



Reducing Antimicrobial Resistance (AMR)

Edgar Garcia Manzanilla



Bugs resistant to antibiotics 'will kill more than cancer'



Outline

- What is Antimicrobial Resistance (AMR)?
- Where is the problem and how bad is it?
- Who is using Antimicrobials?
- What can we do about it?

What is AMR?

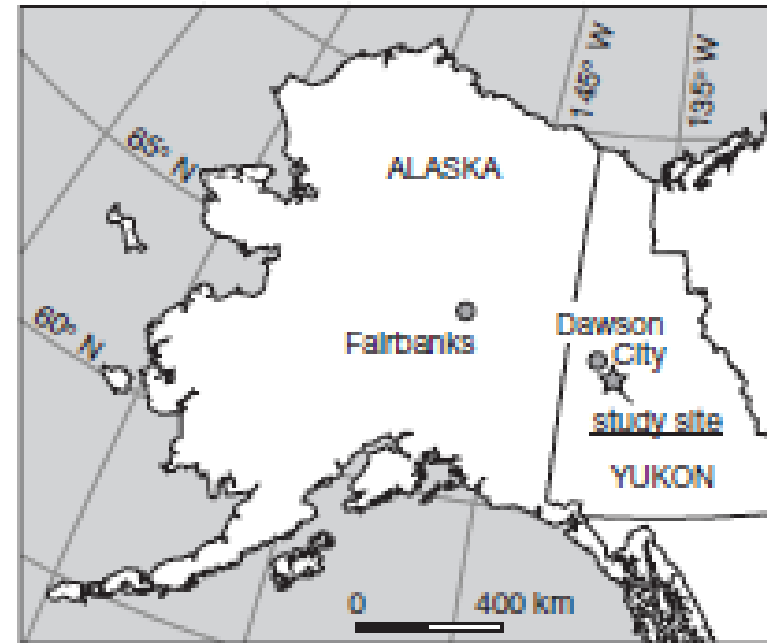
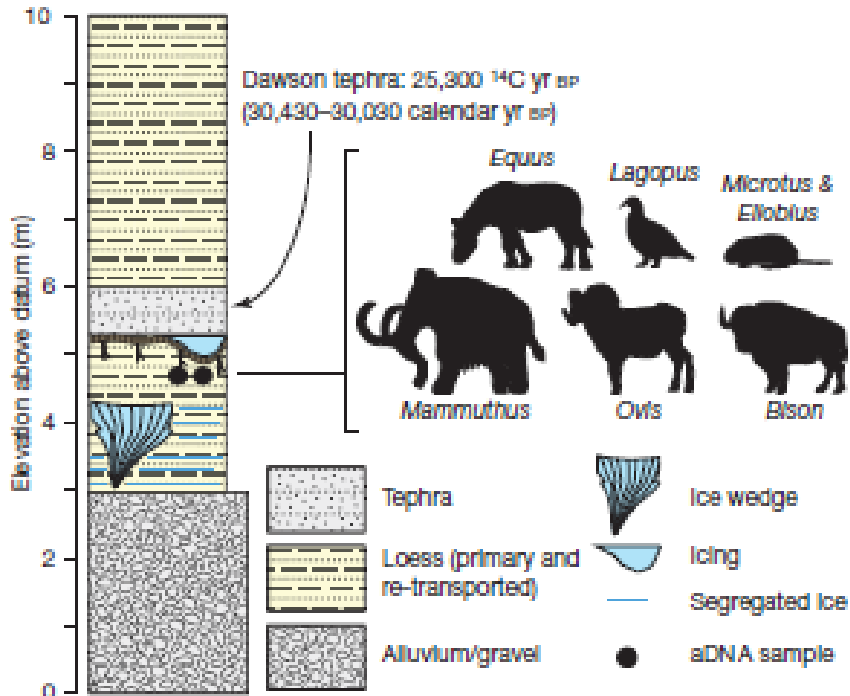
Antimicrobial resistance (AMR) is the ability of a microorganism (bacteria, viruses, and some parasites) to grow/survive in the presence of an **antimicrobial** (such as antibiotics) that should be capable of killing it when used correctly



