

The background features abstract, overlapping green geometric shapes in various shades, creating a modern and dynamic look. The shapes are primarily triangles and polygons, some with gradients, set against a white background.

# ANTIMICROBIAL RESISTANCE: Call to Action

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Ministry of Industry, Commerce, Agriculture and Fisheries

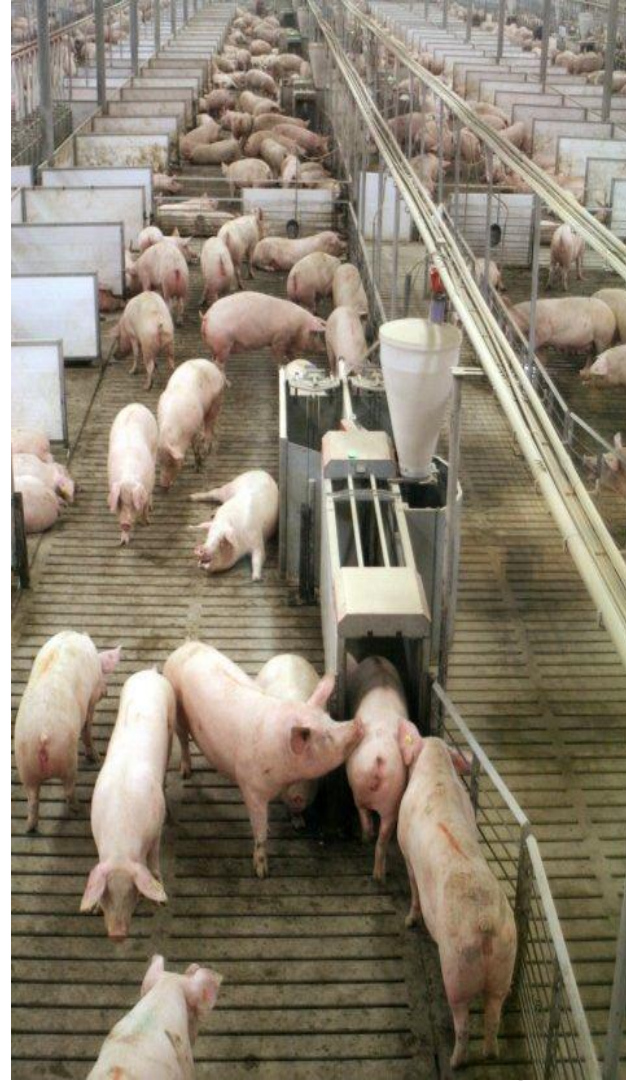
# Veterinary Services Division



# Brief History

- ▶ Widespread use of antibiotics in animal feed began in the 1950's
- ▶ Production facilities were able to become larger and more centralized
- ▶ Animals could be raised year-round in concentrated facilities with less disease
- ▶ Tetracyclines and beta-lactams are used the most now





# Food Animal Production Systems

Although animal products & numbers of livestock are increasing, this isn't enough for local requirements for a growing population.

Livestock holdings (2013):

- Poultry 50,000,000
- Cattle 120,000
- Buffaloes 60
- Goats 200,000
- Equine 5,000
- Sheep 8,000
- Swine 180,000

PRELIMINARY ESTIMATES OF LIVESTOCK PRODUCTION IN JAMAICA 2014

T Y P E	NUMBER	TOTAL	SWISS	SOLE OF OFFALS
	SUBMITTED	WEIGHT (kg)	WEIGHT (kg)	WEIGHT (kg)
CATTLE	22,400	6,195,900	5,163,200	1,032,700
EGG	111,700	6,195,200	6,821,000	1,264,200
SHEEP	800	21,000	16,200	4,800
GOAT	88,200	901,000	791,400	109,600
<b>TOTAL</b>		<b>19,513,100</b>		
<b>MEAT</b>		<b>436,884</b>		
<b>Total Poultry Meat</b>		<b>1,103,128.00</b>		
EGG (kg)	101,850,700			
MLP - Grade A		11,000,000		
Grade B		20,000		

