surveillance

Report resistance patterns; participate in ICAR-NIVEDI networks

Source: ICAR-NIVEDI National AMR Survey | India Livestock Census 2019 | NITI Aayog AMR Report

What Veterinarians Can Do : Practical Interventions

1. Diagnose First

- Perform culture & sensitivity tests before prescribing antibiotics
- Use California Mastitis Test (CMT) for field diagnosis of mastitis in dairy cattle
- Avoid empirical broad-spectrum use when narrow-spectrum drugs suffice

2. Prescribe Prudently

- Follow VCPR (Vet-Client-Patient Relationship) and never prescribe without examination
- Adhere to ICAR & IVRI antibiotic guidelines; respect withdrawal periods
- Prefer procaine penicillin over enrofloxacin / 3rd-gen cephalosporins for common infections

3. Educate Dairy Farmers

- Train farmers: do not use leftover antibiotics; discard milk during withdrawal period
- Promote clean milking practices & teat dipping to reduce mastitis incidence
- Encourage farmer record-keeping of antibiotic use (important for traceability)

4. Participate in Surveillance

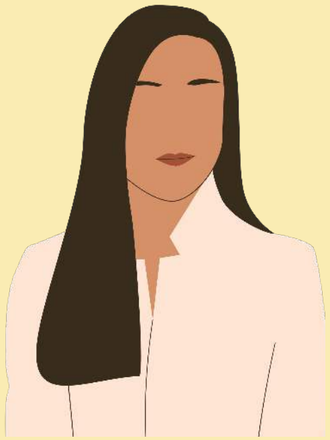
- Submit samples to ICAR-NIVEDI, NRCE, and state disease labs for AMR tracking
- Report unusual treatment failures that may indicate emerging resistance
- Engage with India's National AMR Action Plan and state veterinary networks

Guideline Reference: ICAR-IVRI AMR Action Guidelines | IVMA Antibiotic Stewardship Statement

Resist Resistance
Learning through Expert Talks and Discussion

Panel Discussion

AMR and Dairy Farming:
Emerging Threats, One Health Challenges, and Vet Action



Add Speaker Name and Designation

A scientist with expertise on AMR.

Add Speaker Name and Designation

A veterinarian who has experience working with animal farmers.

Add Speaker Name and Designation

Public Health Researcher with significant expertise in the containment of zoonotic diseases

Add Speaker Name and Designation

Science Communicator / Policy-Advocate / Representative from Civil Society

Expert Talk

Biosecurity on Dairy Farms: Challenges, Realities, and Vet-Led Solutions to AMR

Add Speaker Name & Designation

This could be a veterinarian-researcher

Themes to cover:

- Practical challenges and on-ground realities of biosecurity implementation on dairy farms
- Farmer education and counselling on responsible antibiotic use
- Importance of treatment adherence and correct dosing
- Infection prevention through farm hygiene and sanitation
- Role of vaccination in reducing disease burden and antibiotic dependence

