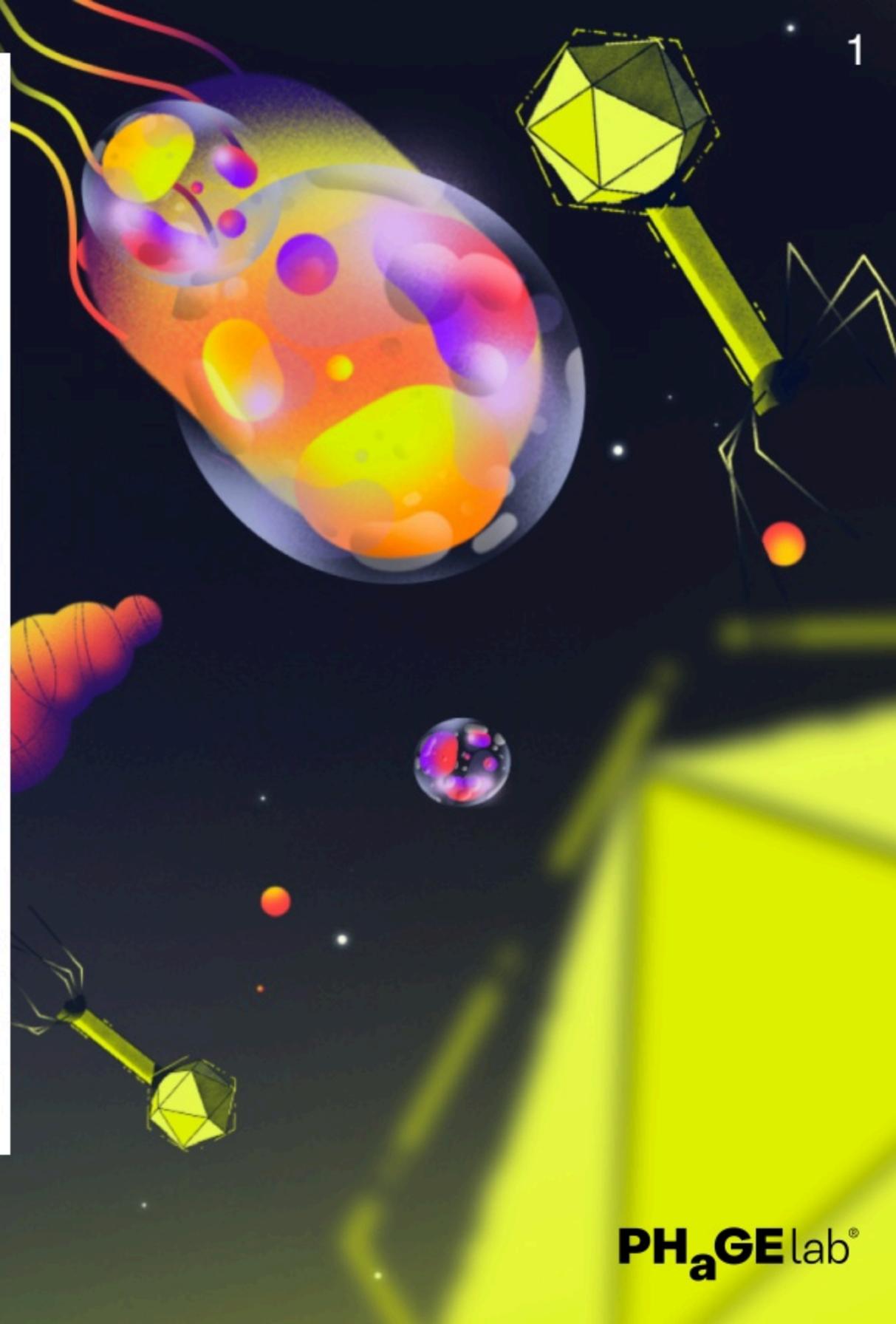


# PH<sub>a</sub>GE lab<sup>®</sup>

The AI-powered biotech platform  
solving the global bacterial threat.

[phage-lab.com](https://phage-lab.com)



# PhageLab at Poultry Science Journal: an official journal of the Poultry Science Association

**PH<sub>a</sub>GE**lab®

“DEVELOPMENT AND  
CHARACTERIZATION OF A  
BACTERIOPHAGE COCKTAIL  
WITH HIGH LYTIC EFFICACY  
AGAINST FIELD-ISOLATED  
*SALMONELLA ENTERICA*”

This paper was published in *Poultry Science*®, an official journal of the Poultry Science Association.

