شكرا لأعضاء الجمعية العلمية لطلاب الطب

فى مصر

- Thank you *IFMSA for your kind invitation*
- *Thank you for all organizers*

شكرا للاتحاد الدولى الفيدرالى لطلاب الطب فى مصر

شكرا للاتحاد الدولى لطلاب الطب البيطرى فى مصر

شكرا للاتحاد المصرى لطلاب الصيدلة

Drug residues in animal production and it,s effects on human health

By

Prof. Mostafa Fayez

Faculty of Veterinary Medicine

Suez Canal University

Outlines

- Veterinary drug applications.
- Evidence-based applications.
- Wise use of veterinary drugs.
- Wise use of growth promoters.
- Case study.
- Veterinarian role.
- Prevention protocol on the farm.
- Prevention by authorities.


THINKING TOGETHER

Use of Food Animal Drugs and "One Health"

Food Safety

- Multi-drug resistant food borne pathogens
- Public expectation of safe food
  - Pathogen free raw products
- Farm to fork surveillance
- Food product liability
- Food Product traceability
- Food borne illness data

Animal Health

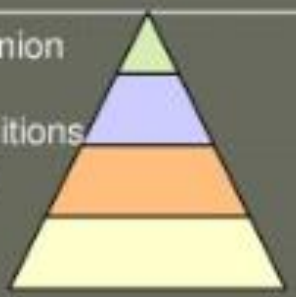
- Preventive & disease control antimicrobial use
- Antimicrobial drug availability
- Animal traceability
- Disease data

Public Health

- Human Antimicrobial Use
- Immune compromise (HIV, chemo)
- Animal drug use and resistance of human pathogens
- Disease data

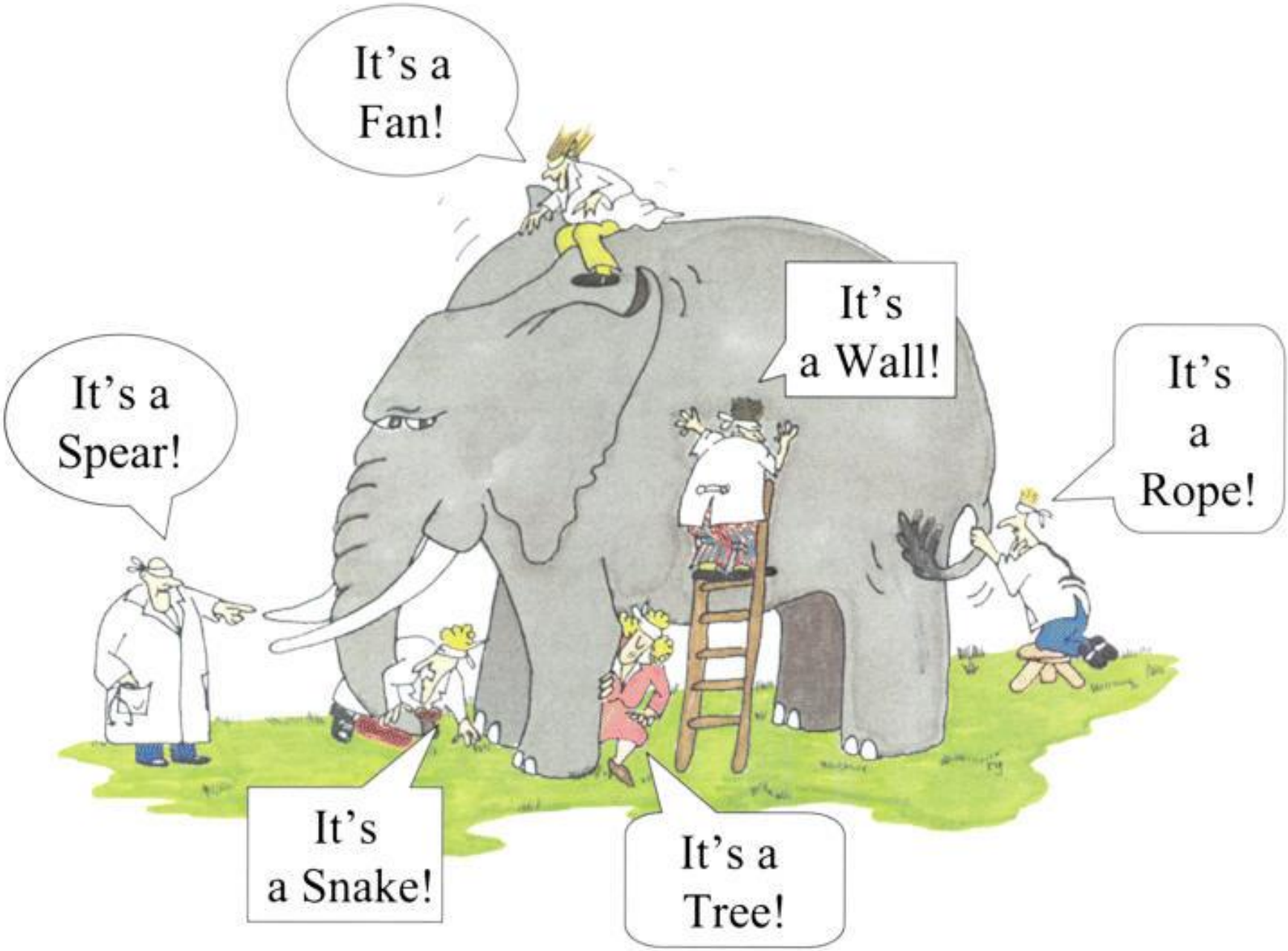
Animal Well Being

- Perception of animal well being - Companion animal vs. production animal
- Food production practices – different conditions for animal vs. human antimicrobial therapy
- NSAIDS use vs. abuse
- Environmental sustainability – carbon footprint of intensive animal production



Human Well Being

- Perception of human well being
- Food preferences
- Food affordability and quality
- Antibiotic effectiveness and human well-being
- Environmental sustainability – carbon footprint of non-intensive animal production

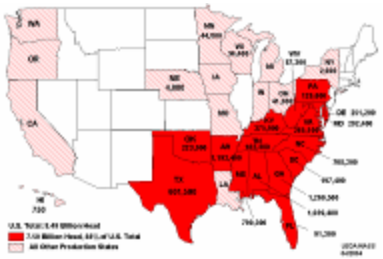

It's a Fan!
It's a Spear!
It's a Wall!
It's a Rope!
It's a Snake!
It's a Tree!