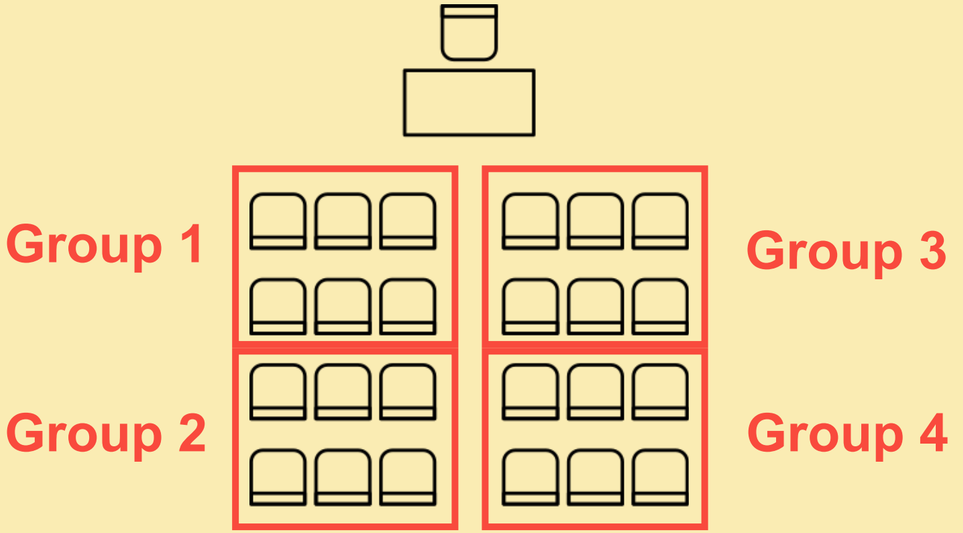

Q&A

BIOSECURITY FARM MAP CHALLENGE

Guidelines

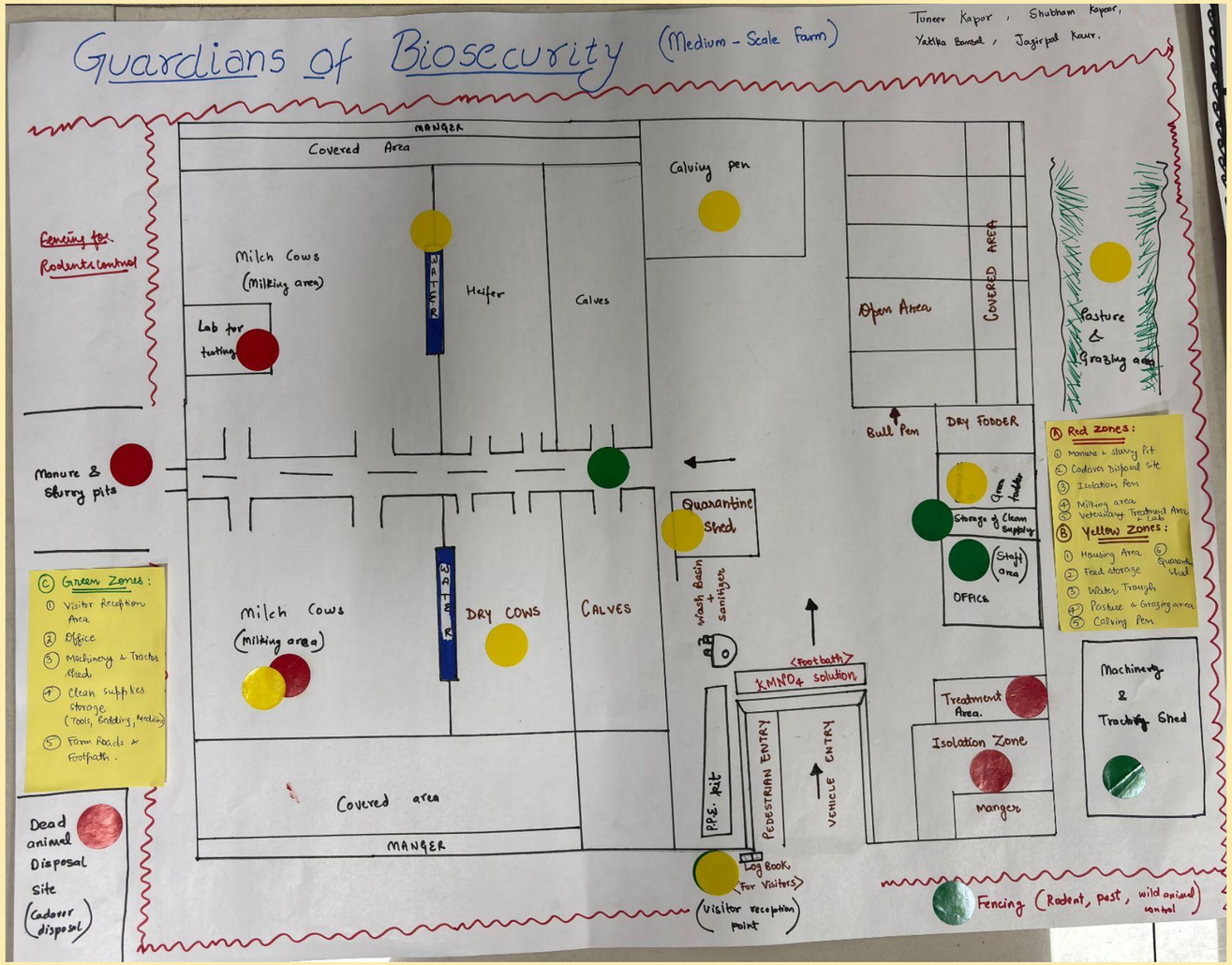
- Sketch a basic layout of a small- or medium-scale dairy farm
- Use colored stickers to indicate risk zones:

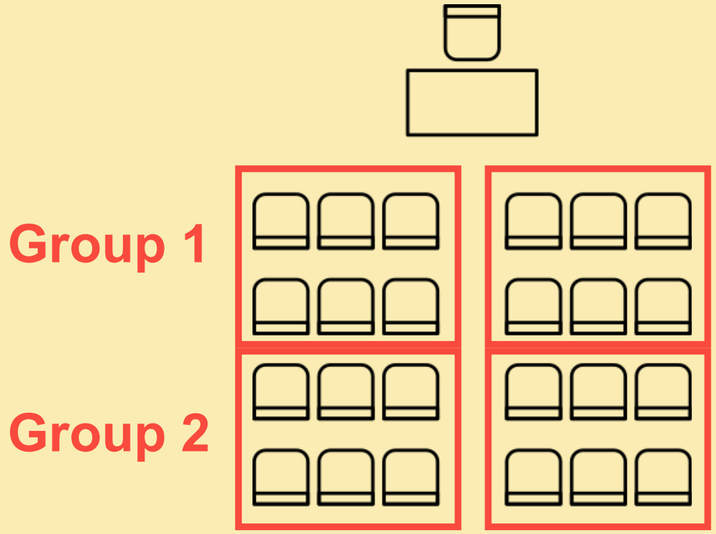
🔴 **Red** = High-risk zones (likely hotspots for infection spread, e.g., manure handling areas, sick animal pens).
🟢 **Green** = Safe zones (areas with low risk, e.g., feed storage if well protected, office area)
🟡 **Yellow** = Uncertain zones (areas where risk depends on practices, e.g., water troughs, equipment storage).



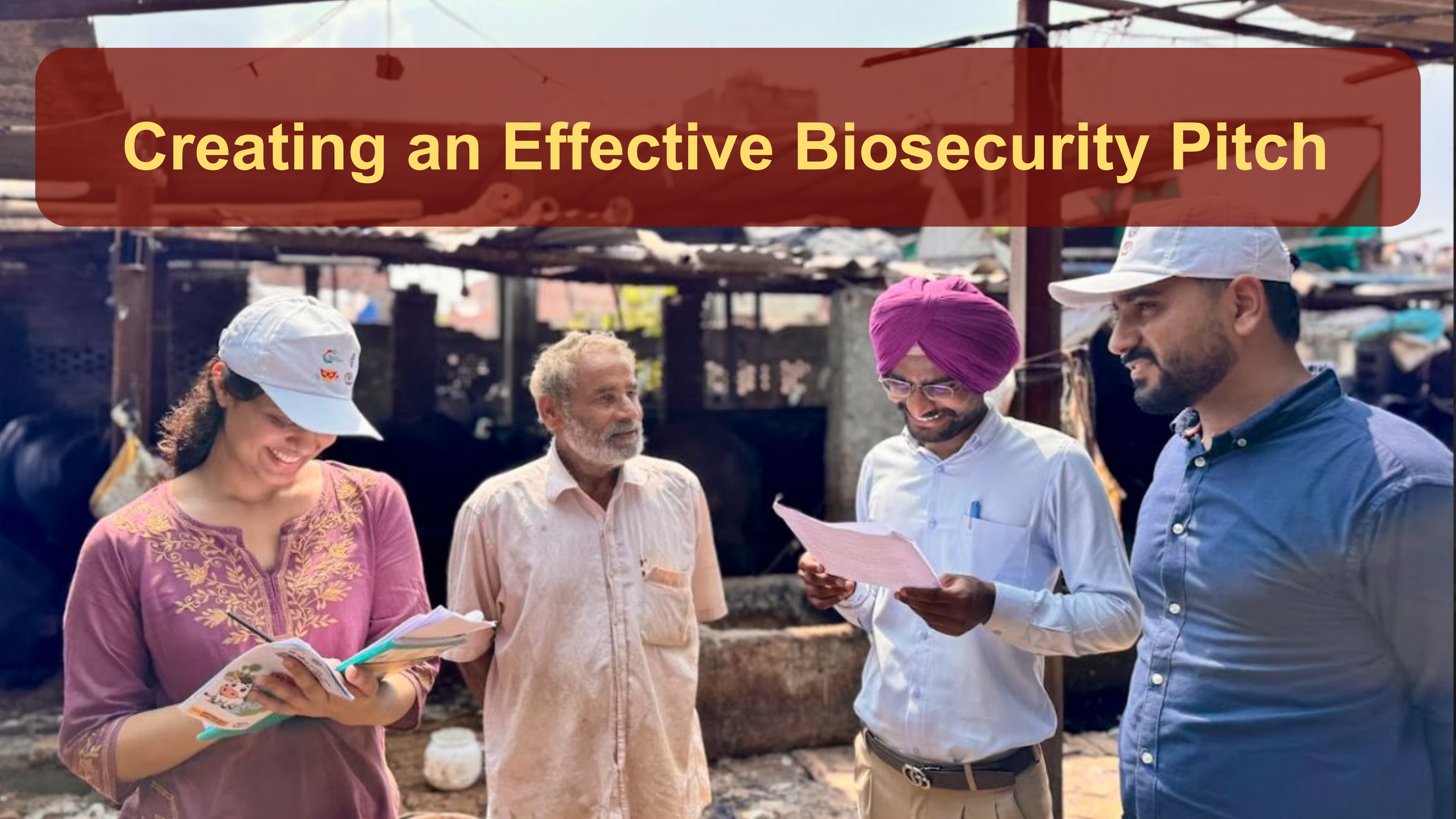
- Add arrows to show possible movement of people, animals, and equipment between zones.
- Write brief notes next to zones explaining why you assigned each risk level.
- Mention a few biosecurity based interventions that can be implemented at each risk zone.