Poultry Science®

## A QUICK SUMMARY

Our researchers used a diverse collection of *Salmonella* isolates from commercial broiler farms.

01

They identified bacteriophages effective against the most common *Salmonella* serovars to assemble a cocktail of three highly specific phages.

02

The solution was tested for its tolerance to pH and temperature conditions similar to a chicken's gut as well as its lytic activity against *Salmonella*.

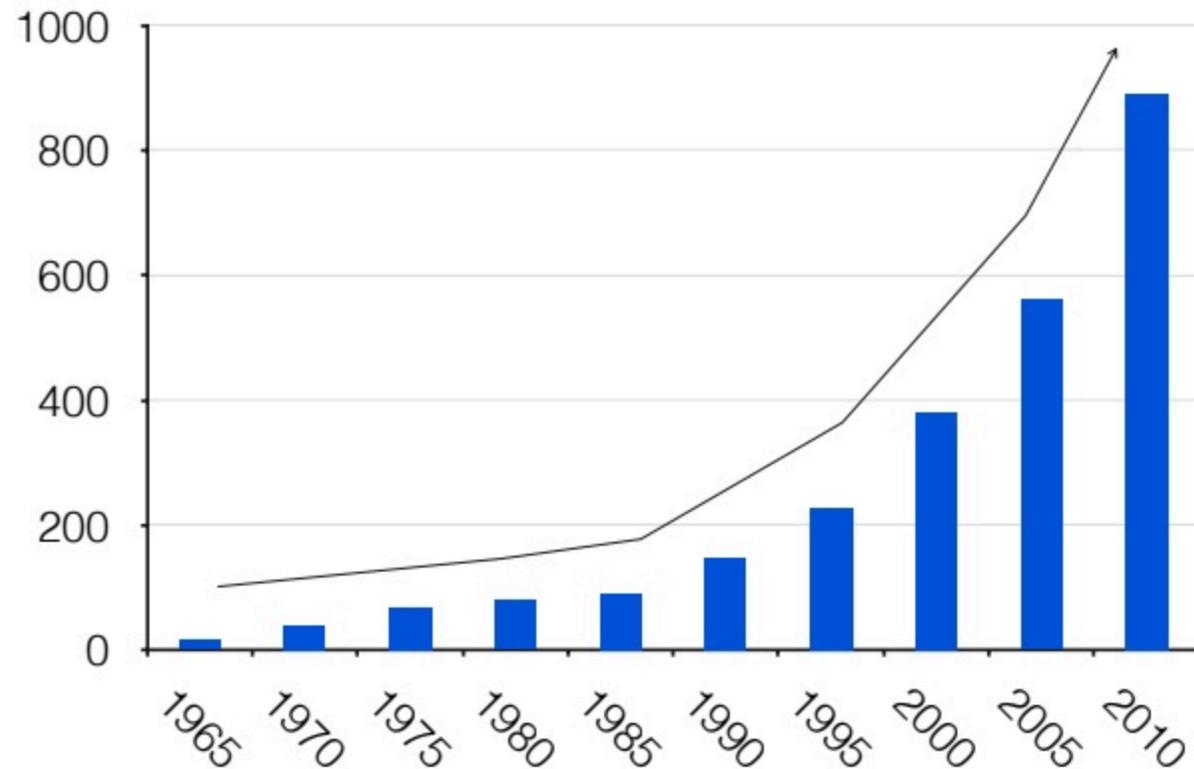
03

The results showed that **INSPEKTOR®** maintained its effectiveness even under conditions that mimic *in vivo* exposure. Importantly, there was limited or no development of cross-resistance between the three phages in the cocktail.