Medical
HPAI
Environment
Zoonotic
humans
began
physicians
zoonotic
health
people
National
Center
wildlife
global
One
Association
H5NI
enhancing
linked
disciplines
diseases
CDC
recognize
outbreaks
international
Diseases
Initiative
Health
animals
animal
collaboration
Emerging
human
office
public
activities
virus
Organization
emerging
veterinarians
outbreak
infectious
Agriculture
World
influenza
promote
ecosystem
scientists
promotes
promoting


Eat Well
Live Well

Intensive Animal Production

- From Animal husbandry To Meat Production
  - Gestation crates, Early weaning, debeaking, Growth promoting synthetic hormones & feed additives
- From Geographically dispersed to highly concentrated
- From Pasture-based to Confinement based



veterinary drug applications


1626

Growth

- **Determinate Growth**
  - Mammals
  - Grow to a given size (mature size)
- **Indeterminate Growth**
  - Fish
  - No predetermined size
  - Will grow to available nutrients and environment
  - Can create new muscle fibers after hatching

Cattle Implants

- No withdrawal times
- Effect lasts:
- Ralgro 80 days
- Synovex S 80-90 days
- Synovex X 90 days
- Revalor 90 days

Wise use of veterinary drugs


Don`t eat Poisoned
Ractopamine!!
不想變成
瘦肉精人種


No Ractopamine!
No Poisoned Pork!
拒用瘦肉精拒絕有毒豬肉


يسبب الموت المفاجئ
و«سرطان الثدى»
و«البروستاتا»
«الركتوبامين»
هرمون قاتل فى اللحوم المستوردة


حذاري من الهرمونات الصناعية على أجسامنا
نصائح
وإرشادات
مجانية

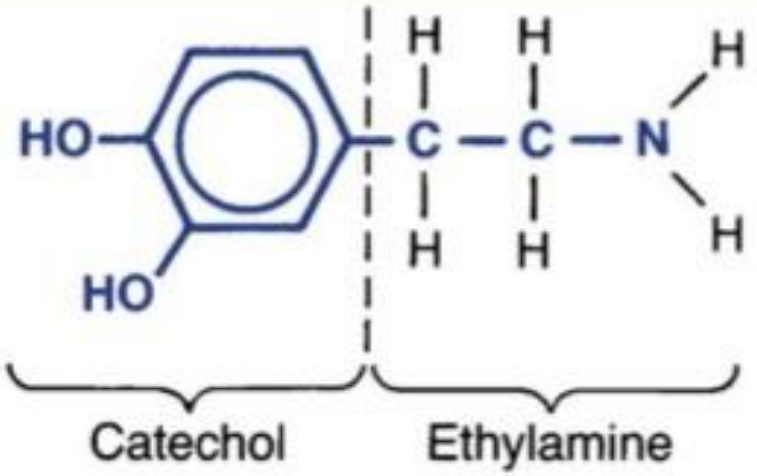
Wise use of growth promoters


OH
OH
H
N
HO
CH3
ractopamine

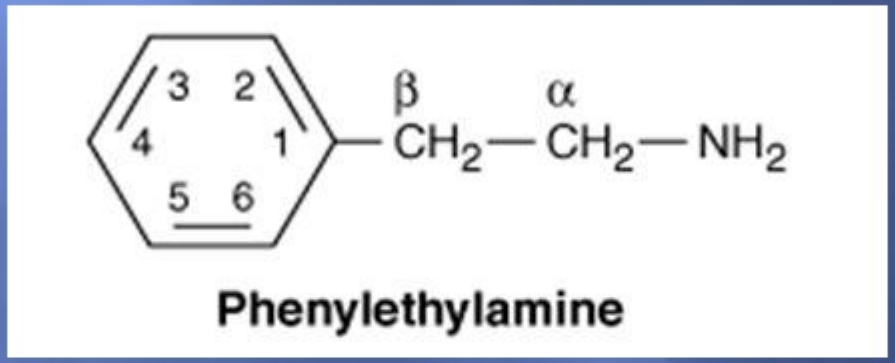
Adrenergic Agonists

- Chemical classification
  - Catecholamines
  - Non-catecholamines

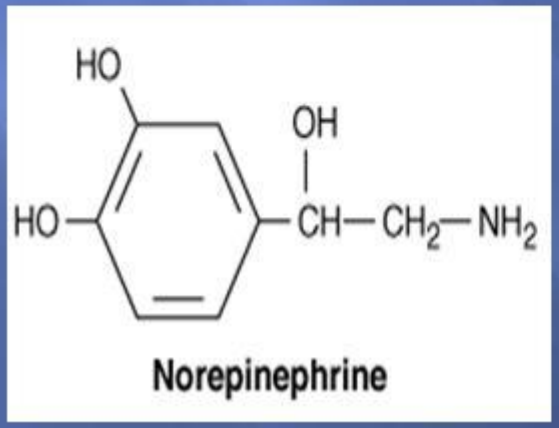
Basic structure of the catecholamines



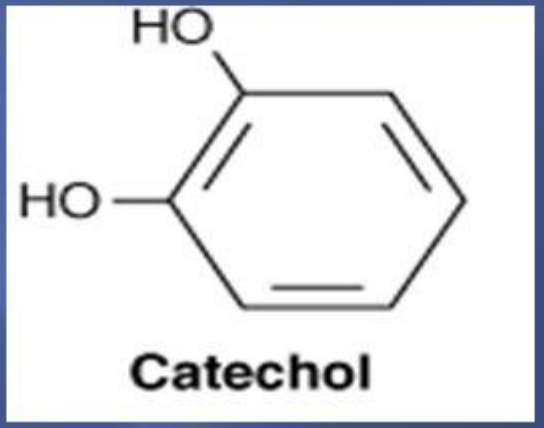
Chemistry & Structure –Activity Relationship of Sympathomimetic Amines



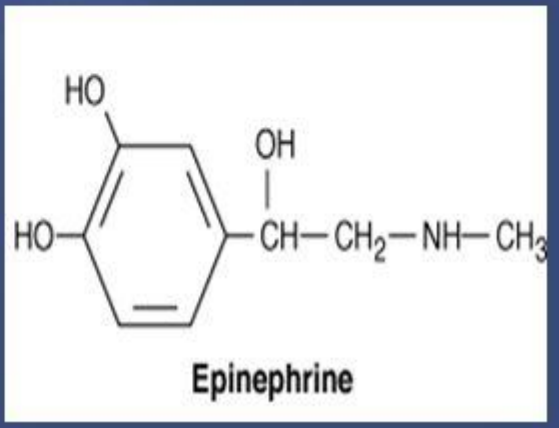
Phenylethylamine



Norepinephrine



Catechol



Epinephrine

What is Ractopamine?

- β agonist;
- not a hormone;
- not a steroid;
- not “biotechnology.”

G20 Ministerial Declaration
Meeting of G20 Agriculture Ministers, June 2011
Action Plan on Food Price Volatility and Agriculture

As far as public health, animal health and plant health are concerned, "we stress the importance of **strengthening international and regional networks, international standards**…

…We encourage **international organizations, especially FAO, WHO, OIE, Codex, IPPC and WTO** to continue their efforts towards enhancing **interagency cooperation**" (Point 25 of the Ministerial Declaration)

Hormones commonly used as growth promotors

- Six hormones are commonly used for growth purposes.
- Of the six hormones, three are naturally occurring and the other three are artificially produced.
- The naturally occurring hormones are:
  1. Oestradiol-17β
  2. Progesterone,
  3. Testosterone),
- The artificially produced hormones are:
  1. Trenbolone acetate,
  2. Zeranol,
  3. Melengestrol acetate (MGA).