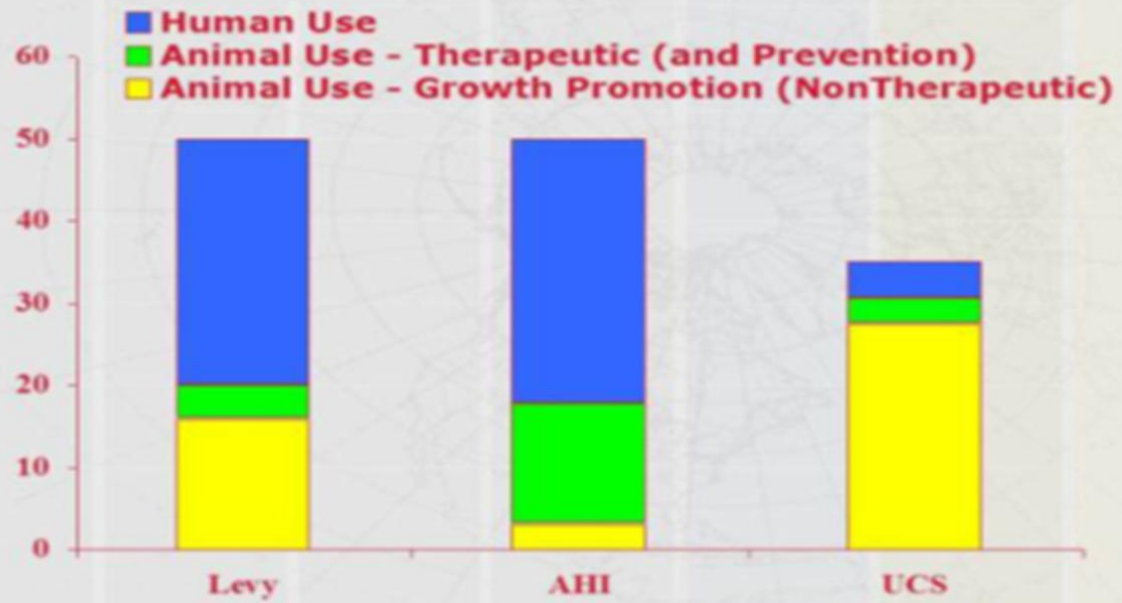
Source: Ministry of Agriculture & Fisheries & Ministry of Health

# Antibiotics

Antimicrobial agents are essential tools for protecting animal health and welfare and also contribute to meeting the increasing global demand for safe meat, milk, fish and eggs, other products of animal origin,



## Discrepancy in antimicrobial use estimates





# Antibiotic Use

- **Prophylactically**, to prevent disease (e.g., in cattle after shipping, or in newborn pigs)
- **Therapeutically**, to treat active infections (**Individual or Metaphylactic**)
- **Subtherapeutically**, as growth promoters/to improve feed efficiency
  - Most controversial





June 2nd, 2011  
06:30 PM ET

## Cows, people infected with new strain of MRSA

Scientists say a new strain of antibiotic-resistant staph has been identified in humans and fresh, unpasteurized cow's milk in Europe, although it's not known how widespread or virulent it is. A bigger concern, according to their study, is that a newer test may miss this strain of methicillin-resistant staphylococcus aureus (MRSA).

## ConsumerReports<sup>®</sup> meat on drugs

The overuse of antibiotics in food animals & what supermarkets and consumers can do to stop it