# A GLOBAL HEALTH CATASTROPHE IS IMMINENT

# ANTIBIOTICS ARE BECOMING USELESS, LIMITING OPTIONS TO FIGHT BACTERIA

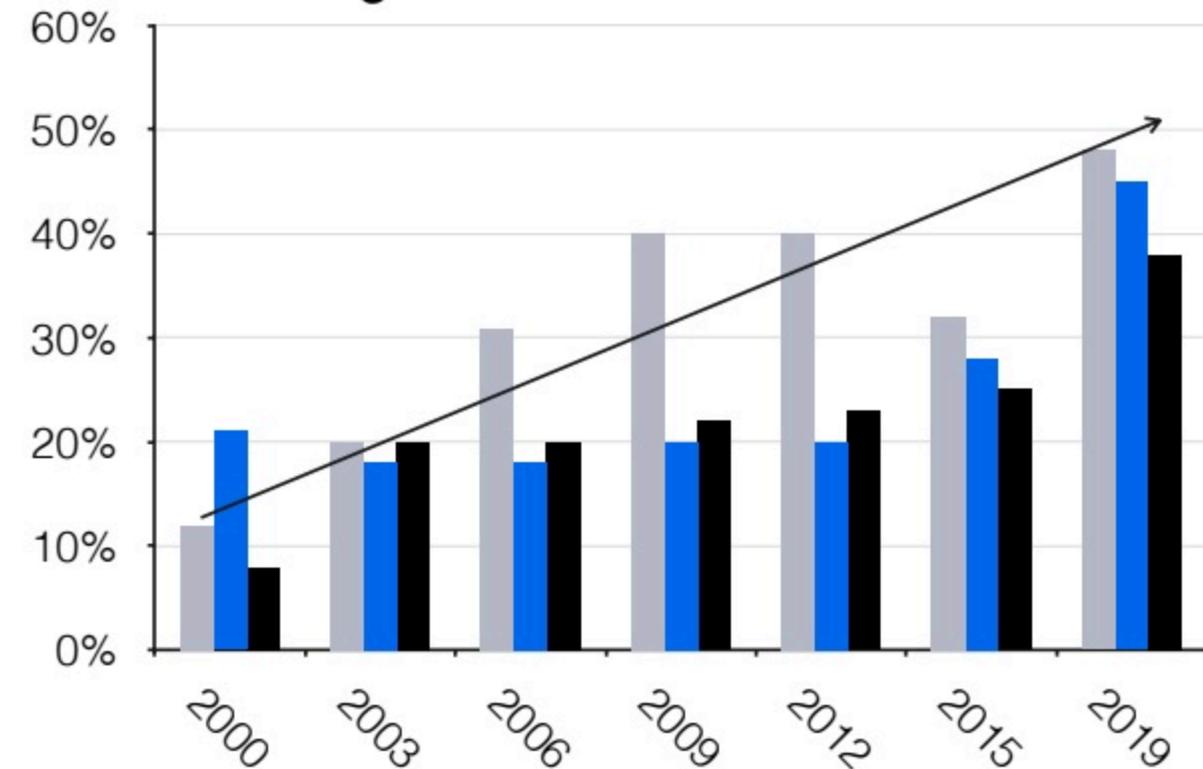
Bacteria are learning how to **resist antibiotics at an exponential rate, both in humans and animals.**



Types of bacterial antibiotic resistance mechanisms

Source: US Center Disease Control and Prevention (CDC)

Since 2019, **50% of all antibiotics** used in intensive animal farming **are ineffective, worsening the situation.**



