

# Resistance and New Rules on Antibiotic Use in Agriculture

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# Antibiotic resistance

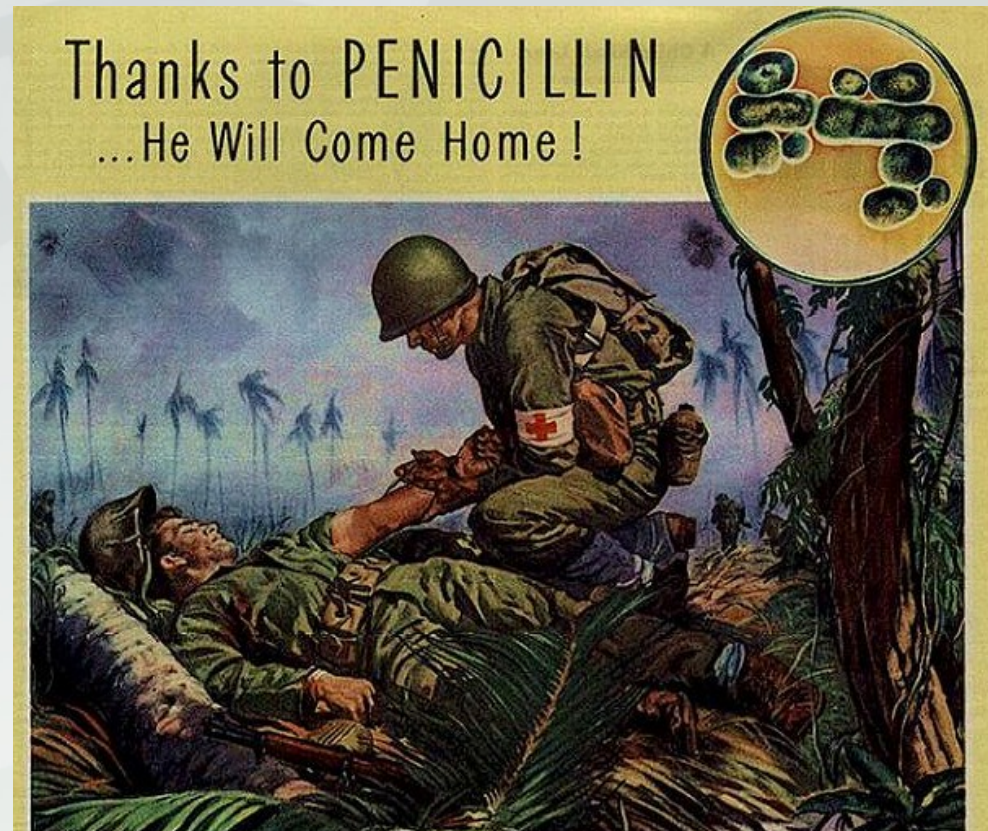
- § Increasing attention to antibiotic resistance within the past couple of decades
- § Has become very important issues for human health and food animals production, perhaps for different reasons

# What is antibiotic resistance?

§ “Antimicrobial resistance is the ability of microbes to grow in the presence of a chemical (drug) that would normally kill them or limit their growth.”

(NIH NIAID)

§ In other words, resistance allows resistant bacteria to survive antibiotic treatment