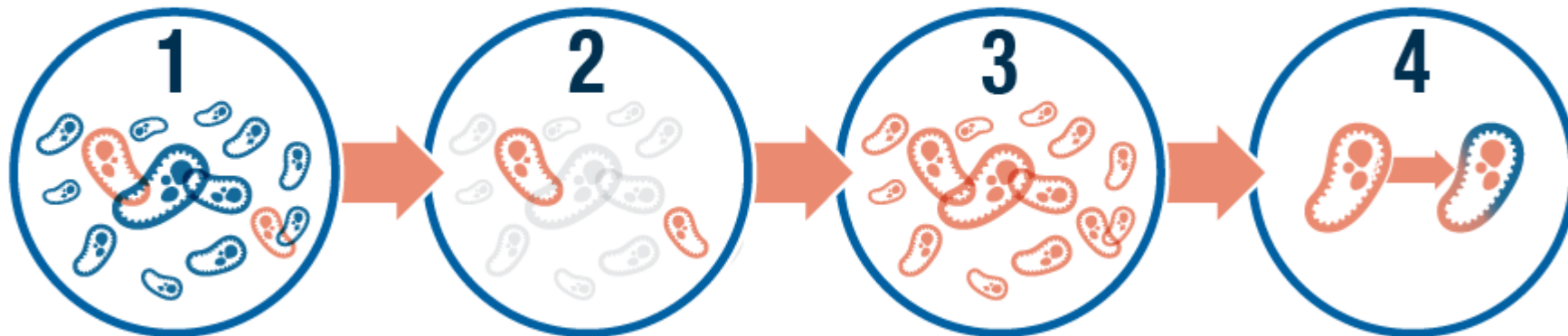


# AMR

- ▶ **Antimicrobial resistance (AMR)** is when a microbe evolves to become more or fully resistant to antimicrobials which previously could treat it.



# How does antibiotic resistance occur?



1  
High number of bacteria.  
A few of them are resistant  
to antibiotics.

2  
Antibiotics kill  
bacteria causing the illness,  
as well as good bacteria  
protecting the body  
from infection.

3  
The resistant bacteria now  
have preferred conditions to  
grow and take over.

4  
Bacteria can even transfer  
their drug-resistance to other  
bacteria, causing more  
problems.

# OIE

The recommendations of the OIE Global Conference on the responsible and prudent use of antimicrobial agents in animals, held in March 2013 in Paris, France.

# WHO Global Report

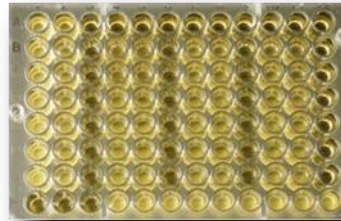
- **“Determining the scope of the problem is essential for formulating and monitoring an effective response to AMR.” WHO**





# Main Goal

- ▶ Establish baseline and determine disease burden
- ▶ Identify priorities and define interventions
- ▶ Guide urgent public health actions and establish policy
- ▶ Monitor public health interventions and evaluate progress

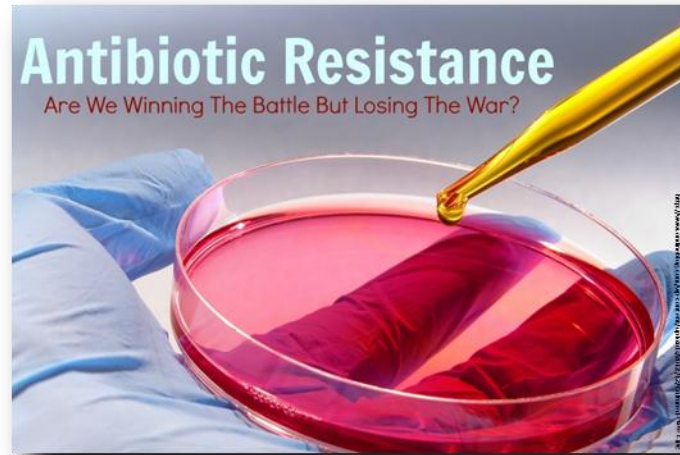


# AMR Problems

- ▶ Lack of commitment by national governments
- ▶ Lack of financial support and investment (both public and private)
- ▶ Lack of assurance programs on drug quality and access
- ▶ Irrational use of AMD (in both human and animal) and poor enforcement (when there are laws/regulations) in place
- ▶ There is poor prevention and infection control (in both human and animal) using AMD as a “crutch”

## Lack of education at all levels

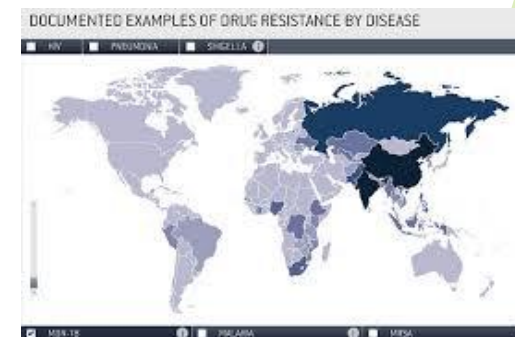
- ▶ Policy-makers and public health managers/planners
- ▶ General public
- ▶ Stakeholders
- ▶ Health Professionals
- ▶ Producers
  