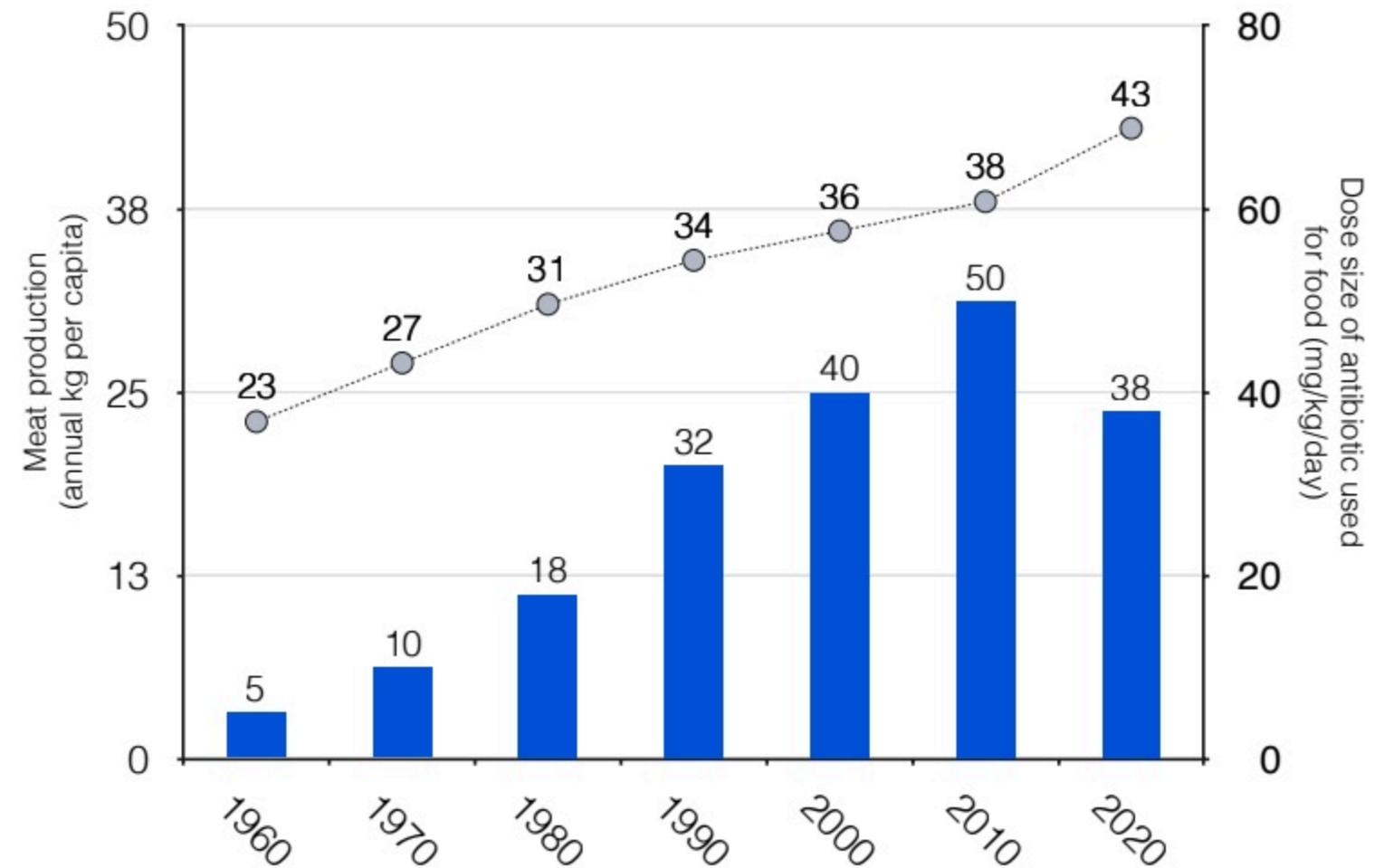
% of ineffective products for chickens  
% of ineffective products for swine  
% of ineffective products for cows

# MEAT CONSUMPTION WILL GROW CONSISTENTLY IT'S HIGHLY DEPENDENT ON ANTIBIOTICS

Today, to supply enough animals for consumption requires a concentrated and intensive rearing process –