Antibiotic resistance is ancient

Vanessa M. D'Costa^{1,2*}, Christine E. King^{3,4*}, Lindsay Kalan^{1,2}, Mariya Morar^{1,2}, Wilson W. L. Sung⁴, Carsten Schwarz³, Duane Froese⁵, Grant Zazula⁶, Fabrice Calmels⁵, Regis Debruyne⁷, G. Brian Golding⁴, Hendrik N. Poinar^{1,3,4} & Gerard D. Wright^{1,2}

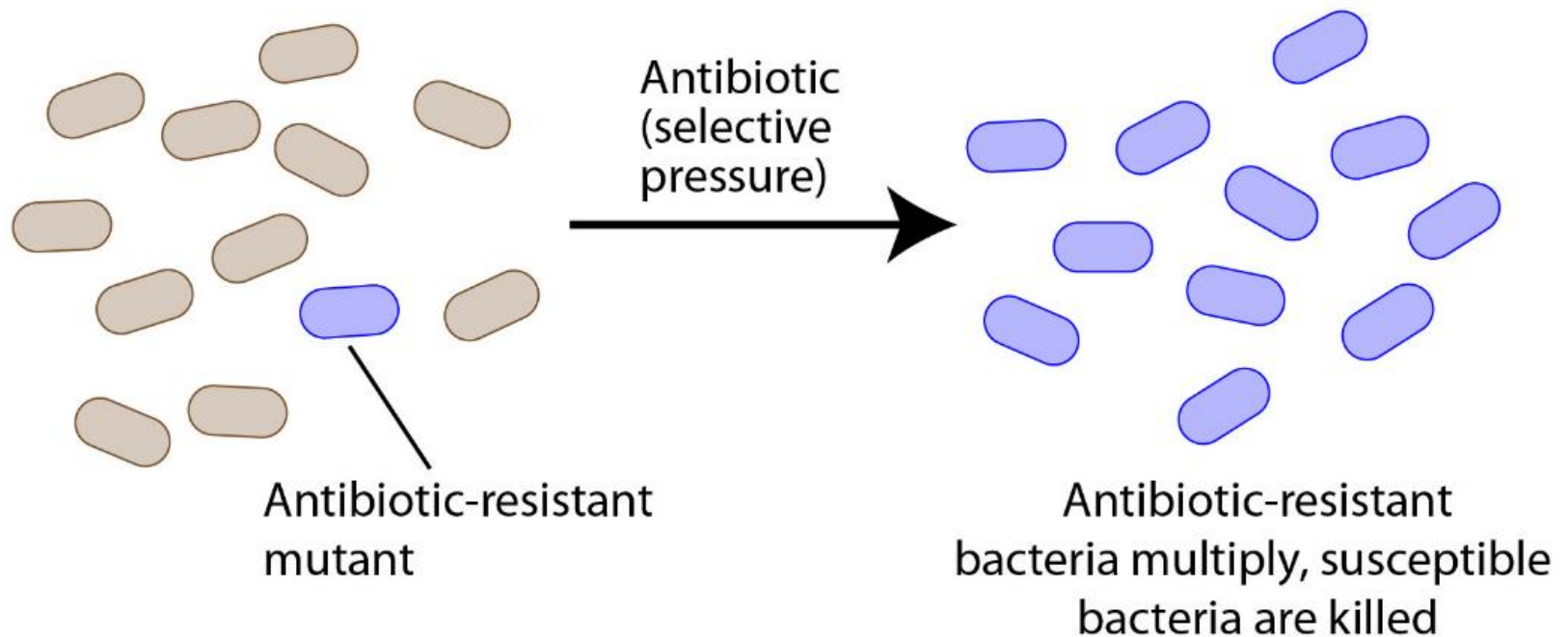
22 SEPTEMBER 2011 | VOL 477 | NATURE | 457