- ▶ Research languishing



- ▶ From 700,000 deaths/yr today to 10,000,000 in 2050
- ▶ Global costs estimated to be \$100 trillion/yr in 2050
- ▶ Developing world would be hit the hardest
- ▶ Up to 50% of human antibiotics are used unnecessarily or inappropriately (CDC estimate)
- ▶ U.S. illnesses currently estimated at 2.25 million and 37,000 deaths; \$20-35 billion excess healthcare costs; \$35 billion loss of productivity and 8 million additional hospital days

# Developing World

- Lack basic health care and infrastructure
- Low rates of vaccination
- Inadequate clean water
- Indiscriminate access to OTC drugs
- Sub-standard quality and counterfeit
- Limited availability of newer drugs
- Shortage of trained health care provider





# Jamaica

- ▶ Initiate and maintain continuous surveillance AMR
- ▶ Situation analysis of AMR
- ▶ Baseline data
- ▶ Regulation of Vet products
- ▶ Registration of farms
- ▶ Training of Personnel
- ▶ Integrated surveillance system
- ▶ Data management personnel
- ▶ Equipment and reagents
- ▶ Human resource
- ▶ **FUNDING!!!**



# Countries for Pilot Study

## IICA (Inter American Institute for Cooperation on Agriculture) and The Ohio State University

- ▶ Jamaica
- ▶ Trinidad and Tobago
- ▶ Dominican Republic
- ▶ Barbados
- ▶ Belize
- ▶ Suriname
- ▶ Guyana



- ▶ Farm Sampling. Samples collected at processing facilities . 10 farms per week to get 100samples.
- ▶ Consumer Sampling. Purchasing leg quarters in supermarket and testing. 100 samples
- ▶ Import sampling. Sampling imported leg quarters.



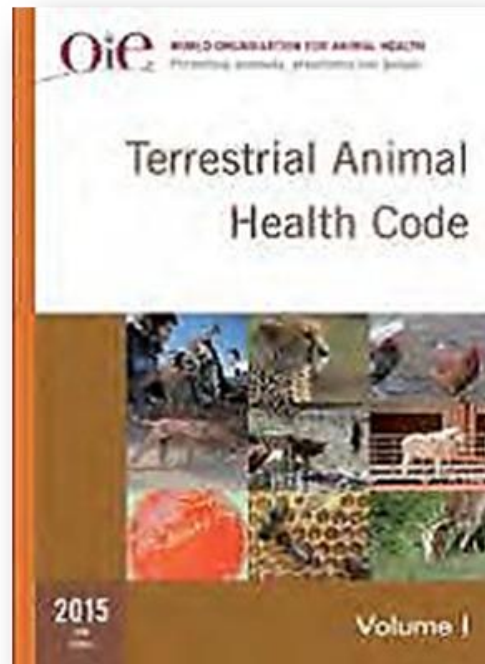
- ▶ Lab testing. Test for *Salmonella* sp.
- ▶ *Samonella* sp. Then tested for susceptibility to antibiotics. If resistance found further testing to see if multiple resistance.

# Jamaica Antimicrobial Resistance Committee

- ▶ Ministry of Health and Wellness
- ▶ Ministry of Industry, Commerce, Agriculture and Fisheries
- ▶ NEPA
- ▶ Ministry of Finance
- ▶ Ministry of Education



# OIE



OIE

# World Organisation For Animal Health

**Chapter 6.6. Introduction to the recommendations for controlling antimicrobial resistance**

**Chapter 6.7. Harmonization of national antimicrobial resistance surveillance and monitoring programs**

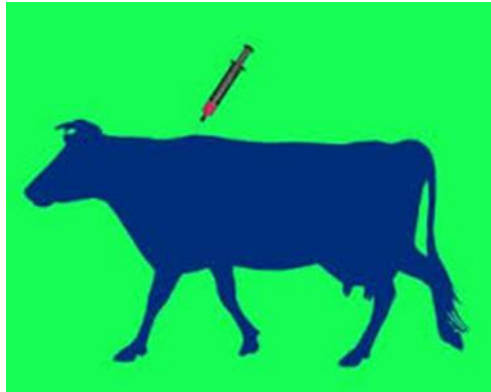
**Chapter 6.8. Monitoring of the quantities and usage patterns of antimicrobial agents used in food-producing animals**

**Chapter 6.9. Responsible and prudent use of antimicrobial agents in veterinary medicine**

**Chapter 6.10. Risk analysis for antimicrobial resistance arising from the use of antimicrobials in animals**

# Animal Health

- ▶ There is extensive use of antibiotics in animal agriculture to treat and prevent disease and promote growth. These practices produce antibiotic resistance for animals and through a variety of mechanisms can spread to people



# Control

- Sanitation and hygiene
- Biosecurity and infection control
- Health Management - ventilation, weaning age, farm traffic, vaccine use, non-drug additives
- Improve the host immune response
- Re-conceptualize bacteria - good vs bad
- Environmental risk reduction
- Build on existing practices: quality assurance, etc.