**Conditions that increase the risk of a multi-drug-resistant bacterial outbreak.**

**Antibiotics** are the most used method to fight against pathogenic bacteria in animals.

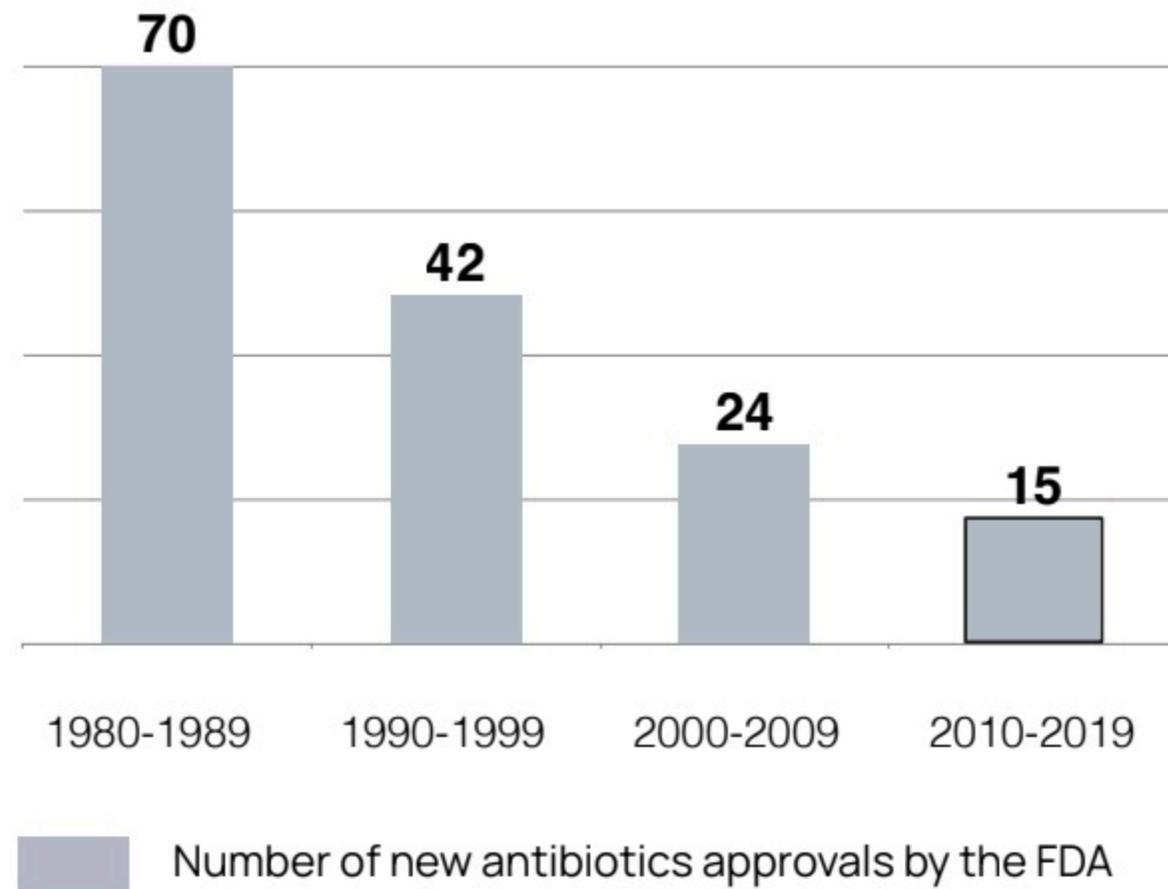


Source: Food and Agriculture Organization of the United Nations (FAO)  
World Organization for Animal Health (OIE)  
*Global trends in antimicrobial use in food animals, 2015, PNAS*

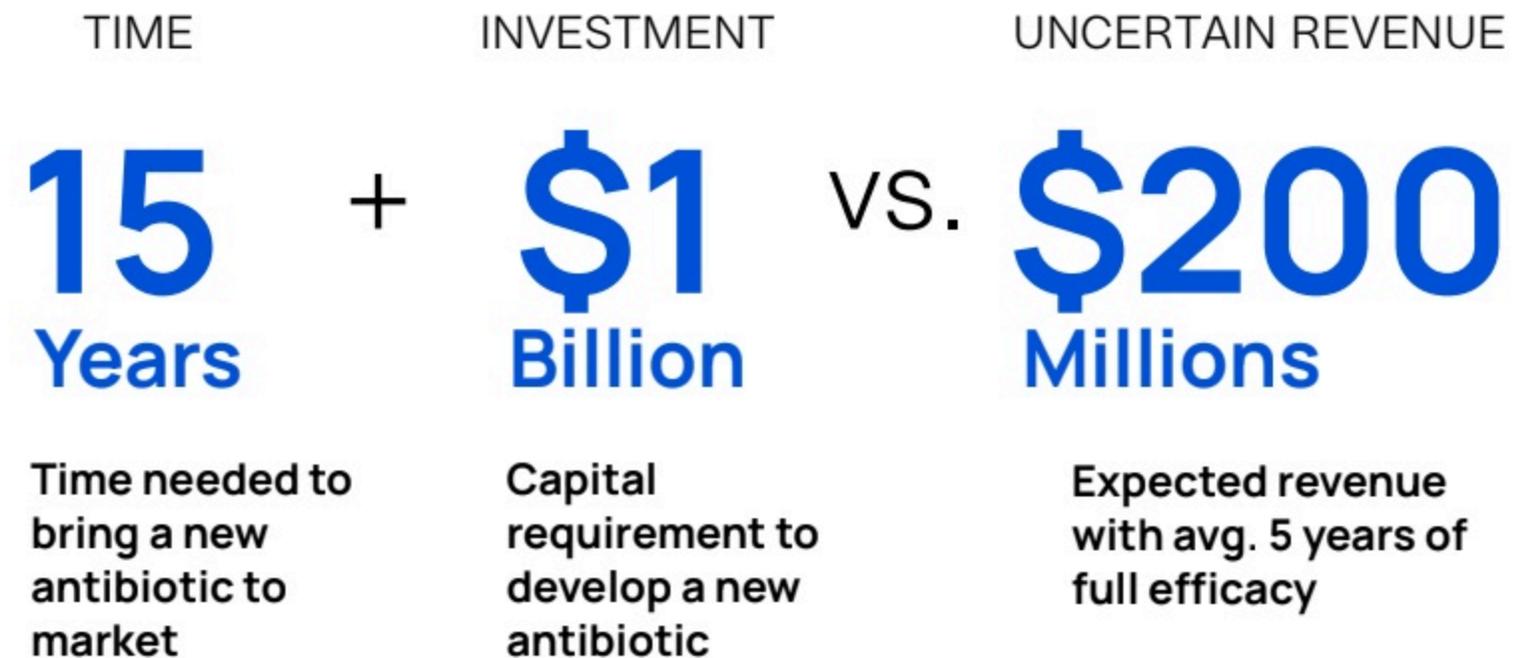
■ Dose size of antibiotic used for food (mg/kg/day)  
○····· Meat production (annual kg per capita)