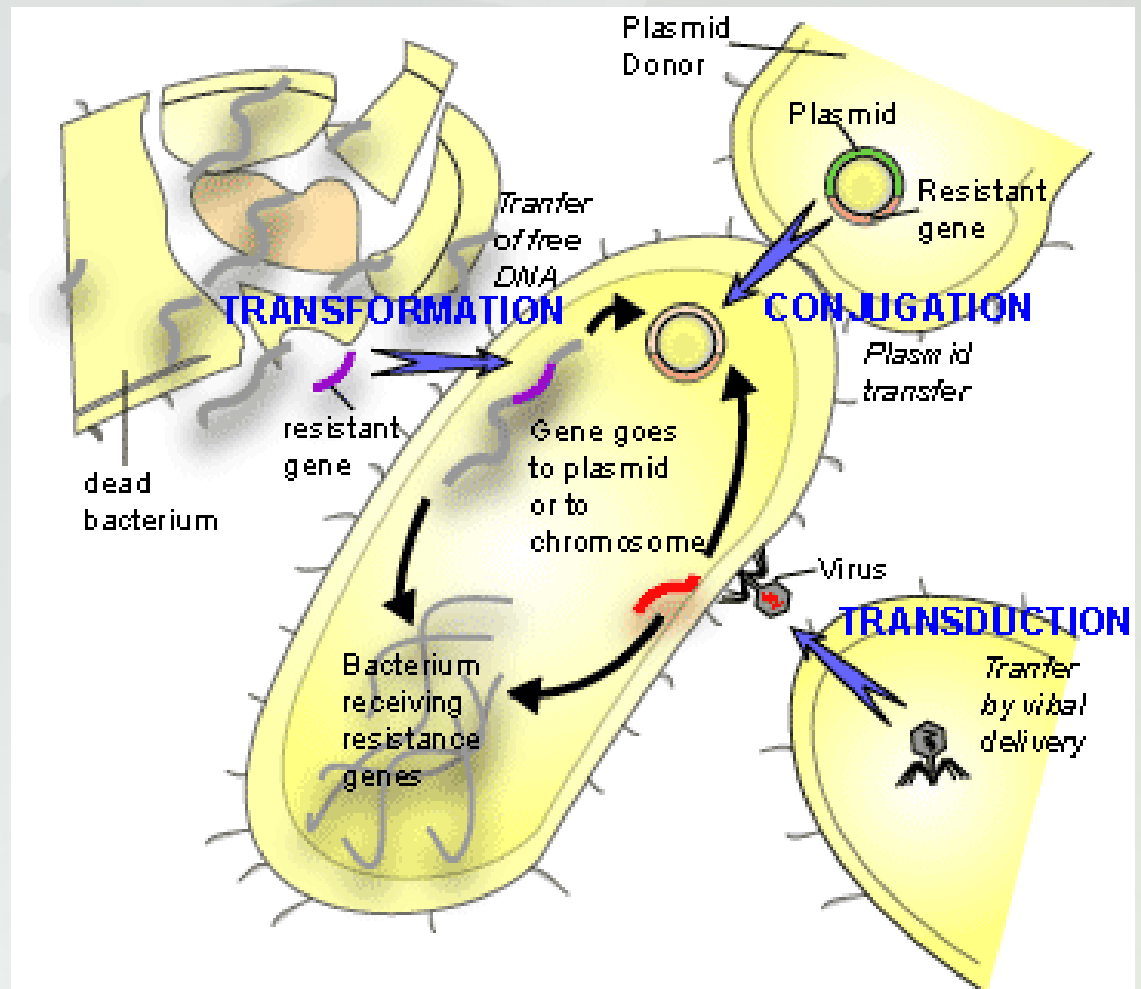


<http://textbookofbacteriology.net/themicrobialworld/bactresanti.html>

# Bacteria share resistance genetic material

§ **Mutations  
conferring  
resistance**

§ **Sharing  
resistance  
genes**



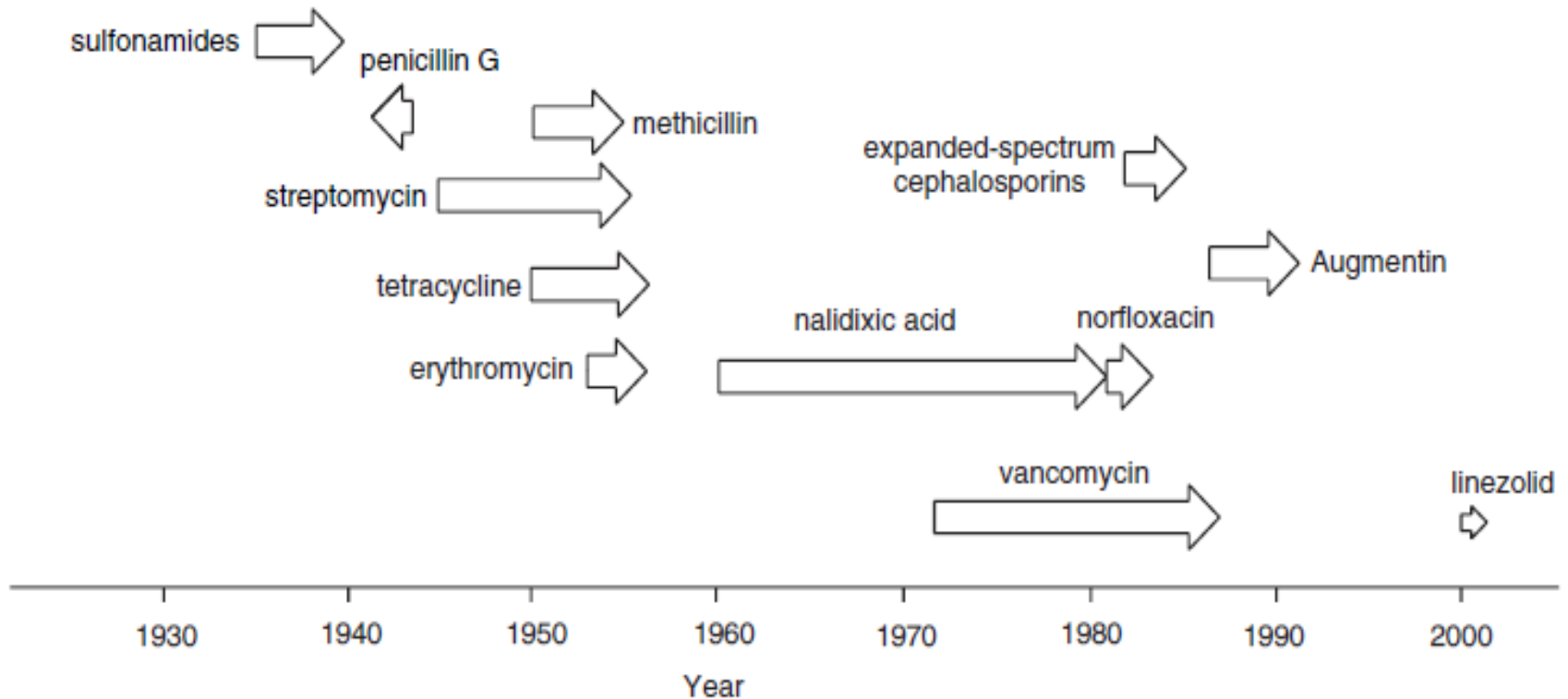
## Resistance is not a new phenomenon!

Alexander Fleming in Nobel Prize acceptance speech: (1945)



- "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. The time may come when penicillin can be bought by anyone in the shops. 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."

# Time from antibiotic entered the market until resistance was detected



**FIGURE 6-1** Resistance to antibiotics develops rapidly. The beginning of the arrow is when a given antibiotic was introduced to the clinic and the tip of the arrow is when the first clinical case of resistance to it was reported. Adopted and expanded from Wong and Pompliano, 1998.