## **Principles and Guidelines for Responsible Antibiotic Use**

The National Pork Board has developed the following five principles to help producers use antibiotics responsibly:

**Principle I.** Take appropriate steps to decrease the need for the application of antibiotics.

**Principle II.** Assess the advantages and disadvantages of all uses of antibiotics.

**Principle III.** Use antibiotics only when they provide measurable benefits.

**Principle IV.** Fully implement the management practices described for responsible use of animal health products into daily operations.

**Principle V.** Have a working veterinarian/client/patient relationship (VCPR) and follow the responsible antibiotic use guidelines.

# Prevention

Improve awareness and understanding of AMR

Strengthen knowledge through surveillance and research

Reduce the incidence of infections

Optimize the use of antimicrobial agents

Develop the economic case for sustainable and increased investment in new drugs, diagnostic tools, vaccines and other interventions

# GAP's

1. General farm management
2. Animal health management
3. Veterinary medicines and biologicals
4. Animal feeding and watering
5. Environment and infrastructure
6. Animal and product handling
7. Biosecurity



# BIOSECURITY

- Biosecurity is a set of management practices which reduce the potential for the introduction and spread of disease-causing organisms onto and between sites.

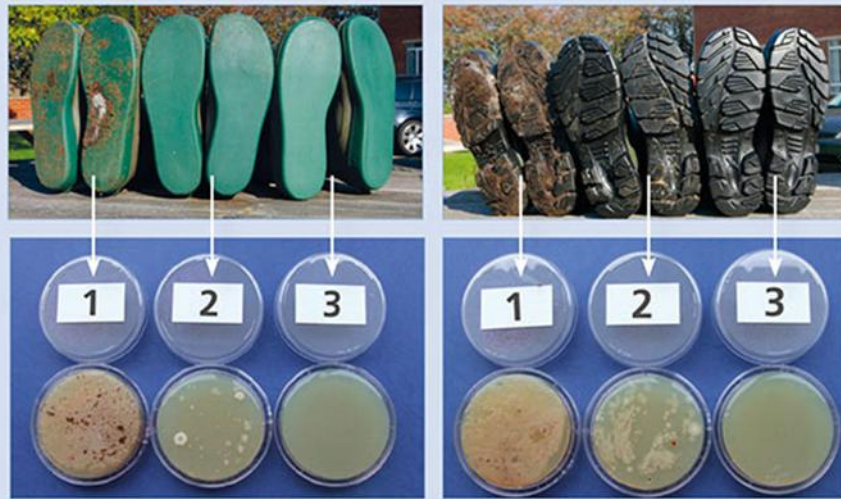