Guidelines


Guardians of Biosecurity (Medium - Scale Farm)
Tuneer Kapur , Shubham Kapur,
Yashika Bansal , Jagirpal Kaur.
MANGER
Covered Area
Calving pen
Fencing for Rodents control
Milch Cows (Milking area)
Heifer
Calves
Lab for testing
Open Area
COVERED AREA
Pasture & Grazing area
Bull Pen
DRY FODDER
Manure & Slurry pits
Quarantine Shed
Green fodder
Storage of Clean Supplies
(Staff) area
OFFICE
Wash Basin + Sanitizer
Milch Cows (Milking area)
DRY COWS
CALVES
(Footbath) KMNO4 solution
Treatment Area.
Isolation Zone
Machinery & Tractor Shed
manger
PEDESTRIAN ENTRY
VEHICLE ENTRY
P.P.E. kit
Log Book (For Visitors)
(visitor reception point)
Fencing (Rodent, pest, wild animal control)
Dead animal Disposal site (Cadaver disposal)
MANGER
Green Zones :
1. Visitor Reception Area
2. Office
3. Machinery & Tractor Shed
4. Clean supplies storage (Tools, Bedding, Medicine)
5. Farm Roads & Footpath.
Red zones :
1. Manure & Slurry Pit
2. Cadaver Disposal Site
3. Isolation Pens
4. Milking area
5. Veterinary Treatment Area
Yellow Zones :
1. Housing Area
2. Feed storage
3. Water Troughs
4. Posture & Grazing area
5. Calving Pen
6. Quarantine Shed


Group 1
Group 2
Group 3
Group 4

Creating an Effective Biosecurity Pitch



Key Elements of a Compelling Biosecurity Pitch

1. Start with a relatable problem
2. Keep the message simple and focused
3. Use practical and feasible recommendations
4. Explain benefits, not just instructions
5. Use respectful and non-judgmental communication
6. End with a clear action message

Quick Formula for a Strong Pitch

Problem → Risk → Solution → Benefit → Action

Example:

Disease outbreaks → Increased antibiotic use → Better hygiene & vaccination → Healthier animals → Start with one preventive step today!

Be A Superhero Against Superbugs: Group Assignments

Group Assignments

Assignment option 1

Draft a plan to start an **AMR Club** at your institute. Your proposal may include a catchy name and tagline briefly describing the focus of your club.

1. Outline the objectives, focus areas, activities the club would organize, source of funding (if required for certain activities), process of recruiting members of the club, and an action plan for the first month.
2. List the roles and responsibilities the members would have.

Assignment option 2

Create a **visual infographic** to raise awareness on issues related to AMR catered to one of the following target groups:

1. Local pharmacies (medical stores, retail vendors, etc)
2. Poultry and Agri farmers
3. Local public
4. For your college
5. Hospitals/Clinics

Guidelines

What makes an infographic both informative and visually appealing?

- **A Catchy Title**
- **Key information on the subject**
- **Relevant visuals/Doodles**
- **Clear call to action for your audience**
- **Statistics or data**
- **Slogan(s)**

Share 3 new things you learnt today?

Here’s what we learnt today....

AMR is a complex problem which require everyone‘s attention including veterinarians, and animal farmers.

As Guardians of AMR, we can play our role by spreading awareness, being responsible consumers of antiobiotics, and participating in academic and public discussions on AMR.

Priorities to address AMR in human health include preventing infections; ensuring universal access to quality diagnosis and appropriate treatment of infections; research and development for novel vaccines, diagnostics and medicines.

Further Learning Resources

You all are

now

SUPERHEROES AGAINST SUPERBUGS