Veterinarian role

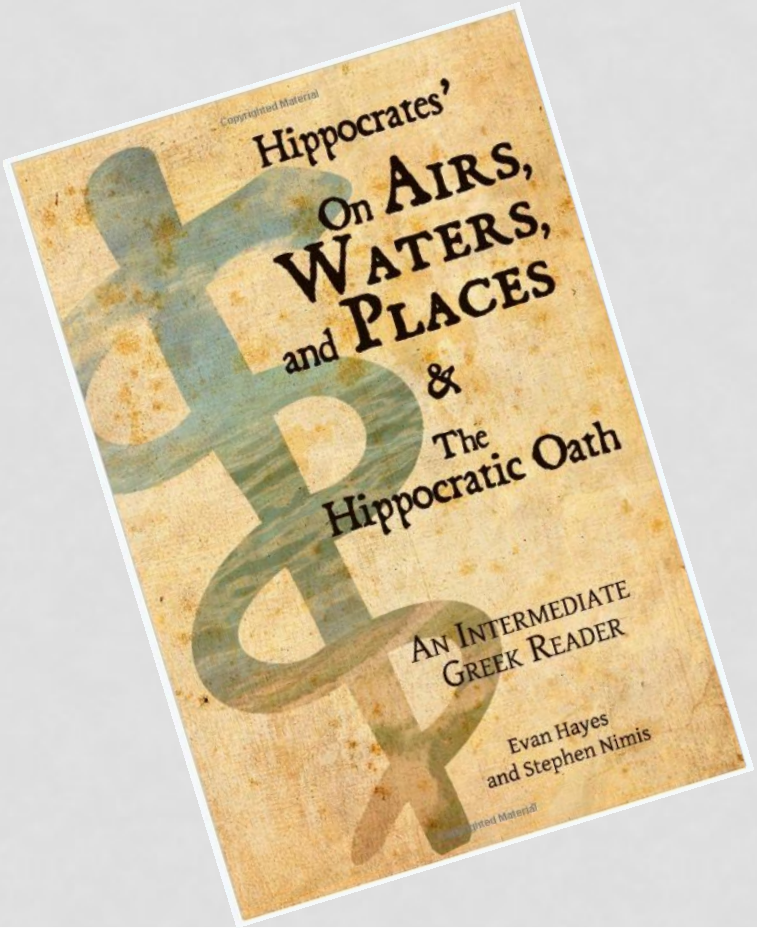
Withdrawal Time

- Time required for a drug or chemical concentration to fall below the *Tolerance Level* established in a specific target animal tissue.
- Dependent upon drug, dose, formulation, route of administration, species, target tissue and disease /management factors.
- Pharmacokinetics-toxicokinetics of the drug is the main factor.– Therapeutic level vs. elimination
- PK of elimination can be different for different tissues

Prevention protocol on the farm

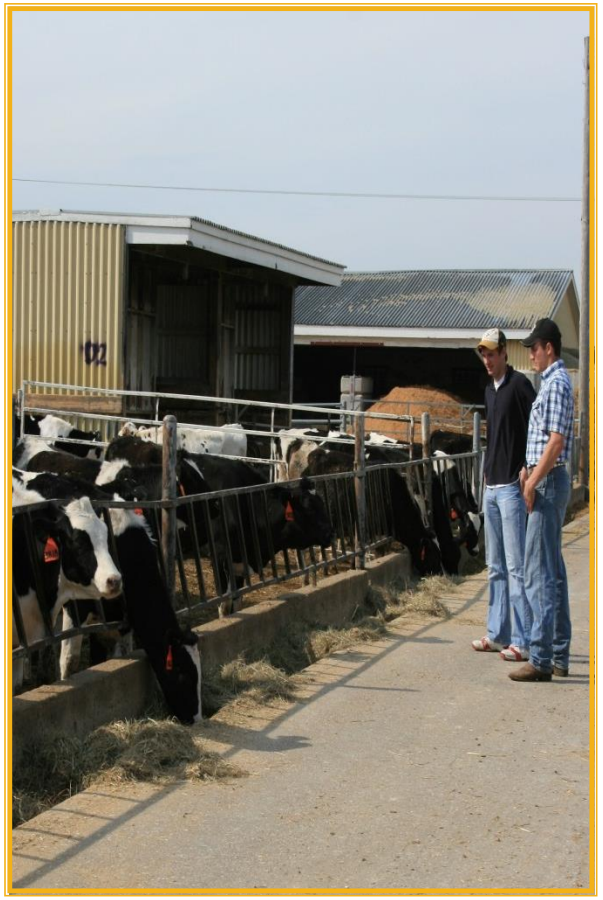
HIPPOCRATES

C. 460 BCE – C. 370 BCE



Prevention Practices

- Veterinary-Client-Patient Relationship
- Good Record Keeping
- Avoid Extra-Label Drug Use
- Proper Injection Techniques

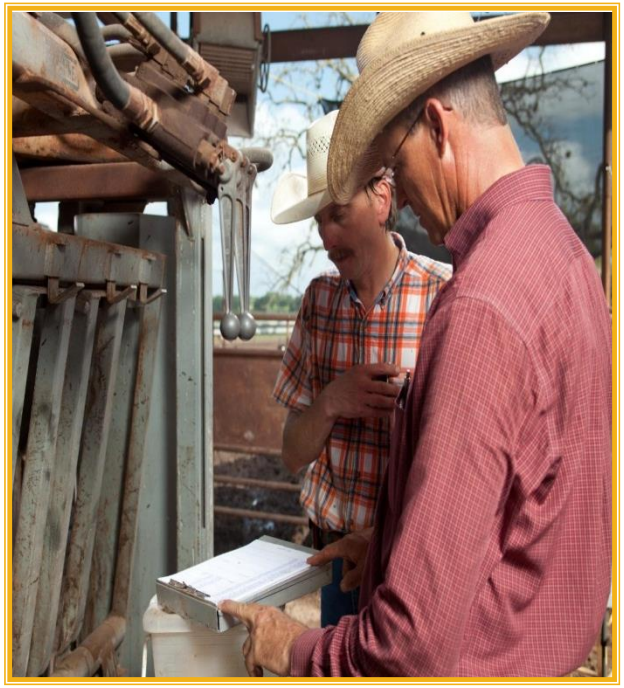


Drug Withdrawal Time

- Time to be eliminated from body
- Time to be reduced to safe level in body
- Published on label
  - Time more than 24 hrs
- Do not enter show until expired
  - Drug in urine
- Do not slaughter until expired
  - Drug in tissues

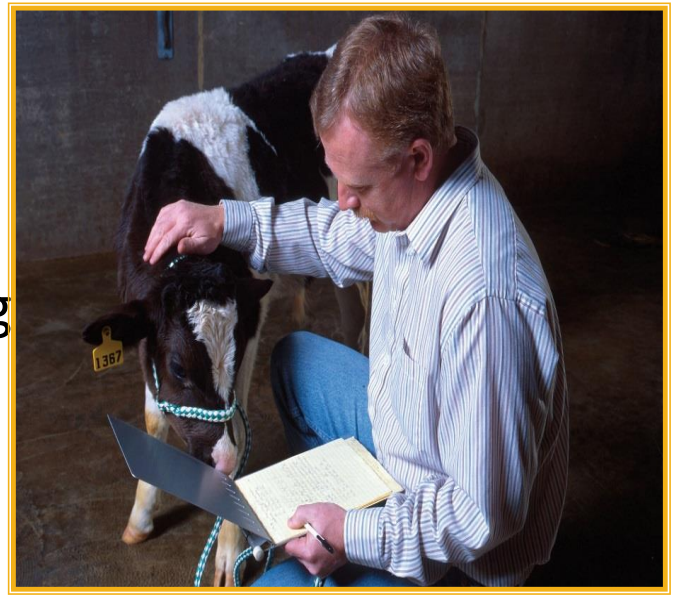
Veterinary-Client-Patient Relationship

- It is important for a producer to have an ongoing relationship with an accredited veterinarian.
- This helps to ensure the veterinarian has assumed responsibility for making medical judgments regarding the health of the animal and need for medical treatment.