Bacterial DNA for antibiotic resistance >30,000 years old

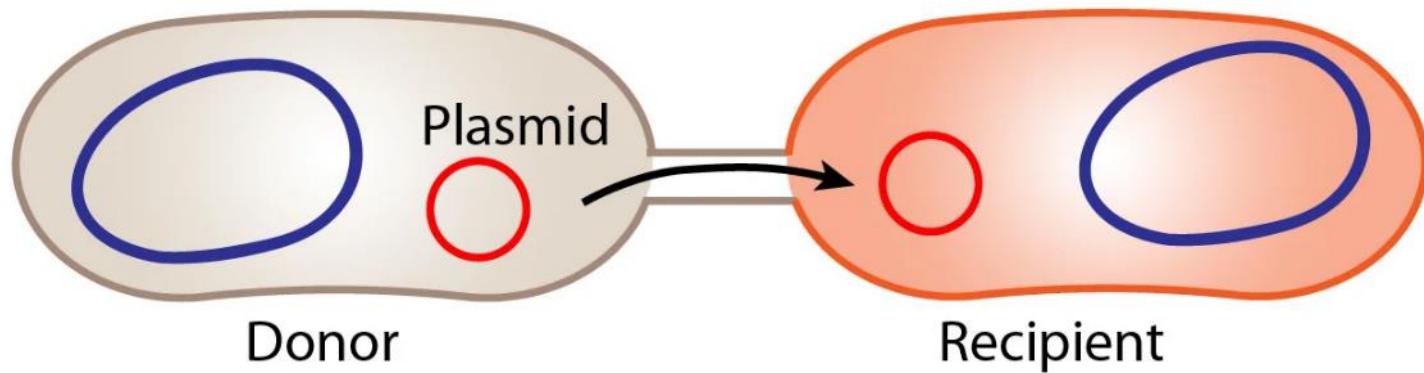
Why do we have to worry?

AMR is a natural phenomenon...