# BIG PHARMA IS ABANDONING NEW ANTIBIOTIC DEVELOPMENT

The number of **new antibiotic initiatives** is **decreasing dramatically**.



And requires a huge amount of effort and investment with an uncertain commercial future



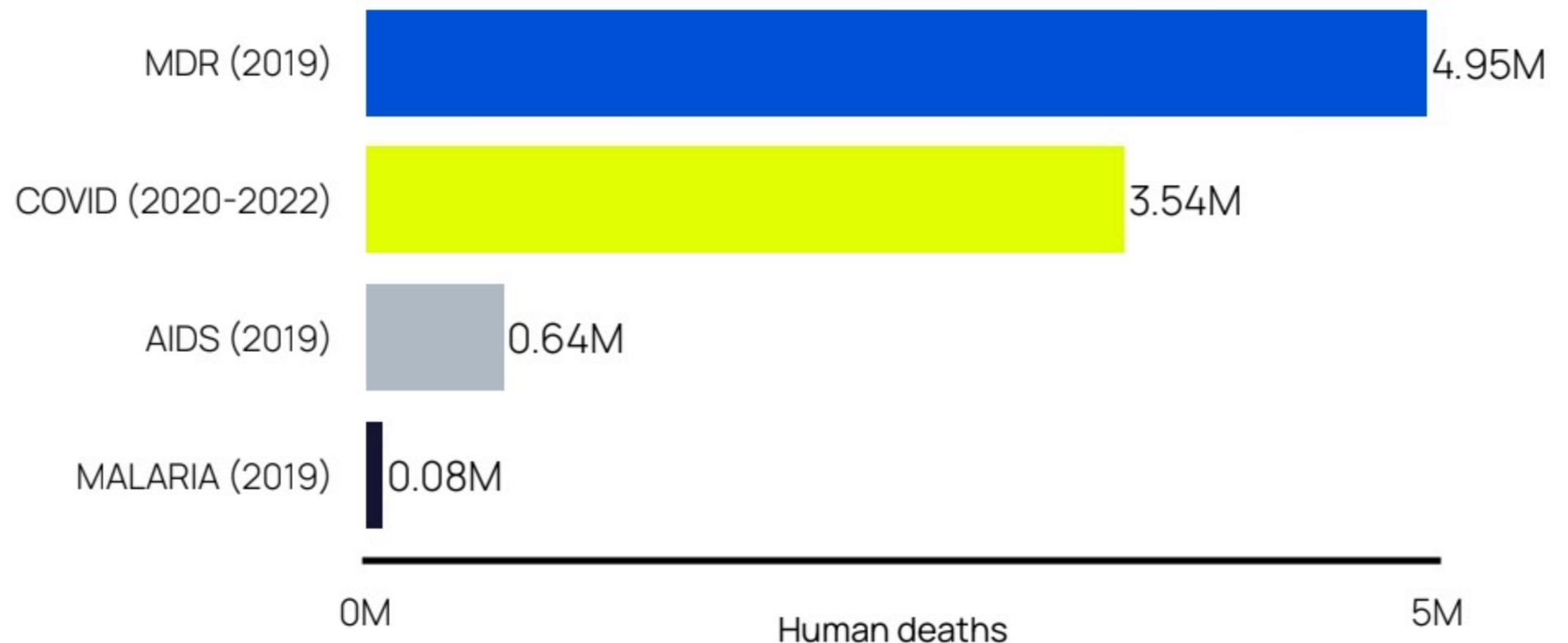
Source: US Food and Drug Administration (FDA 2023), *The PEW Charitable Trusts (2020)*, World Health Organization (WHO 2022), *Center for Disease Control and Prevention (CDC 2019)*