Avoid Extra-Label Drug Use

- Extra-label drug use (ELDU) is the use of an animal drug in a manner that is different from label instructions in regard to:
  - the disease being treated
  - route of administration of the drug
  - dosage of the drug
  - recommended treatment regimen



- It is important to follow all labeled directions and withdrawal dates.

Record Keeping

Should your operation get cited for a residue violation and you believe it's a case of mistaken identity, good records are your only evidence that the animal in question does not belong to you.

Records should include: treatment date, animal identification, name of employee administering the drug, drug administered, weight of animal, route of administration, disease being treated, withdrawal time and the first date the animal can be sent to slaughter.

Records should be kept at least two years.

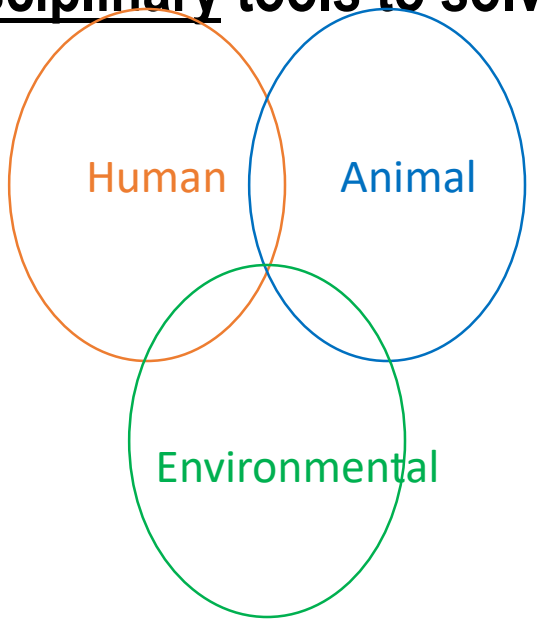
Milk and Dairy Beef Residue Prevention Protocol

1. Practice Healthy Herd Management
2. Establish a Valid VCPR
3. Use Only FDA Approved OTC or Prescription Drugs
4. Label Correctly
5. Store Drugs Correctly
6. Administer Drugs Correctly and Identify Treated Animals
7. Maintain Treatment Records
8. Use Drug Residue Screening Tests
9. Implement Employee/Family Awareness
10. Complete Protocol Annually

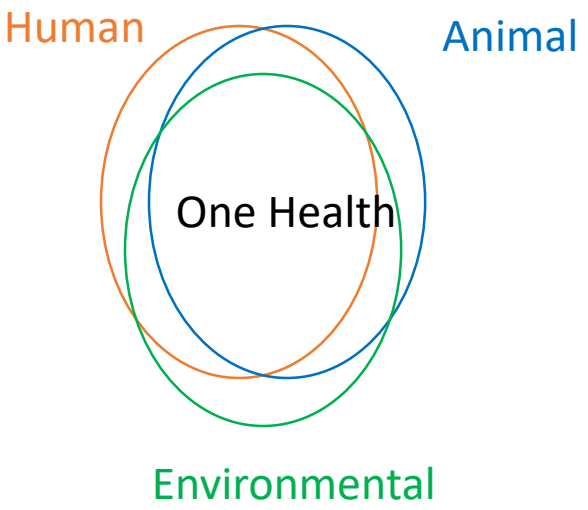
Prevention by authorities

What is One Health?

A one health approach recognizes the relationships between the human, animal, and environmental health, and applies interdisciplinary tools to solve complex public health problems



TRADITIONAL PUBLIC HEALTH MODEL



ONE HEALTH APPROACH

Source: Gael Lamielle

One Health Core Competency Domains

ONE HEALTH CONCEPTS AND KNOWLEDGE, ONE HEALTH COURSE

The SAVC embraces the One Health concept

A firm decision was taken early in 2015 to position the concept of One Health within the bigger paradigm of veterinary services in South Africa

Several global health issues have driven awareness of the concept, *inter alia* infectious diseases such as avian influenza, rabies and brucellosis, and in particular the emergence of bacterial resistance to antibiotics

One of the deliverables that is part of the mandate of the SAVC is to promote and ensure food safety and food security.

Why the SAVC concerns itself with the One Health concept/approach

The currently reality of human infectious diseases:

- The control of infectious diseases is central to One Health

- Traditional approaches and past requisite *skills and levels of knowledge* may not be commensurate with the rapid changes and new demands of food-animal industries and the shifting requirements needed for public health, biomedical research and the global food system (KPMG study, 1999)

- The OIE/FAO/WHO emphasize that Member States must enhance/support the

Antimicrobial resistance – the biggest One Health issue on the globe

Death from bacterial infections in pre-AB era was between 40-50% and in the antibiotic era <10% with an increased life expectancy of 20 years.

By 2050, AMR is estimated to lead to 10 million deaths per year, and lost outputs worth US $100 trillion across the world