# Human and societal impact of resistance



# ANTIBIOTIC RESISTANCE THREATS in the United States, 2013

## NATIONAL SUMMARY DATA

Estimated minimum number of illnesses and deaths caused by antibiotic resistance\*:

At least  **2,049,442** illnesses,  
 **23,000** deaths

\*Bacteria and fungus included in this report

§ Antibiotic resistance is one of the greatest threats to human health world wide

§ Economic growth, PH, agriculture, economic and national security

§ Impact on U.S. economy in excess of

§ \$20-30 billion in direct health care cost

§ \$35 billion in lost productivity

## METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA)



**80,461**  
SEVERE MRSA  
INFECTIONS PER YEAR



**11,285**  
DEATHS FROM  
MRSA PER YEAR



STAPH BACTERIA ARE A LEADING CAUSE OF  
**HEALTHCARE-ASSOCIATED INFECTIONS**

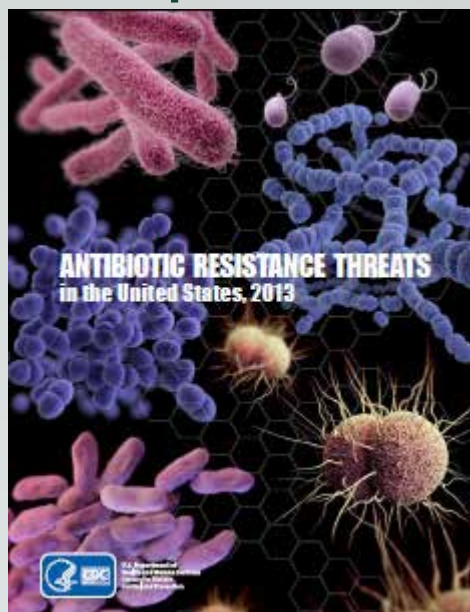


THREAT LEVEL  
**SERIOUS**

This bacteria is a serious concern and requires prompt and sustained action to ensure the problem does not grow.