...but we added **SELECTION** pressure

Selection is not the only problem



Bacteria can share resistance genes

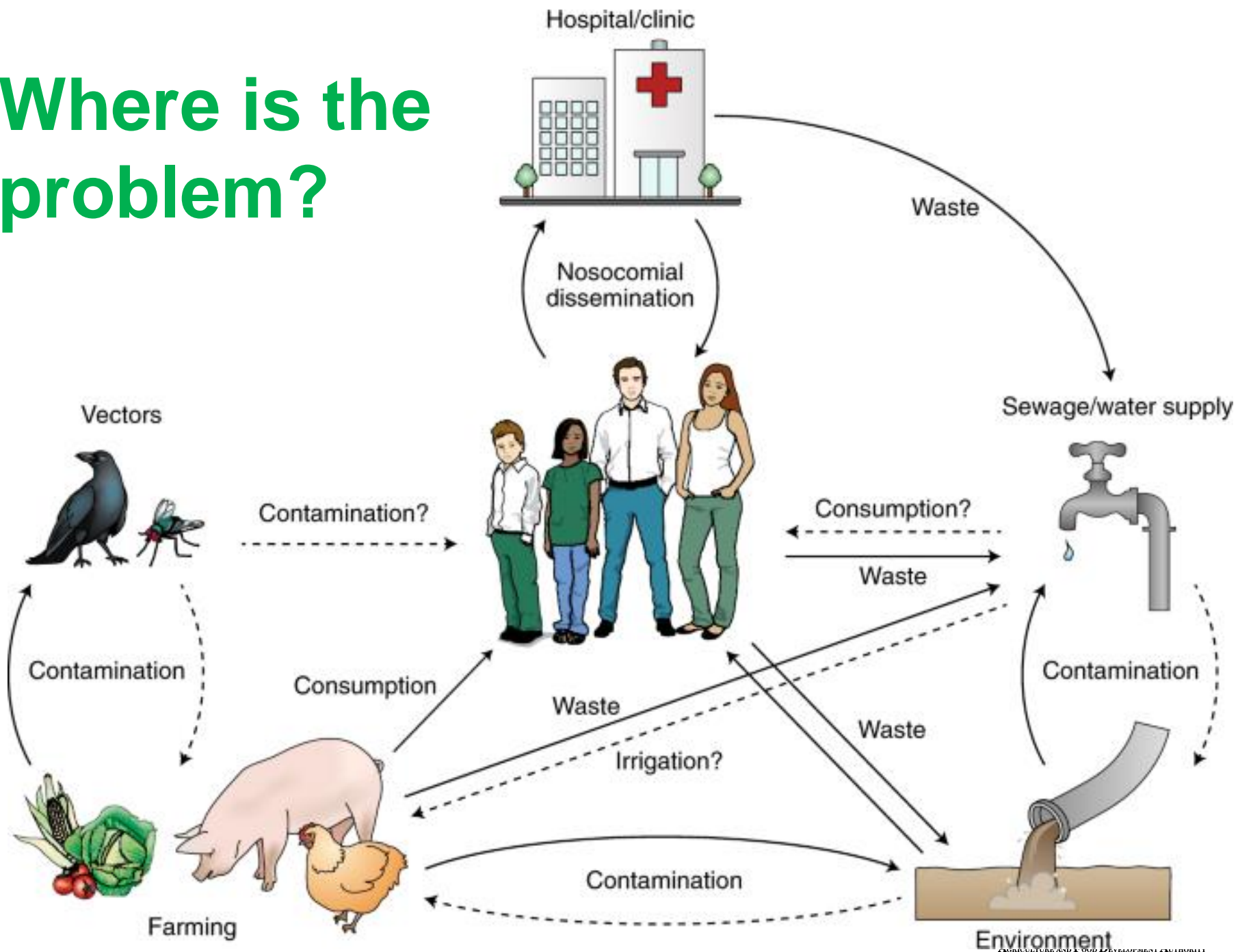
Multiresistant bacteria



Superbugs

ANTIBIOTIC	RESISTANCE ANALYSIS
Amoxicillin	RESISTANT
Co-amoxiclav	RESISTANT
Cefuroxime	RESISTANT
Cefotaxime	RESISTANT
Ceftazidime	RESISTANT
Piperacillin	RESISTANT
Aztreonam	RESISTANT
Meropenem	RESISTANT
Ciprofloxacin	RESISTANT
Gentamicin	RESISTANT
Tobramycin	RESISTANT
Amikacin	RESISTANT
Tigecycline	RESISTANT
Colistin	NON RESISTANT

Where is the problem?





**ANIMAL
HEALTH**



**HUMAN
HEALTH**

**ENVIRONMENTAL
HEALTH**



**Food and Agriculture
Organization of the
United Nations**



**World Health
Organization**



Ten threats to global health in 2019

10 global health issues to track in 2021

How bad is it?