No new class of antibiotics has been discovered since 1987

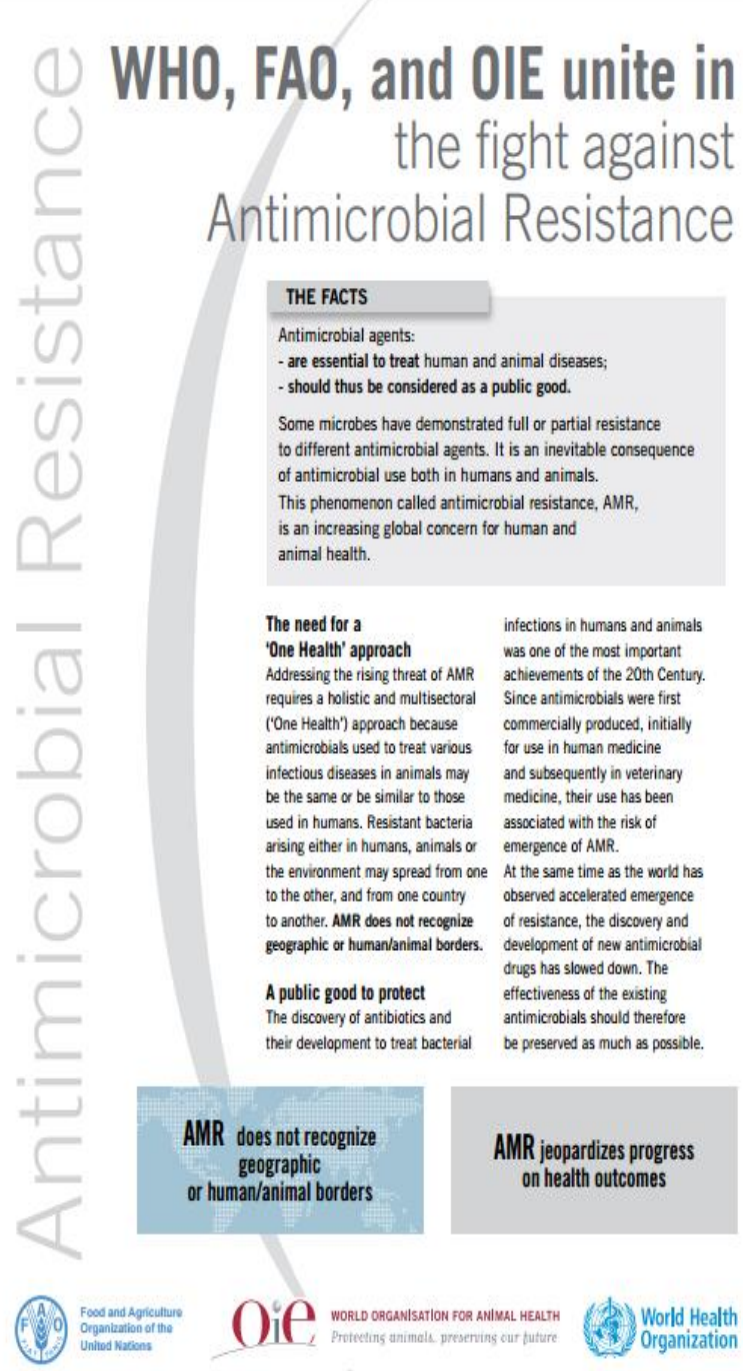
Definition of One Health

One Health is the collaborative effort of multiple health science professions, together with their related disciplines and institutions – working locally, nationally, and globally – to attain optimal health for people, domestic animals, wildlife, plants, and our

Tripartite collaboratior

FAO-OIE-WHO Tripartite Agreement/Vision, Mexico October 2011

- Holistic and coordinated management of AMR across the animal, food and human sectors in different ecosystems and geographic locations



POSSIBLE MEMBERS OF A ONE HEALTH TEAM

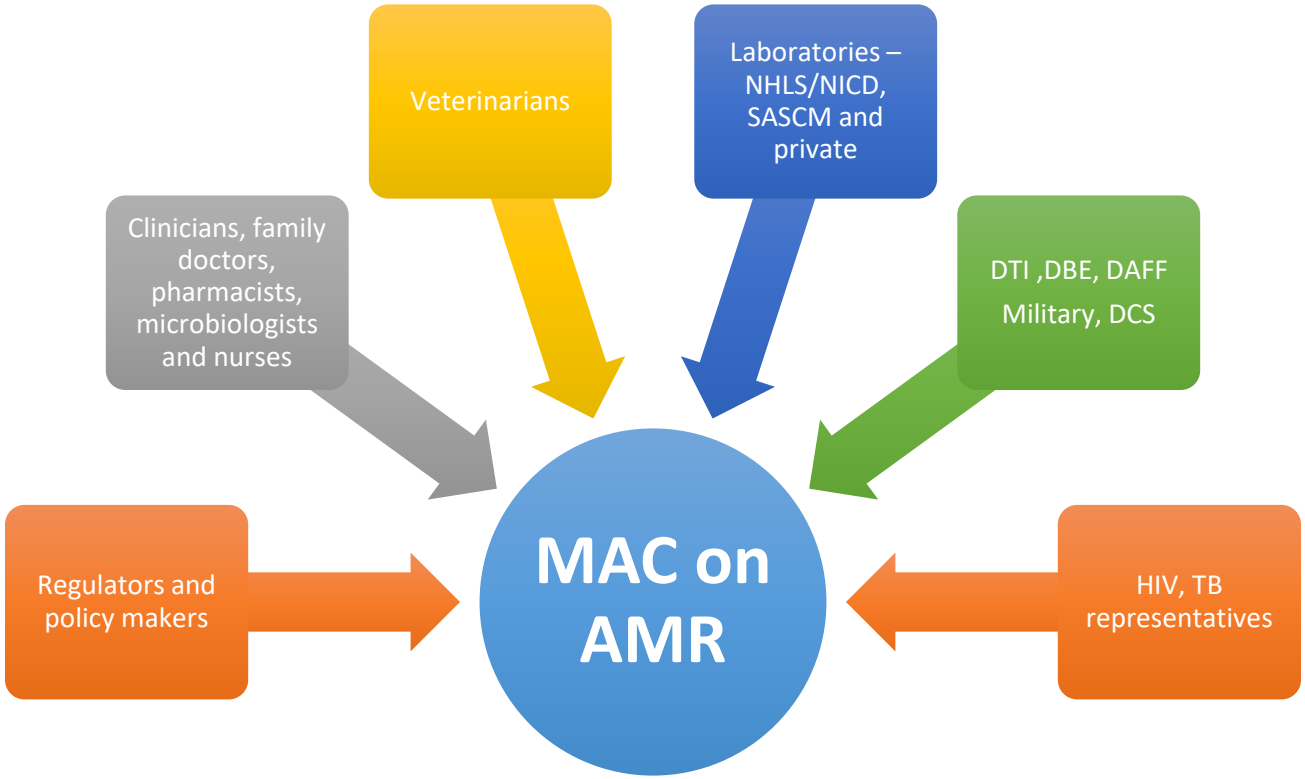
- Veterinarian
- Physician
- Nurse
- Public Health Worker
- Epidemiologist
- Wildlife Scientists
- Local Leader/Politician
- Environmental Health Worker
- Ecologist
- Social Scientist
- Economist
- Communications Specialist
- Emergency Responder
- Laboratorian
- Pharmacist
- Logistician
- Public Affairs/Marketing
- Information Technologist

What has changed that today the bigger picture is seen and AMR is accepted as a global crisis?

The sheer magnitude of the problem

The world is not divided on this issue

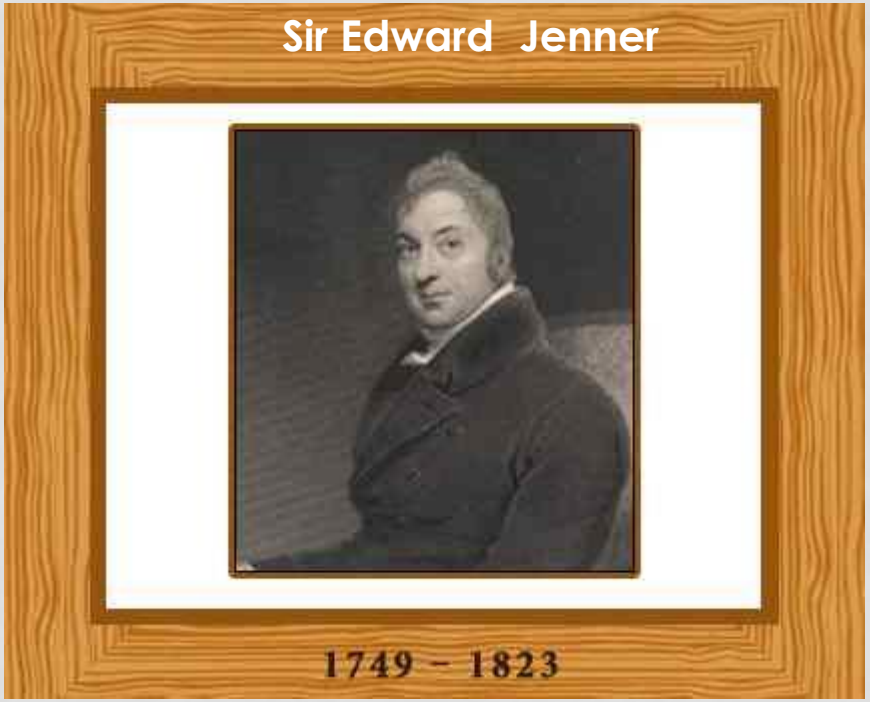
There is political weight behind initiatives to co
AMR



NHC has approved the MAC and the approval of appointments was completed

ONE HEALTH HISTORY

- Edward Jenner found that milkmaids exposed to cowpox that were not infected with smallpox.
- From this discovery, produced first successful vaccine to prevent smallpox.
- E. Jenner, first using dead vaccine to prevent hog cholera – open the way to produce vaccine to prevent Rickettsia and Polio diseases in man.