# Reports and action plans.....



## NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

MARCH 2015



### Guidance for Industry

#### The Judicious Use of Medically Important Antimicrobial Drugs in Food-Producing Animals

Submit comments on this guidance at any time. Submit written comments to the Division of Dockets Management (HFA-302), Food and Drug Administration, 5600 Fishers Lane, Room 1061, Rockville, MD 20852. Submit electronic comments on the guidance at <http://www.regulations.gov>. All written comments should be identified with the Docket No. FDA-2013-01-0086.

For further information regarding this document, contact William T. Flynn, Center for Veterinary Medicine (OPV-1), Food and Drug Administration, 7119 Swansboro Place, Rockville, MD 20853, 240-276-6086. E-mail: [william.flynn@FDA.gov](mailto:william.flynn@FDA.gov).

Additional copies of this guidance document may be requested from the Communications Staff (OPV-12), Center for Veterinary Medicine, Food and Drug Administration, 7119 Swansboro Place, Rockville, MD 20853, and may be viewed on the Internet at <http://www.fda.gov/oc/ohrt/ohrt-guidance-on-the-judicious-use-of-medically-important-antimicrobial-drugs-in-food-producing-animals> or <http://www.fda.gov/oc/ohrt/ohrt-guidance-on-the-judicious-use-of-medically-important-antimicrobial-drugs-in-food-producing-animals>.

U.S. Department of Health and Human Services  
Food and Drug Administration  
Center for Veterinary Medicine  
April 13, 2013

Combine Your Regulatory Recommendations

#213

### Guidance for Industry

#### New Animal Drugs and New Animal Drug Combination Products Administered in or on Medicated Feed or Drinking Water of Food-Producing Animals: Recommendations for Drug Sponsors for Voluntarily Aligning Product Use Conditions with GFI #209

Submit comments on this guidance at any time. Submit written comments to the Division of Dockets Management (HFA-302), Food and Drug Administration, 5600 Fishers Lane, Room 1061, Rockville, MD 20852. Submit electronic comments to <http://www.regulations.gov>. All written comments should be identified with the Docket No. FDA-2013-01-0089.

For further information regarding this document, contact William T. Flynn, Center for Veterinary Medicine (OPV-1), Food and Drug Administration, 7119 Swansboro Place, Rockville, MD 20853, 240-276-6086. E-mail: [william.flynn@FDA.gov](mailto:william.flynn@FDA.gov).

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U.S. Department of Health and Human Services  
Food and Drug Administration  
Center for Veterinary Medicine  
December 2013