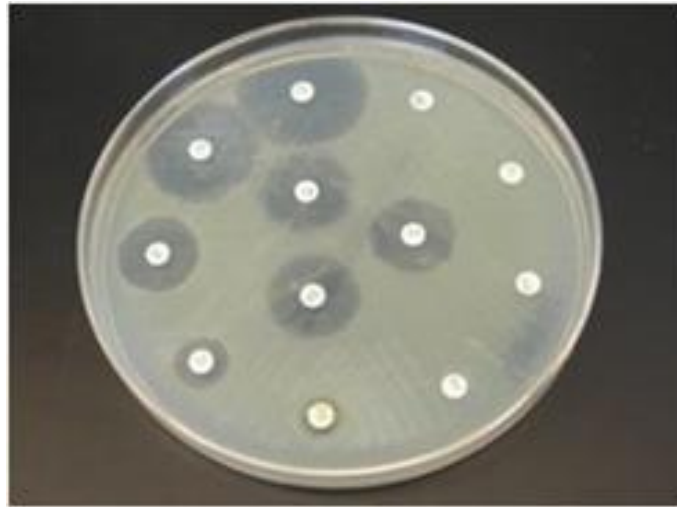
# Sanitation

1. dirty boots
2. rinsed with water
3. disinfected

Source: ILVO 



# Proper Use

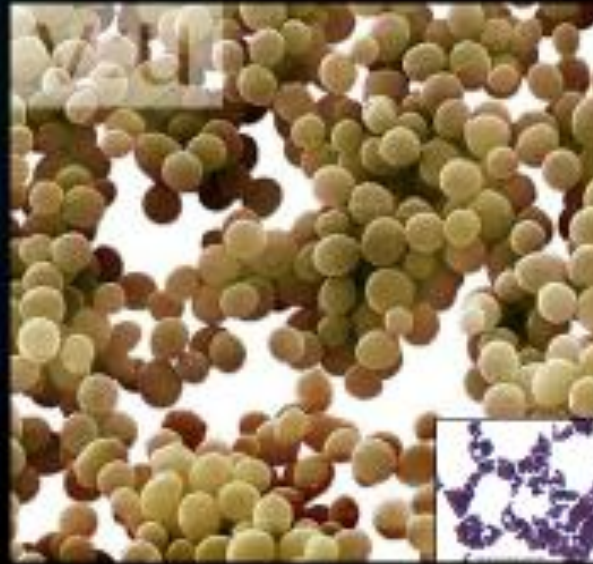




## Background

### > Etiology

- Genus: *Staphylococcus*
- Species: *Staphylococcus aureus*
- Gram positive cocci bacterium
- Coagulase positive
- Normal inhabitant of skin and/or nose of healthy people and animals
- No detrimental risks to immunocompetant host
- Severe infection or death in immunocompromised host





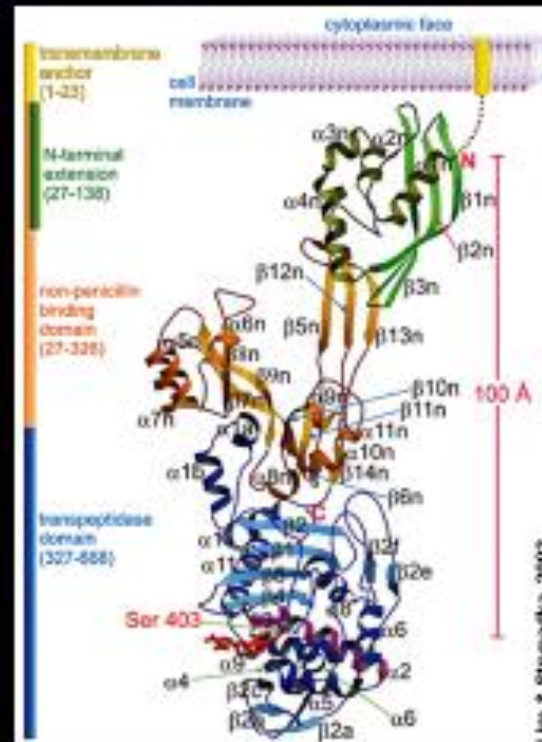


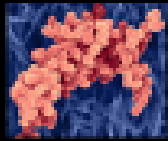
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## > Etiology

### Methicillin (Oxacillin)-resistant *Staphylococcus aureus* (MRSA)

- MRSA as well as other *Staphs* spp expressed an altered penicillin-binding protein (PBP2a) that is encoded in the *mecA* gene
- The PBP2a binds beta-lactams with lower avidity than normal PBP, which results in **resistance to all  $\beta$ -lactam antimicrobial agents**





# MRSA

## MRSA TIMELINE

1942-1944 Introduction of Penicillin

1947 1<sup>st</sup> Reports of Penicillin Resistant Staph

1959 Introduction of Methicillin (beta-lactamase resistant Penicillins)

1961 1<sup>st</sup> Reports of MRSA in Humans (UK)

1968 1<sup>st</sup> Reports of MRSA in Humans (USA)

1972 1<sup>st</sup> Report of MRSA in Animals = Cow with Mastitis

1981 (1989) "Reassessment" of Vancomycin to treat MRSA

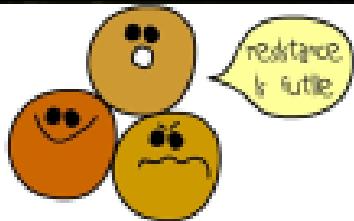
Late 1990s 1<sup>st</sup> Reports of VISA