Source: Patricia at al., 2009

ONE HEALTH HISTORY (CONTINUED)

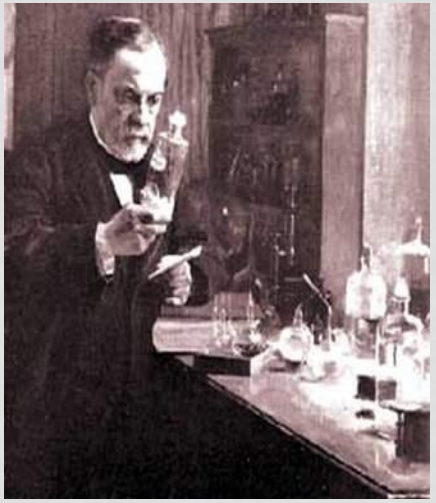
Rudolf Virchow 1821-1902

- Studied trichinosis in pigs, TB and cystercercosis in cattle
- Coined the term "zoonosis"
- "…between animal and human medicine there are no dividing lines – nor should there be"

Source: Laura H. Kahn, 2011

ONE HEALTH HISTORY (CONTINUED)

- Sir Louis Pasteur – French
- Respected as father of Immunology
- Produced vaccine to prevent rabies
- Linked medicine and veterinary medicine.



Sir Louis Pasteur
(1822-1895)

Source: Patricia and et al, 2009

ONE HEALTH HISTORY (CONTINUED)

- Sir Robert Koch, German physician.
- Established the field of bacteria.
- Excellent studied on TB, Vibriocholerae, anthrax.
- Nobel in medicine.
- Linked medicine with vet. medicine, especially study on Bacilus anthacis.

Sir Robert Koch
(1843-1910)

Source: Patricia and et al, 2009

ONE HEALTH HISTORY (CONTINUED)

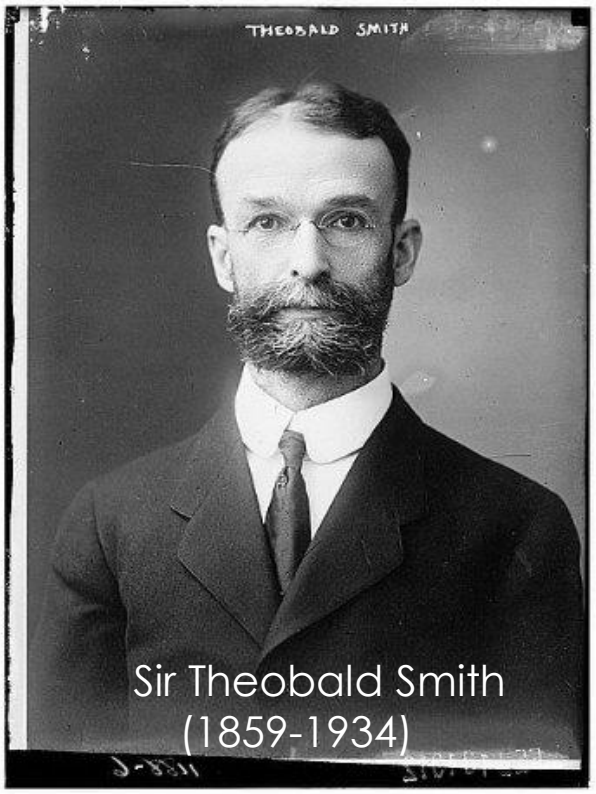
- Sir William Osler, Canadian physician
- 1873 went to Germany, student of Robert Wirchow.
- Established the field of vet. pathology as an academic disciplinary in North American.
- Sir W. Osler was first to use: "One Medicine" in literature

Sir William Osler (1849-1919)

Source: Patricia and et al, 2009

ONE HEALTH HISTORY (CONTINUED)

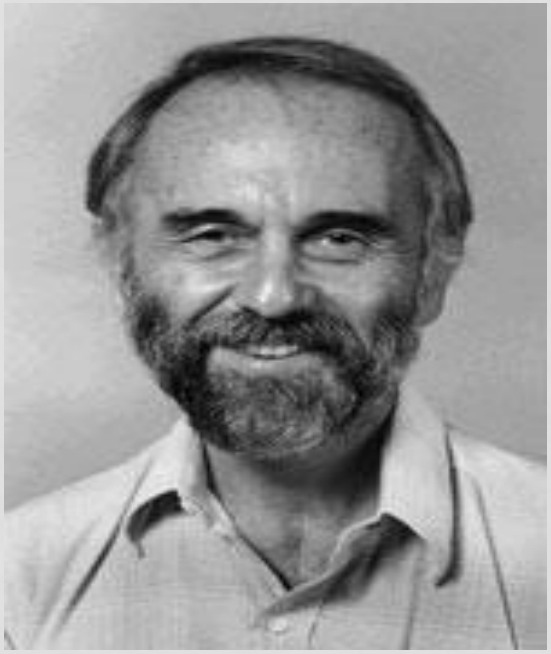
- Theobald Smith and F.L. Kilbourne first discovered arthropode play a role vector (1893)
- Demonstrated *Boophilus* transmission *Babesia bigemina* parasite caused disease in cattle
- Based on this discovery, Walter Reed found the vector of Yellow fever.



Sir Theobald Smith (1859-1934)

Source: Patricia et al., 2009

ONE HEALTH HISTORY (CONTINUED)



Sir Calvin Schwabe
(1927-2006)

- Best known along with Jame H. Steele as one of the founders of the disciplinary of veterinary epidemiology and the concept of One Medicine-One Health

Source: CDC, 2011

HOW WOULD YOU DEFINE…

ONE HEALTH

WHY ONE HEALTH

Why now…	As a result…

WHY ONE HEALTH

Why now…	As a result…
Human populations are growing and expanding into new geographic areas.	

WHY ONE HEALTH

Why now…	As a result…
Human populations are growing and expanding into new geographic areas.	More people live in close contact with wild and domestic animals. Close contact provides more opportunities for diseases to pass between animals and people.

WHY ONE HEALTH

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The earth has experienced changes in climate and land use, such as deforestation and intensive farming practices.	

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International travel and trade have increased.	

WHY ONE HEALTH

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Human populations are growing and expanding into new geographic areas.	More people live in close contact with wild and domestic animals. Close contact provides more opportunities for diseases to pass between animals and people.
The earth has experienced changes in climate and land use, such as deforestation and intensive farming practices.	Disruptions in environmental conditions and habits provide new opportunities for diseases to pass to animals.
International travel and trade have increased.	Diseases can spread quickly across the globe.

DEFINITIONS AND CONCEPTS

DEFINITIONS

Directions:

- Conduct an internet search looking for definitions of the following terms.
  - Ecohealth
  - Ecosystems Health
  - Global Health
  - One Health
  - Environmental Health
- As you conduct the search, write down local, regional and international organizations youcome across.