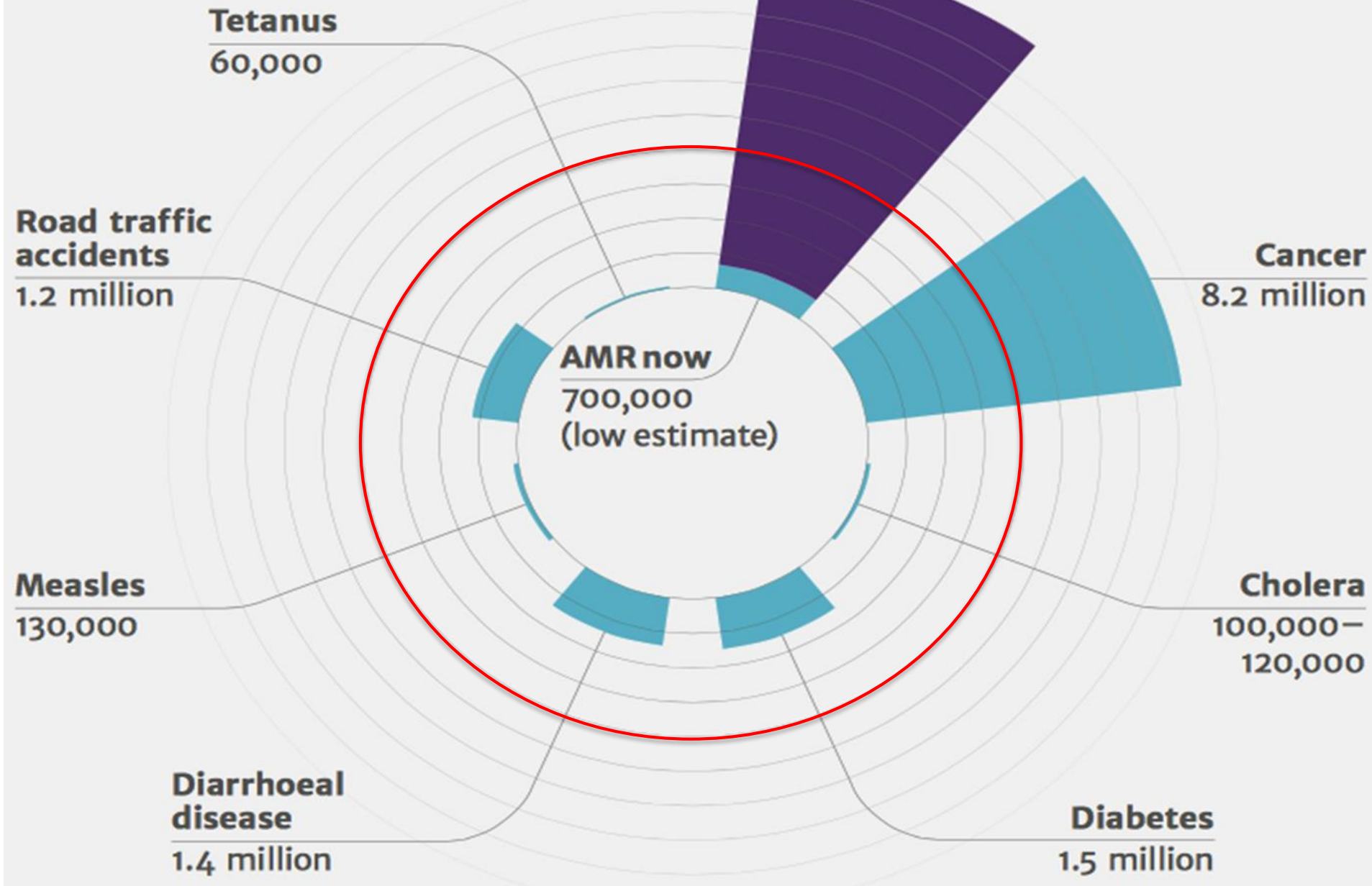
COVID19



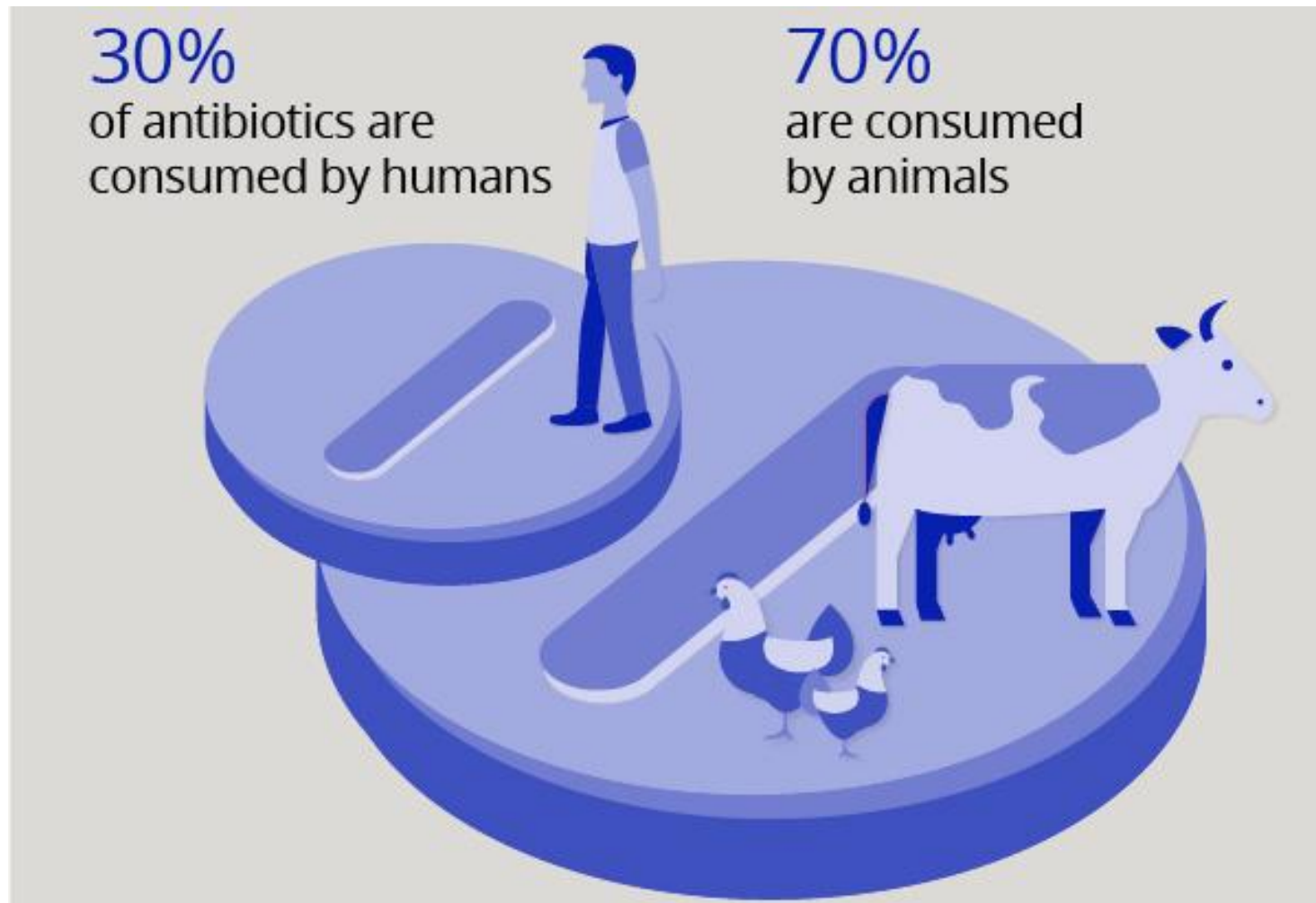
Antibiotic resistance