One thing we do know:

THE CRISIS  
HAS JUST  
BEGUN

# THE CRISIS IS ALREADY IMPACTING HUMAN HEALTH

Recent studies show that in 2019 multi-drug resistance (MDR) played a part in **the deaths of more than 4.95 million people worldwide.**



Graphic: Deaths caused by different diseases between 2019 and 2022.

The background of the slide features several stylized, colorful bacteria. Each bacterium has a multi-colored body (shades of orange, red, yellow, and green) and several blue flagella extending from its base. Some of the bacteria have simple black faces with eyes and a mouth. The bacteria are scattered around a central yellow rectangular area.

BY 2050,  
ANTIBACTERIAL  
RESISTANCE WILL  
BECOME THE  
MAIN CAUSE OF  
DEATH IN HUMANS

*Source: WHO, 2018*

# ...CREATING A HUGE AND GROWING MARKET READY TO BE DISRUPTED



**\$104B**

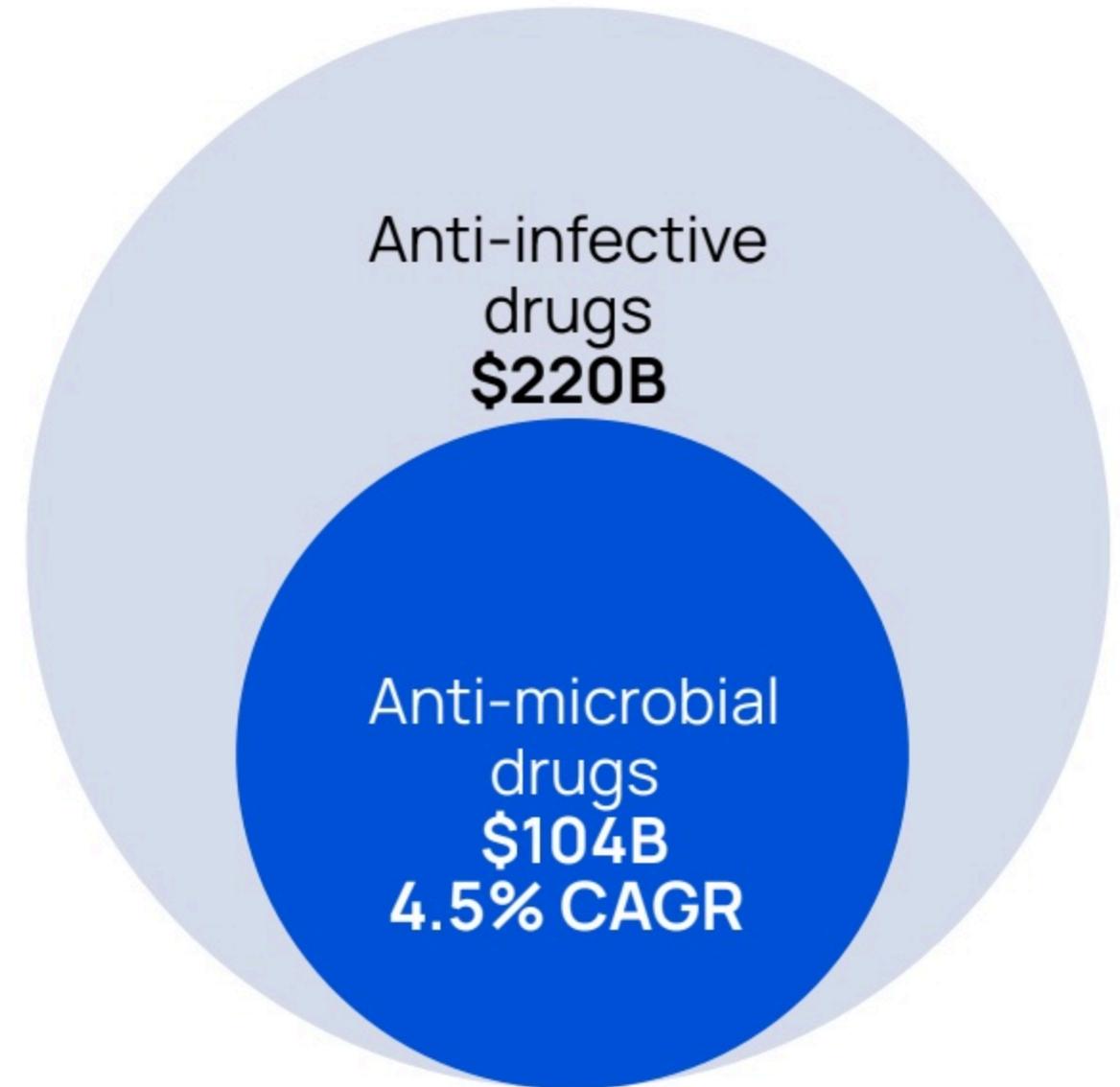
Anti-microbial drugs market



**\$18.9B** Animal health



**\$85.3B** Human health



Source: Fortune Business Insights, 2021 Center for Disease Dynamics, Economics & Policy (CDDEP), 2021 Grand View Research, 2021

---

**NOW,**  
THIS IS HOW  
WE DO IT.

# OUR PLATFORM CAN CREATE A SAFE, EFFECTIVE AND CUSTOM- MADE SOLUTION IN 45 DAYS.



0.1% of the average time for  
other technologies.

---



# USING PHAGES, THE NATURAL- BORN KILLERS OF BACTERIA

**Phages** are viruses that infect bacteria with a high degree of specificity for particular strains: a safe and natural tool for eliminating harmful bacteria in animals and humans.

**Phages** are the most abundant, diverse and sophisticated microorganisms in our planet.

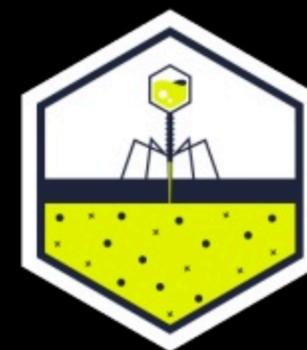