1996 1<sup>st</sup> Report of VRSA - Japan

2002 1<sup>st</sup> Report of VRSA - USA (Michigan)

2000 Introduction of Oxazolidinone - Linezolid

2001-2003 1<sup>st</sup> Reports of MRSA Linezolid Resistant



Methicillin-resistant  
staphylococcus aureus





# MRSA IN ANIMALS

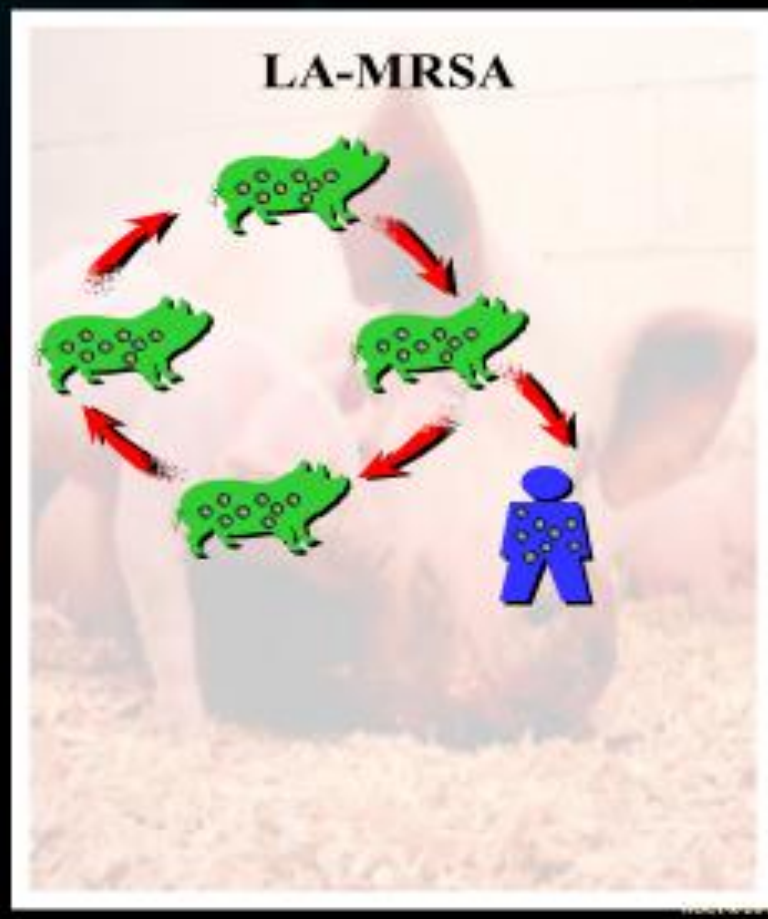
- **High occupational risk**  
(Based on studies in Europe & Canada)
  - Swine veterinarian colonized:
    - 4.6% - 12.5% - 23% (16.3 OR)
  - Swine workers/farmers:
    - 20 - 26%

## Methicillin-resistant *Staphylococcus aureus* in Pig Farming

Andreas Voss,\*† Frans Loeffen,\* Judith Bakker,\*  
Come Klaassen,† and Mireille Wulf\*

We conducted a study among a group of 28 regional pig farmers to determine the methicillin-resistant *Staphylococcus aureus* prevalence rate and found it was >700 times greater than the rate of patients admitted to Dutch hospitals. While spa-type t108 is apparently a more widespread clone among pig farmers and their environment, we did find other spa-types.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 11, No. 12, December 2005





## **MRSA – Occupational Safety**

### **Occupational Risk**

- **4.6 to 15% of physicians, nurses, and health care personnel are colonized with MRSA** (Albrich & Harbarth, 2008; Bisaga et al. 2008)
  - **5.1% had clinical infections** (Albrich & Harbarth, 2008)
- **Up to 4.6% paramedics are colonized with MRSA** (Orellana, 2015)
- **6 to 10% of veterinarians and veterinary personnel\*\* are colonized with MRSA** (Anderson et al. 2007)
- **Prevalence in veterinary personnel in different veterinary settings and geographical regions is unknown...**



The Ohio State University

**Master of  
Public Health**  
Veterinary  
Public Health  
Specialization



College of Veterinary Medicine  
College of Public Health



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Thanks for your  
Attention  
Questions