COVID19 Deaths = 3.7 million

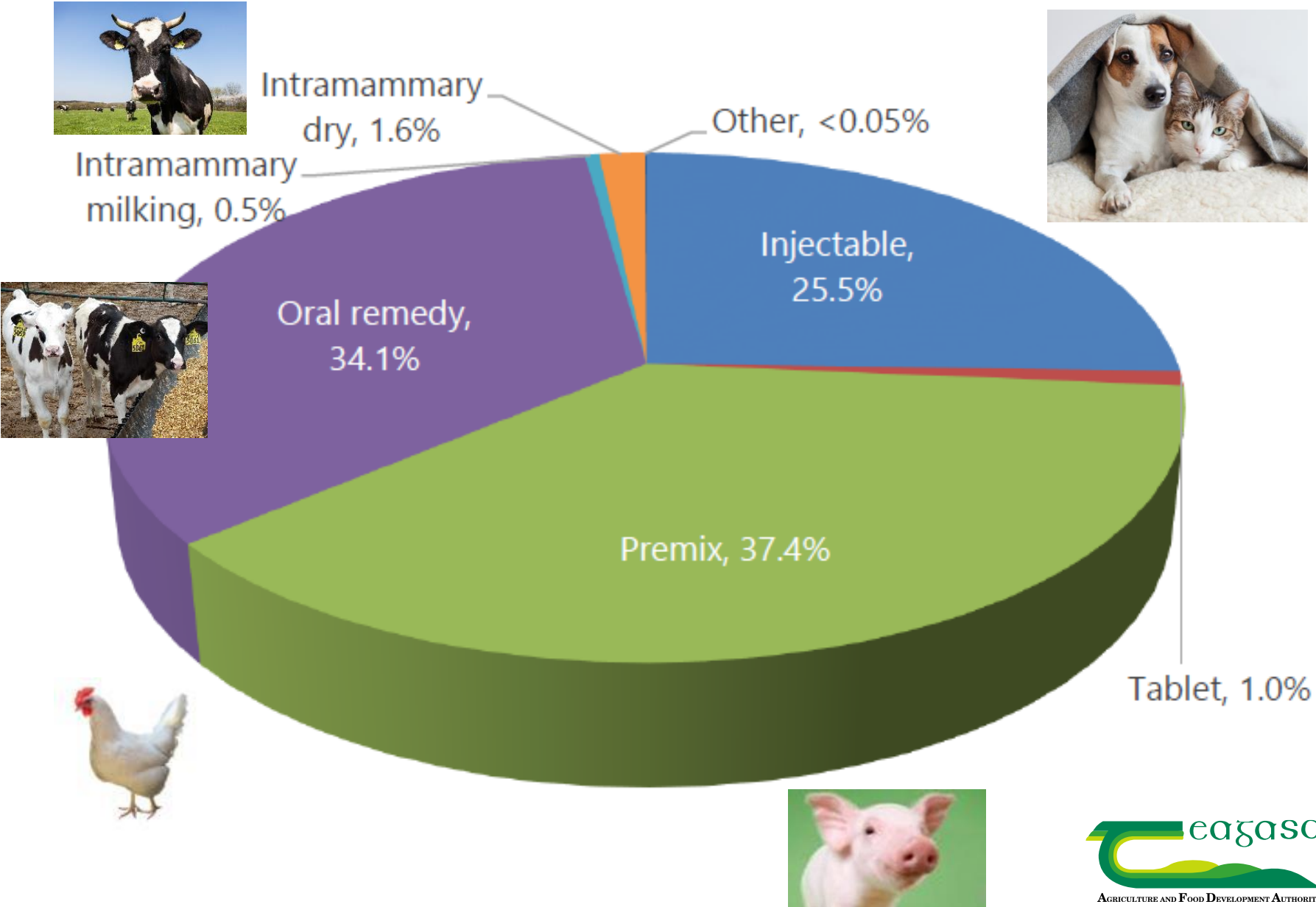
AMR in 2050
10 million



Who is using Antimicrobials?



