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IBCTR
INTERNATIONAL BIOLOGICAL
and CHEMICAL THREAT REDUCTION

Nonproliferation And Biological Threat Reduction Through Public Health

Van H. Brass II, DVM, MPH
Sandia National Laboratories
International Biological and Chemical Threat Reduction
October 19, 2016

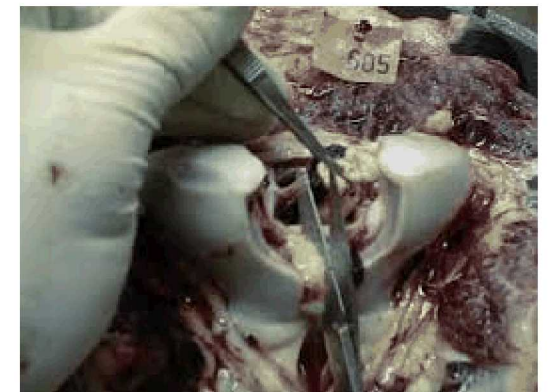
A Little About Me...

B.S. in Biology from Southern University A&M College-2003

- USDA 1890 Scholar

U.S. Department of Agriculture-2004-2007

- Animal and Plant Health Inspection Service-Veterinary Services
- Animal Health Technician
 - *Natural Disaster Relief*
 - *BSE Surveillance*
 - *Animal Fairs and Exhibits*
 - *Johne's Dairy Surveillance*
 - *Disease Outbreak Response*



University of Florida College of Veterinary Medicine

Public Health

Safeguarding the food supply

Research leading to improvements in animal and human health

- Laboratory animal medicine

Environmental health improvement

Disease diagnosis, surveillance, epidemiology, control, prevention

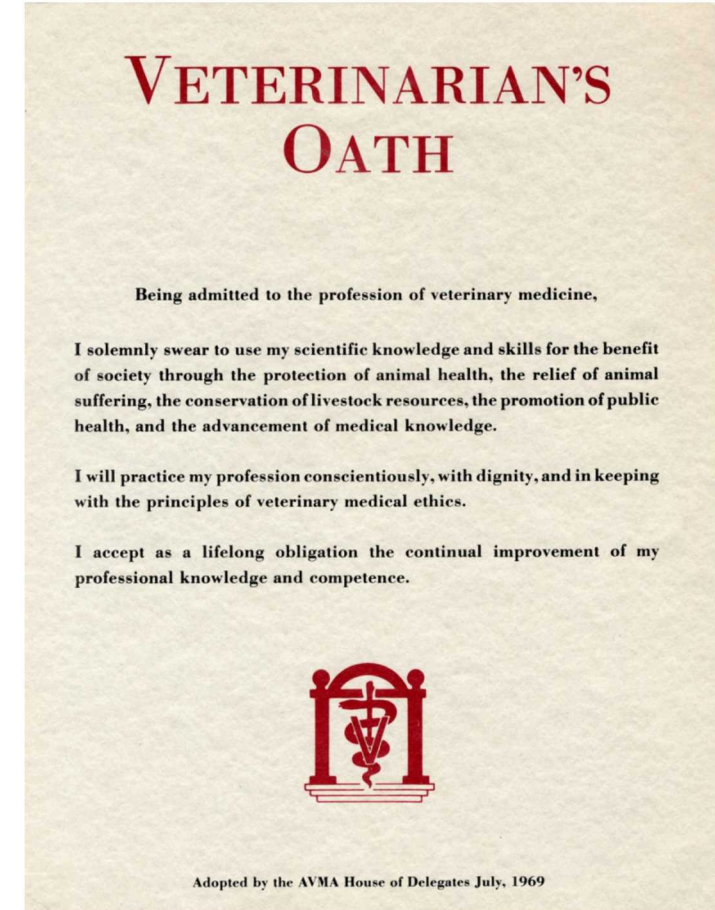
- Domestic, wildlife, and livestock/trade
- Disease outbreak management