DEFINITIONS OF ONE HEALTH

The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. The synergism achieved will advance health care for the 21st century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving medical education and clinical care. When properly implemented, it will help protect and save untold millions of lives in our present and future generations.

http://www.onehealthinitiative.com/about.php

DEFINITIONS OF ONE HEALTH
(CONTINUED)

The One Health concept recognizes that the health of humans is connected to the health of animals and the environment.
CDC uses a One Health approach by working with physicians, ecologists, and veterinarians to monitor and control public health threats. We do this by learning about how diseases spread among people, animals, and the environment.

http://www.cdc.gov/onehealth/

The One Health Concept

"One Health (formerly called One Medicine) is dedicated to improving the lives of all species—human and animal—through the integration of human medicine, veterinary medicine and environmental science."

Source: www.onehealththiniative.com

ORGANIZATIONS WORKING ON ONE HEALTH

- World Health Organization (WHO)
- Food and Agriculture Organization (FAO)
- World Organization for Animal Health (OIE)
- One Health Initiative
- US Centers for Disease Control
- EcoHealth Alliance

Solution to Drug and Chemical Residues

- No easy solution for drug and chemical residues in milk
- System of control points, HACCP for the dairy supply
- Education producers, veterinarians, consumers
- Incentive to do the right thing has to be greater than doing the wrong thing

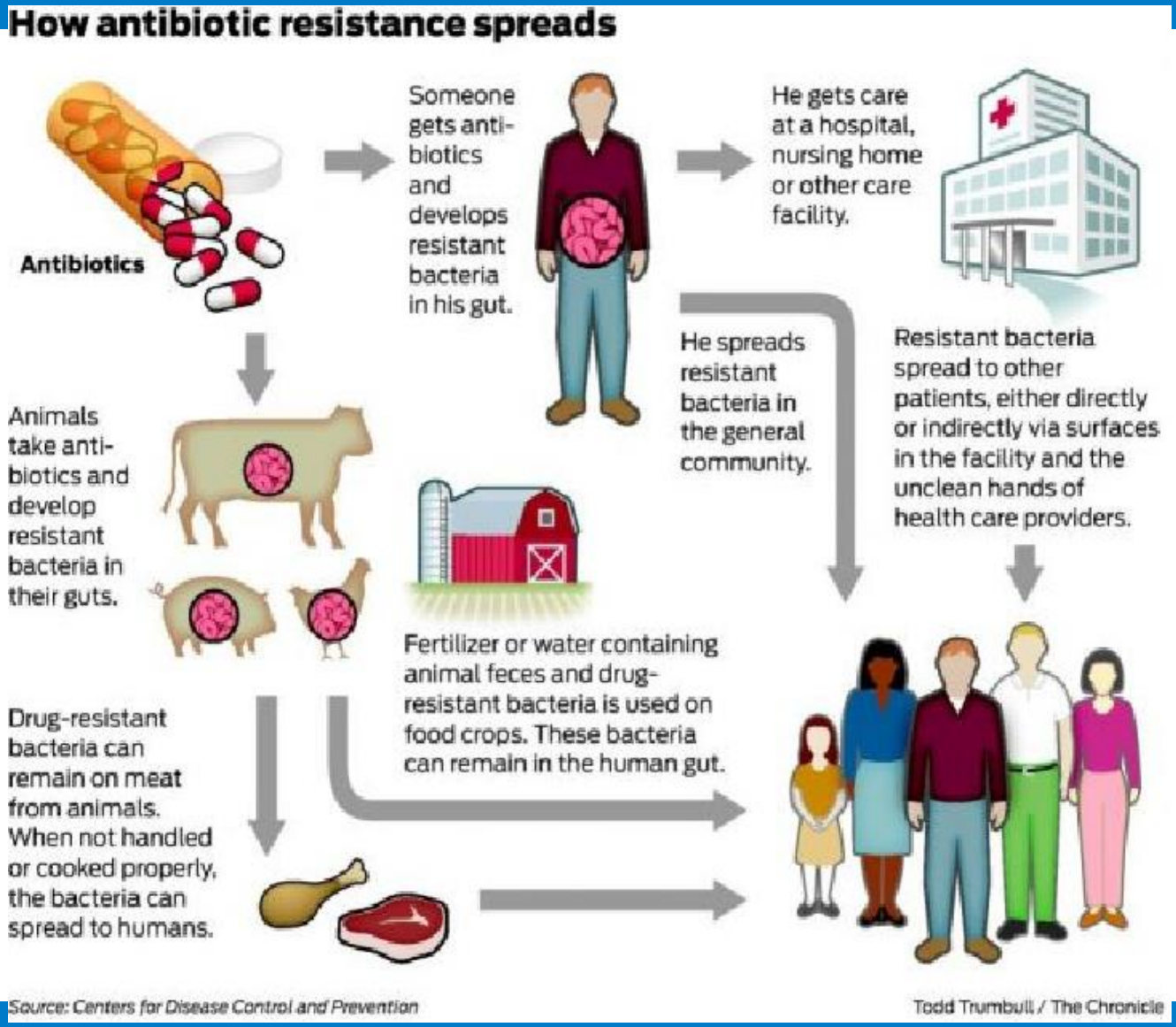
- “The future is not some place we are going to, but one we are creating…The paths are not to be found, but made, and the activity of making them changes both maker and the destination.”

WHO draft global action plan

Five strategic objectives:

1. to improve awareness and understanding of antimicrobial resistance;
2. to strengthen knowledge through surveillance and research;
3. to reduce the incidence of infection;
4. to optimize the use of antimicrobial agents;
5. to develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

Transmission of resistant microorganisms



COMBAT DRUG RESISTANCE

No action today, no cure tomorrow

7 APRIL 2011 **WORLD HEALTH DAY**

World Health Organization

Identifies 7 areas in which actions are most necessary:

- making sure antimicrobials are used appropriately in both humans and animals
- preventing microbial infections and their spread
- developing new effective antimicrobials or alternatives for treatment
- cooperating with international partners to contain the risks of AMR
- improving monitoring and surveillance in human and animal medicine
- promoting research and innovation
- improving communication, education and training.

OIE 5th Strategic Plan 2011-2015
New actions

- The application of the **'One Health'** concept for the **reduction of risks of infectious diseases at the animal–human–ecosystems interface** considering:
  - The contribution of **animal health and veterinary public health** to the improvement of **food security** → strengthen **food security** through **the reduction of disease in food-producing animals** and in bees
  - The relation between **animal production** and **environment:** the impact of **climate and environmental changes** on the occurrence and geographical **spread of diseases, disease vectors and invasive species,** and the impact of **animal production practices on environment and climate change**

Veterinary/Medical Education

First Global Conference: "**Evolving veterinary education for a safer world**", Paris, France, 12-14 October 2009

- For enhanced collaboration between all stakeholders, the One Health approach should be integrated in curricula, university and vocational training courses

Second OIE "**World Conference on Veterinary Education**", Lyon, France,13 to 14 May 2011

- Recommendation 16:"Countries and regions should encourage stronger cooperation between the various education systems for animal health and human health"

Third **OIE Global Conference on Veterinary Education** will take place from 4 to 6 December 2013 in Foz do Iguazu (Brazil)

Contributing to One World, One Health: A Strategic Framework…

Presented at the 2008 Sharm El Sheikh International Conference on Avian Influenza

"…builds on **the existing approaches and mandates** of international institutions and other partners to form a flexible network…