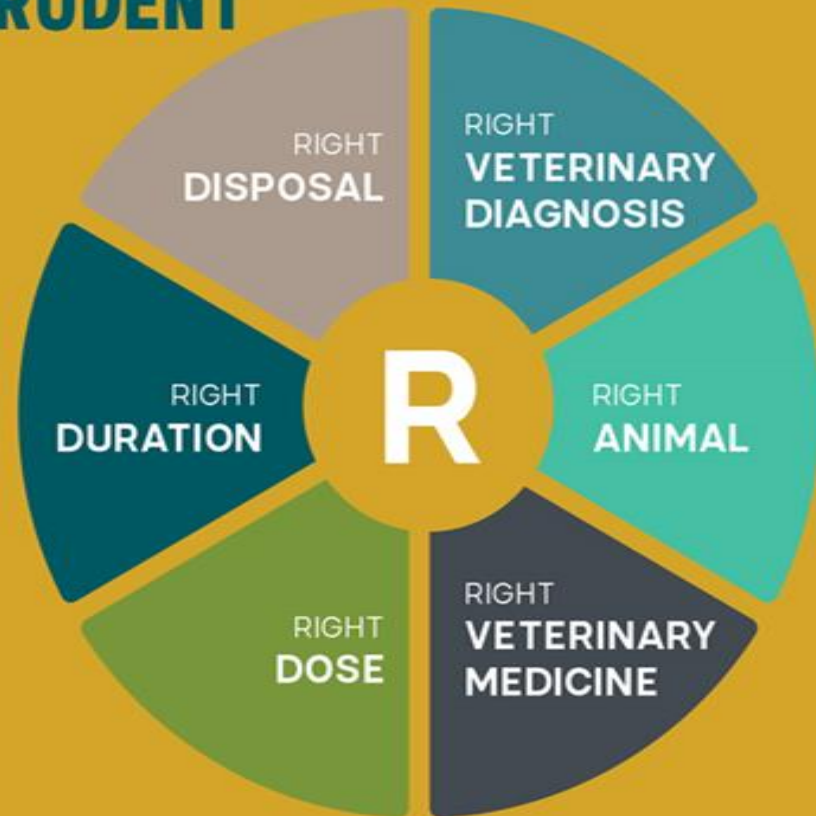
Breakdown of the animal use of antibiotics in 2019 in Ireland