Zoonotic disease prevention and control

- Public health emergencies

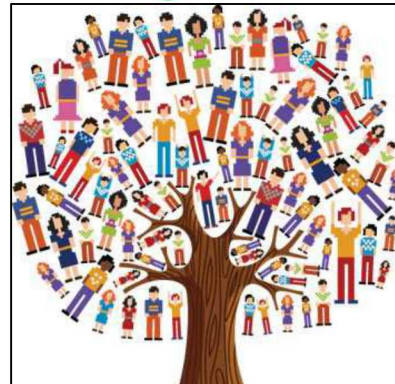
Education

- Public awareness of risks from the animal population
- Extension work
- Continuing education for veterinarians and animal health





Public good / Private good



What are the PUBLIC GOODS our profession supplies to society?

Food safety

Affordable food

Animal research

Laboratory diagnostics (some)

Control of public good diseases – transboundary and zoonotic

Research

Environmental health

Human animal bond?

What are the PRIVATE GOODS our profession supplies to society?

Companion animal health

Equine animal health

Food animal health

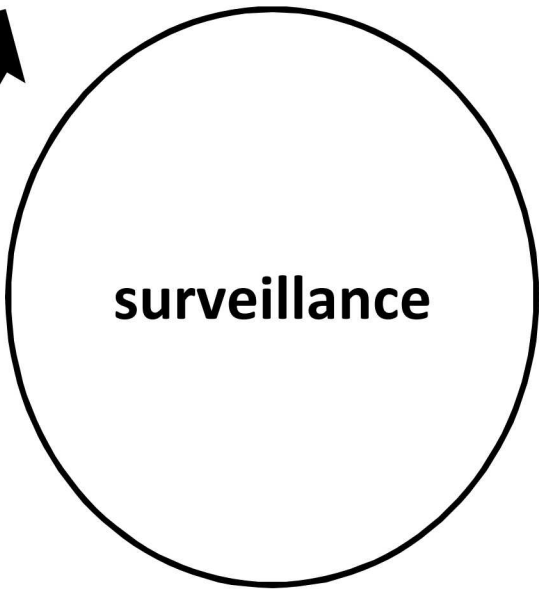
What does Dr. Google say/think about our profession?



Who's taking care of
the PUBLIC GOOD
responsibilities of
our profession?



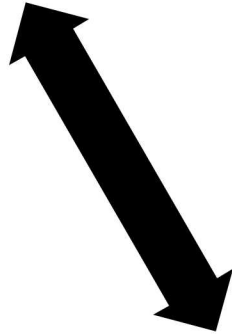
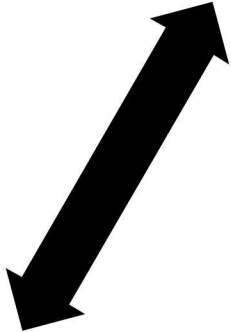
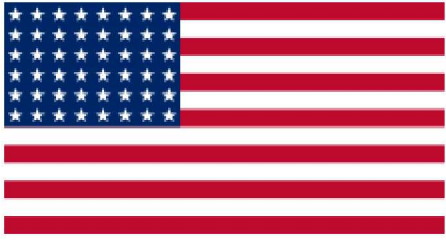
The National Animal Health System protects the PUBLIC GOOD