- able to **adapt and respond rapidly** to all new health emergencies …"
- with **specific objectives and outputs at national, regional and international levels:**
  - Strengthen **public and animal health capacity, prevention, detection and rapid emergency response** to any disease outbreaks
    - Develop **surveillance and monitoring** capacity
    - Promote **inter-agency and cross-sectoral collaboration** and partnerships
    - Control HPAI and other **existing and potentially re-emerging infectious diseases**
    - Conduct **strategic research**

Contributing to One World, One Health*

A Strategic Framework for Reducing Risks of Infectious Diseases at the Animal–Human–Ecosystems Interface

14 October 2008

UN System Influenza Coordination

THE WORLD BANK

*Used with permission of the Wildlife Conservation Society

One World, One Health ™* Symposium - Building Interdisciplinary Bridges to Health in a "Globalized World", Rockefeller University, NY City, September 2004

Adoption of the **'Manhattan Principles'**
12 recommendations with 2 aims:

- preventing epidemic/epizootic disease
- maintaining ecosystem integrity

➢ **Cooperating at the human-animal-ecosystem health interface strengthening interdisciplinary cross-sectoral cooperation**: "Only by breaking down the barriers among agencies, individuals, specialities and sectors can we unleash the innovation and expertise needed to meet the many serious challenges to the health of people, domestic animals, and wildlife and to the integrity of ecosystems…"

*™ Wildlife Conservation Society www.wcs.org

A "Globalized World"

Conclusions:

- No action today no cure tomorrow
- No surveillance no control of AMR and use of antibiotics
- AMR control consists of infection prevention and appropriate us of antibiotics
- Knowledge is not enough for behavior change
- One health fits all (better safe then sorry)

Control of AMR -> Appropriate use of antibiotics

- Right indication, right dose, adequate period, at the lowest cost, good quality
- Treatment is correctly followed by the patient.
- Bacteria causing the infection need to be susceptible.
- Inappropriate use includes over-prescription, under prescription, and prescription and dispensing of unnecessary antibiotic combination
- (From: The evolving threat of antimicrobial resistance - Options for action, WHO 2012)
- Control: surveillance, awareness, problem ownership, responsibilities, professional guidelines, antibiotic stewardship, enforcement

Control of AMR: infection control

- ✓ Infection prevention & hygiene
- ✓ Professional guidelines for each setting
- ✓ Search and destroy or control/contain
- ✓ Awareness and sense of urgency
- ✓ Outbreakmanagement
- ✓ Enforcement by the national health inspectorate
- ✓ Problem ownership/responsibilities

AMR control

Infection control

Appropriate use of antibiotics

Specific objectives of AMR surveillance & AB use

Monitor

- Antibiotic-susceptibility patterns common pathogens
- Magnitude and trends of AMR
- Emergence of new AMR
- Use/overuse/misuse of antibiotics

In order to

- Improve quality, safety and costs of health care
  - Guidance adequate antibiotic therapy – appropriate use
  - Support infection prevention & control
- Awareness & advocacy
- Benchmarking
- Improve laboratory capacity, expertise & quality

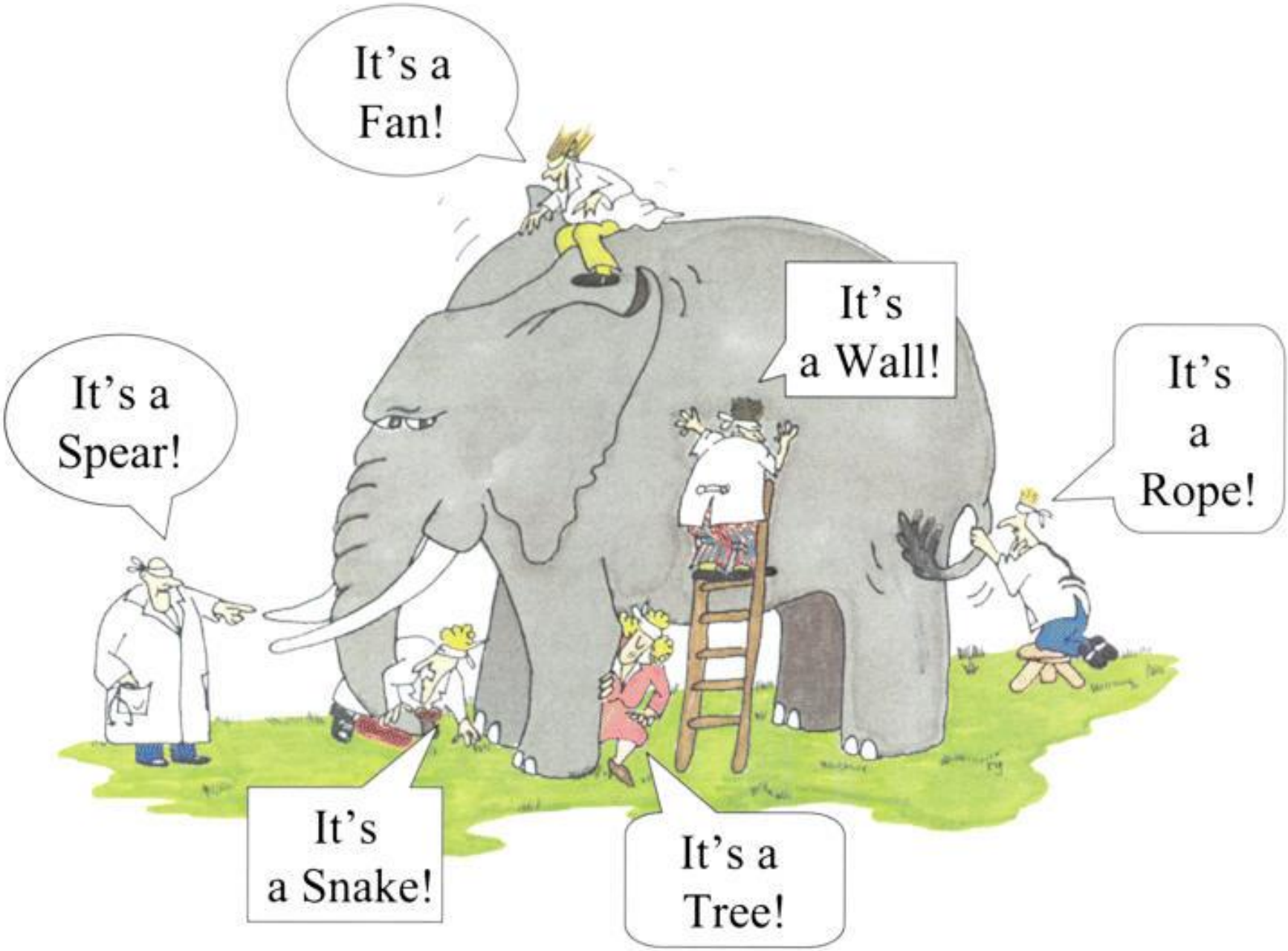
SEAOHUN

South East Asia One Health University Network (SEAOHUN) – includes the following four national networks -

- Indonesia One Health University Network (INDOHUN)
- Malaysia One Health University Network (MyOHUN)
- Thailand One Health University Network (THOHUN)
- Vietnam One Health University Network (VOHUN)

Who Might Be on a One Health Team?

ONE HEALTH CONCEPTS AND KNOWLEDGE, ONE HEALTH COURSE


It's a Fan!
It's a Spear!
It's a Wall!
It's a Rope!
It's a Snake!
It's a Tree!


JUST WANTED TO SAY
THANKS!