USDA

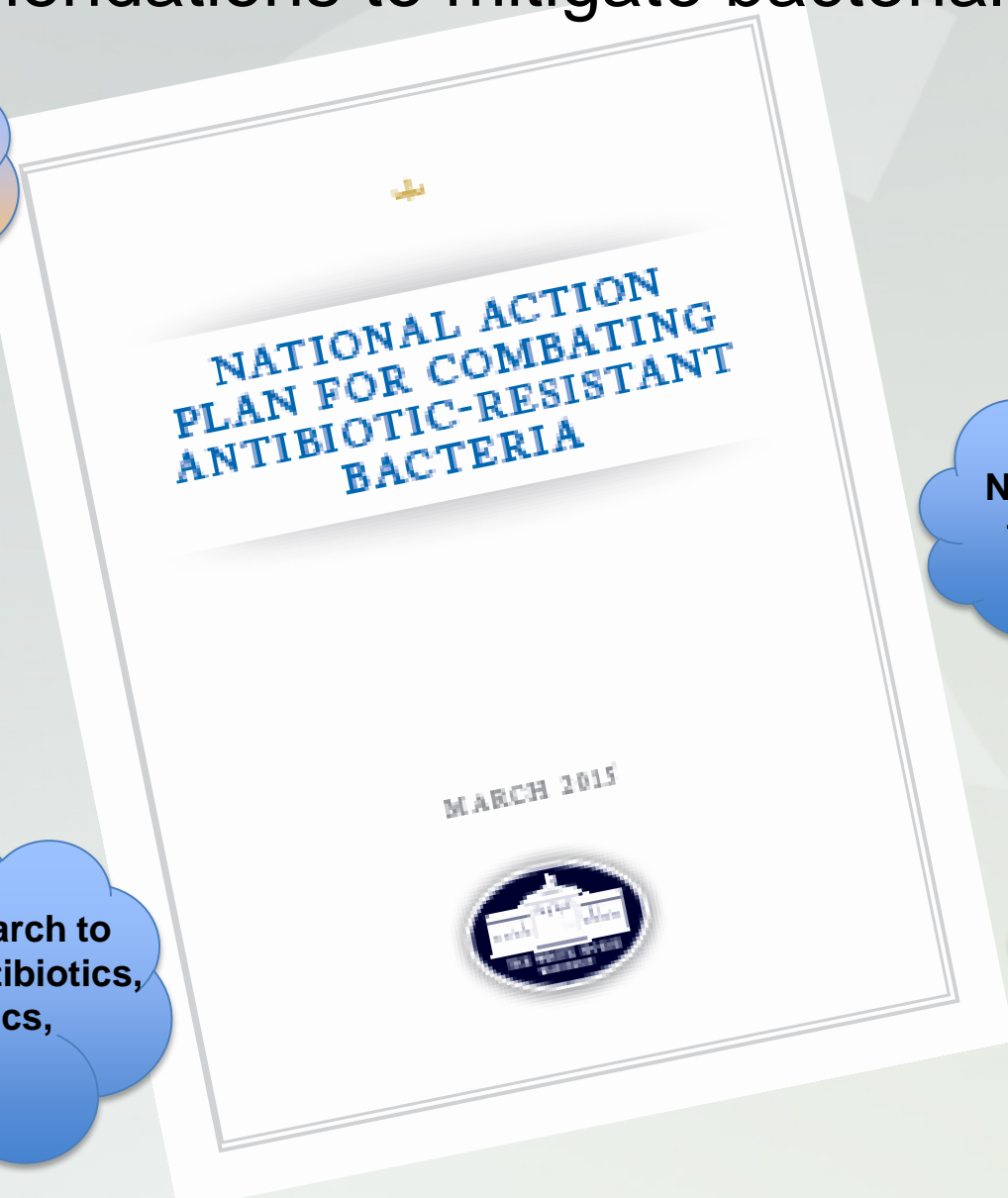
United States Department of Agriculture



### Antimicrobial Resistance ACTION PLAN

# Recommendations to mitigate bacterial resistance

**Eliminate use of medically important antibiotics**



The image shows the front cover of a white document titled "NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA". At the top center is a small gold cross symbol. The title is printed in blue, bold, sans-serif capital letters. Below the title, the date "MARCH 2015" is printed in a smaller, grey, sans-serif font. At the bottom center is a circular seal of the U.S. Department of Health and Human Services, featuring an eagle and the text "U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES". The document is tilted slightly to the right.