Surveillance Activities

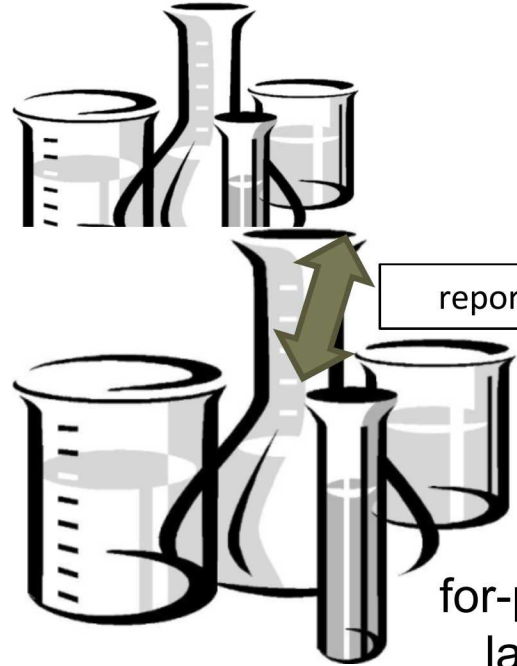
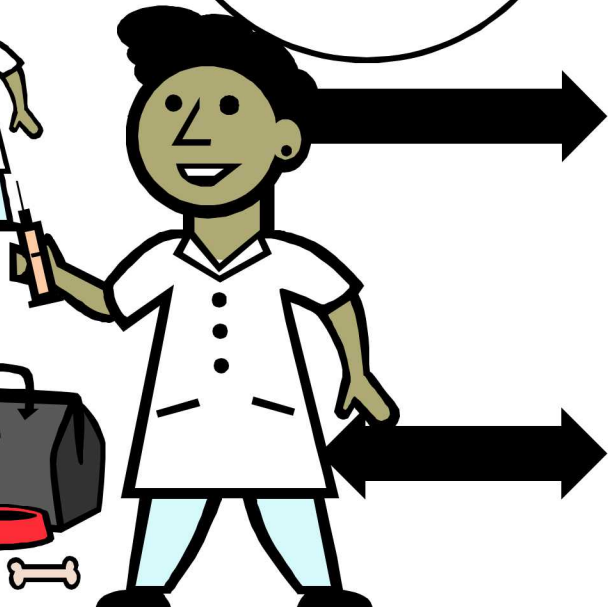
The continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice (WHO, 2016)

- Serve as an early warning system for impending public health emergencies
- Document the impact of an intervention, or track progress towards specified goals
- Monitor and clarify the epidemiology of health problems, to allow priorities to be set and to inform public health policy and strategies