So, what do we do? Prudent use

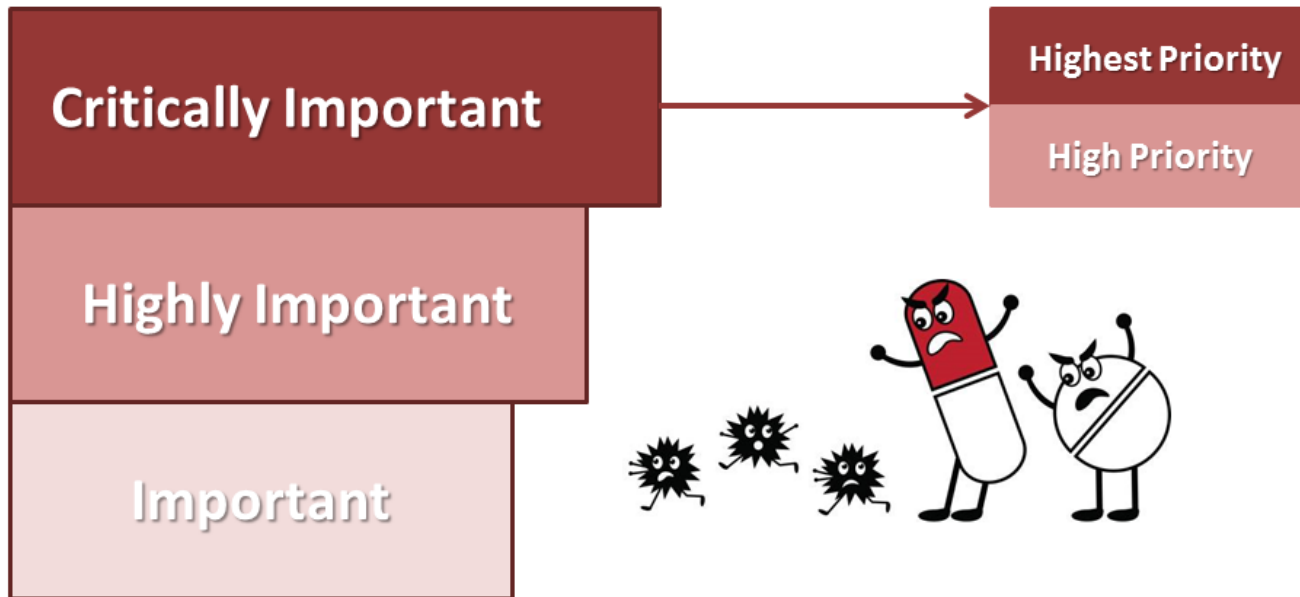
FOLLOW THE 6Rs OF PRUDENT USE OF ANTIBIOTICS

It's right for your animals, right for you, right for your family, right for your community and right for everyone's future



As little as possible, as much as necessary

CIAs Critically Important Antibiotics



CIAs are classes of antibiotics that are a last resort and are crucial in treating human disease where first line antibiotics have not worked.

What do we do? Use the tools

Perceived alternatives (Vets)	Average of effectiveness, feasibility, ROI	
	Mean	Ranking
Internal biosecurity	7.5	1
Increased vaccination	7.2	2
Zinc/metals	7.2	3
Feed quality/optimisation	7.2	4
Diagnostics/action plan	7.0	5
External biosecurity	7.0	6
Climate/environmental	7.0	7
Communication/unified advice	6.6	8
Water quality	6.5	9
Age and transfer management	6.5	10

Behavioural change

Postma et al., 2015

Take home message

- It can only be solved with a One Health approach
- We need to act now (Social challenge)
- Always follow rules of prudent use
- Use all the tools available