## NATIONAL ACTION PLAN FOR COMBATING ANTIBIOTIC-RESISTANT BACTERIA

MARCH 2015



**Foster stewardship of antibiotics**

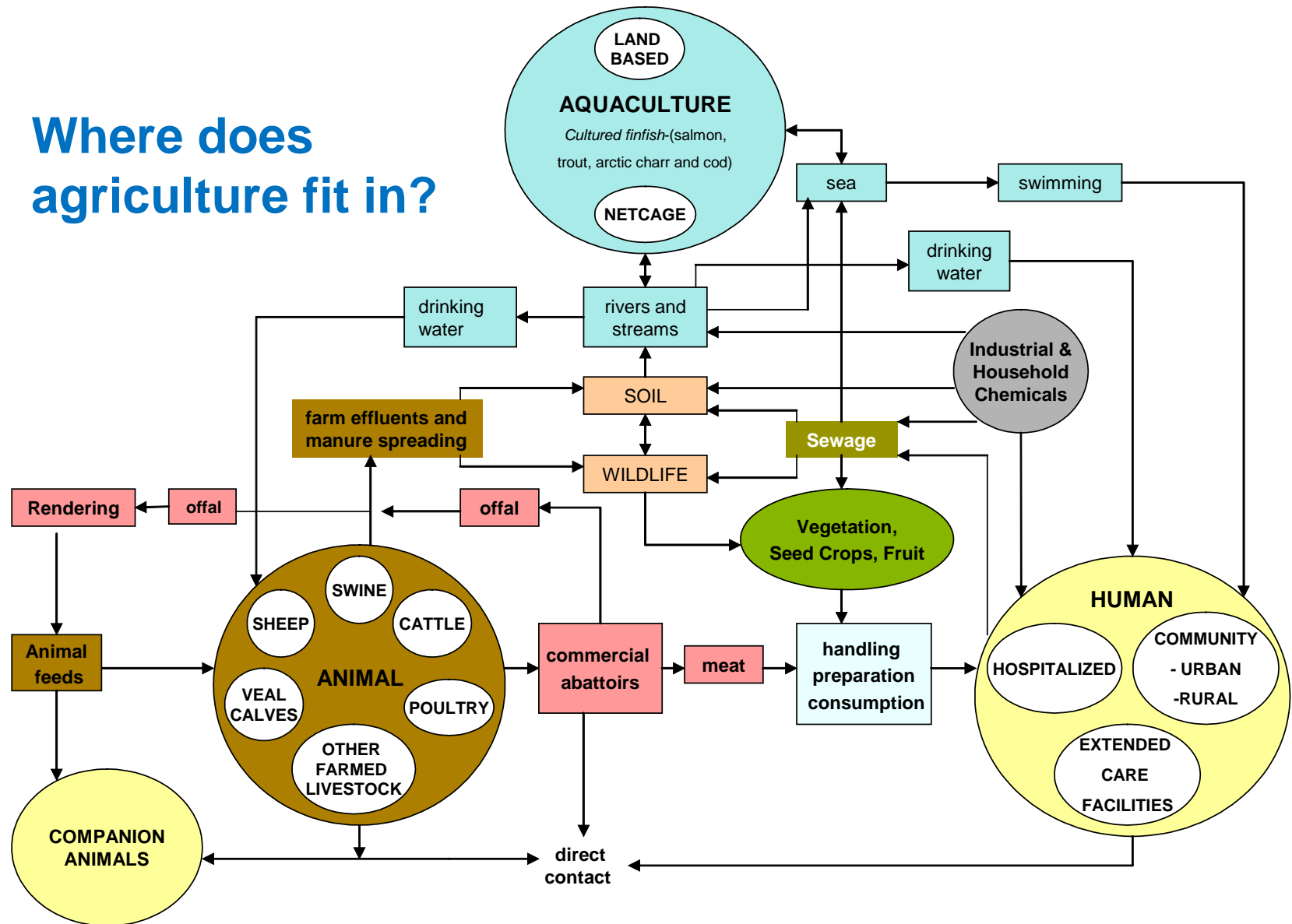
**Non-traditional therapeutics**

**Accelerate Research to Develop New Antibiotics, Other Therapeutics, Vaccines, and Diagnostics**

**Understand environmental factors facilitating AMR**

# EPIDEMIOLOGY OF ANTIMICROBIAL RESISTANCE

Where does agriculture fit in?



# Little information on resistance and its impact on food animal diseases

- § Some information on resistance in cattle pathogens
- § Increasing resistance to 3 or more antibiotic classes in bovine respiratory disease pathogen (*M. haemolytica*) submitted to Kansas state university diagnostic lab.
  - 42% in 2009 (55 isolates)
  - 46% in 2010 (155 isolates)
  - 63% in 2011 (179 isolates)
- § Little info on treatment failures due to resistance



# Impact of antibiotic resistance on agriculture

- § Baytril poultry approval withdrawn in 2005
- § Cephalosporin order of Prohibition, January 2012
  - § Restriction in use of cephalosporins





# Impact of antibiotic resistance on agriculture

§ Limitations and stricter rules for use of certain antibiotics

§ GFI 209, 213 & VFD

§ Medically important antibiotics

§ Cease use of medically important antibiotics for production uses by January 1, 2017



# Impact of antibiotic resistance on agriculture

§ All use of antibiotics in feed is will be VFD

§ No extra-label use

§ All use of antibiotics in water will be prescription

§ Resistance in food animal pathogens

§ Sparse information on impact of resistance on treatment failures



# The future

- § To maintain the availability of antibiotics, we should
  - § Improve stewardship (judicious use) by collaboration between veterinarians and producers
  - § Continue to emphasize and improve preventive measures to reduce infectious diseases
- § FDA has announced that they will evaluate uses of antibiotics in feed for which there isn't a 'duration of use on the label'

Thank you for  
your time!

Questions?



# Ceasing production use of antibiotics, National-level intervention, Denmark

**Figure 4.1. Consumption of antimicrobial agents and growth promoters in animal production, number of pigs produced and prescribed antibacterials in humans, Denmark**

DANMAP 2011