accreditation

private
veterinarians



reporting

for-profit
labs  IBCTR



Public good / Private good

Classical swine fever

Newcastle

Brucella

HPAI

Food safety

Foot-and-mouth disease

ECONOMY

BVD

shipping fever

intestinal parasites

footrot

coccidiosis

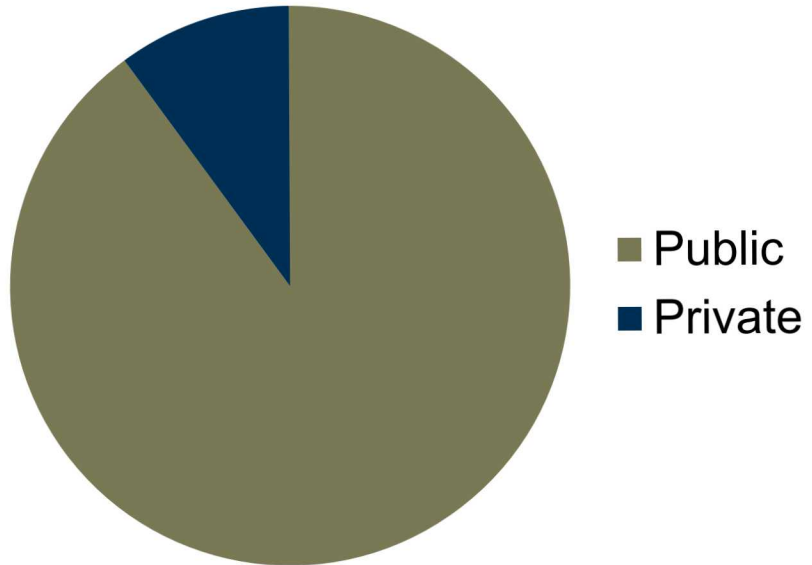
Marek's

canine distemper

US Animal Health System

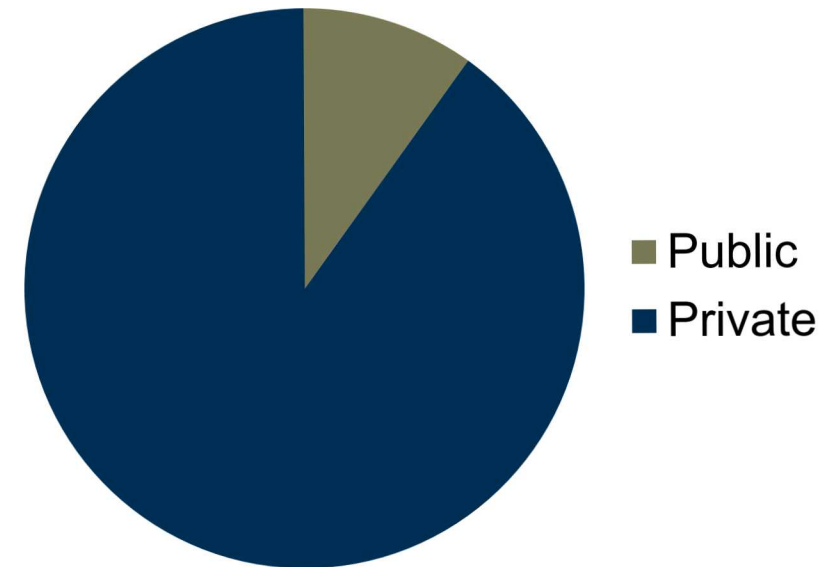
1946

Veterinarians



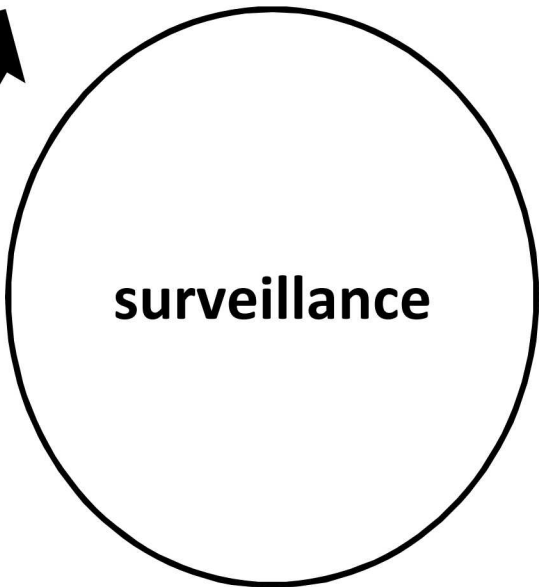
2016

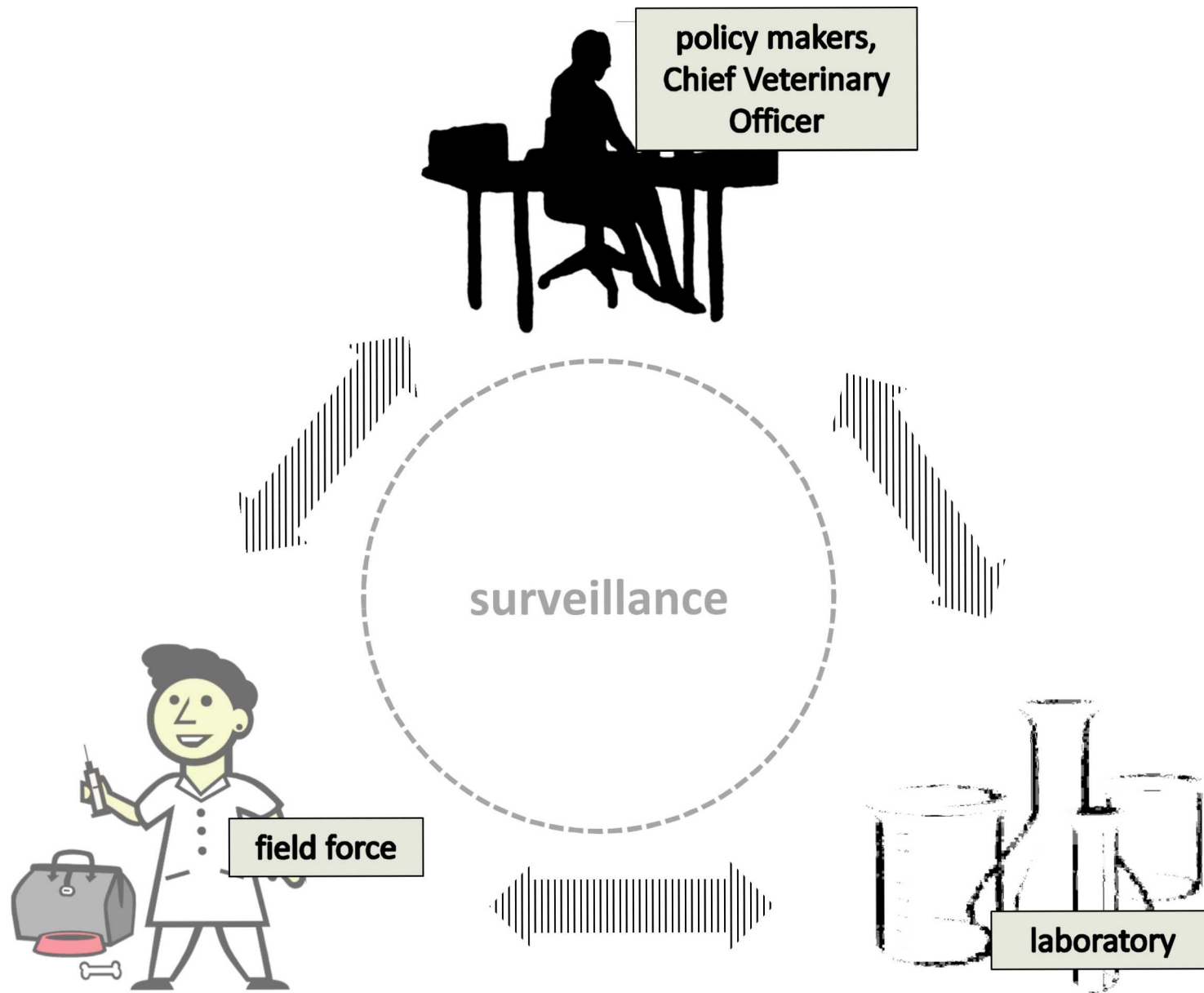
Veterinarians

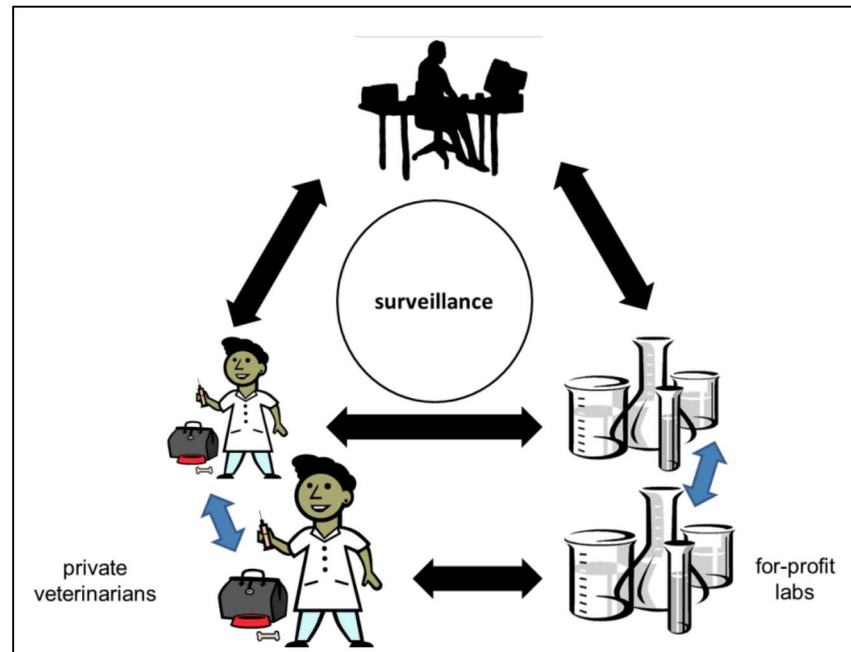
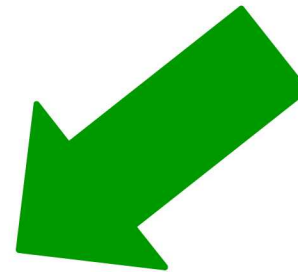