**Phages** have been nature's way of controlling bacteria since the beginning of life on Earth.

## HOW THEY WORK:



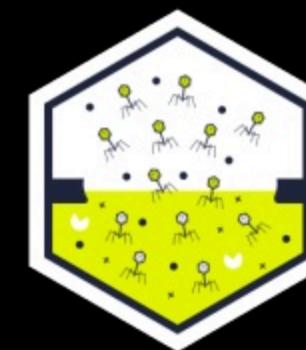
### 1. SEEK

Phage identify the bacteria they are genetically programmed to consume.



### 2. COLONIZE

Phages infect and replicate thousands of times within the target bacteria.



### 3. DESTROY

Phages safely and effectively kill the bacteria through an enzymatic mechanism.

# WHY PHAGES HAVE YET NOT BEEN USED IN MASSIVE SCALE?

1  
Diagnosis

## THE DIVERSITY OF BACTERIA IS IMMENSE

Sequencing is very expensive and diagnosing specific target bacterias require extensive and specialized knowledge.

2  
Matching

## PHAGES ARE EXTREMELY DIVERSE AND SPECIFIC

Each target bacteria can only be matched with specific phages. Developing the right combination of phages requires a massive biological database and matching capability.

3  
Production

## PHAGE PRODUCTION HAS NEVER ACHIEVED PHARMA STANDARDS

Achieving scale and affordable phage-based products is a specialized biotechnological process that is also highly dependent on matching capabilities.

4  
Regulatory

## COMPLEX REGULATORY LANDSCAPES

Getting approvals requires navigating complex regulatory landscapes in a timely and efficient manner (average Pharma time is more than 4 years).

# WE'VE MASTERED THESE CHALLENGES BY CREATING LEIDEN<sup>®</sup>

## EPIDEMIOLOGICAL ANALYSIS ALGORITHM.

**US Patent pending**  
US18/006,453

LEIDEN'S UNIQUE  
SOURCES OF DATA



**10+ years of experimentation data.**



**We have the world's largest industrial bacteria repository.**



**We have a huge and tested Phage repository.**



**We apply genomics and bioinformatics.**