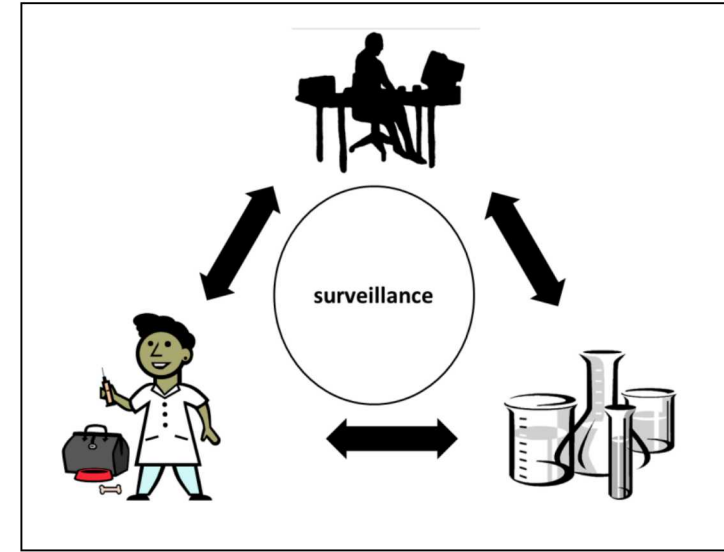
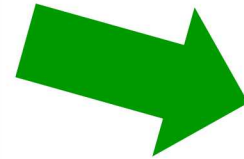
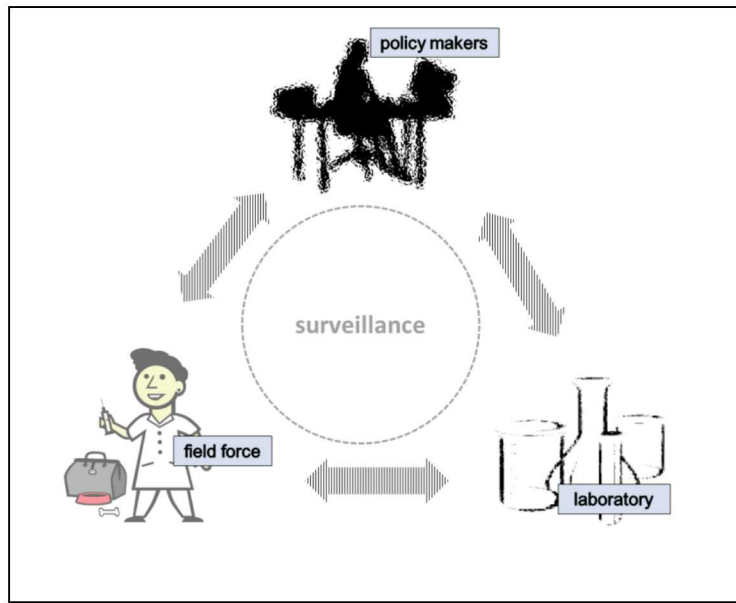




The National Animal Health System protects the PUBLIC GOOD







VETERINARY MEDICINE COMPETENCIES

AVMA COE Accreditation Policies and Procedures: Requirements

OIE Recommendation on the Competencies of Graduating Veterinarians

American Veterinary Graduate Competencies

Global Veterinary Graduate Competencies

Clinical Practice

1. Comprehensive patient diagnosis (problem solving skills), appropriate use of clinical and laboratory tests and record management
2. Comprehensive treatment planning and referral when indicated
3. Anesthesia and analgesia management
4. Client communication
5. Critical thinking
6. Critical thinking relevant to clinical practice

Public Health

7. Health promotion, zoonosis, and food safety

Clinical Practice

1. Communication skills
2. Research
3. Animal welfare

Veterinary Preventive Medicine

4. Disease prevention and control programmes
5. Veterinary products
6. Management of contagious disease
7. Administration and management

Public Health

8. Zoonoses (including food borne diseases)
9. Emerging and re-emerging diseases
10. Epidemiology
11. Food hygiene
12. Application of risk analysis

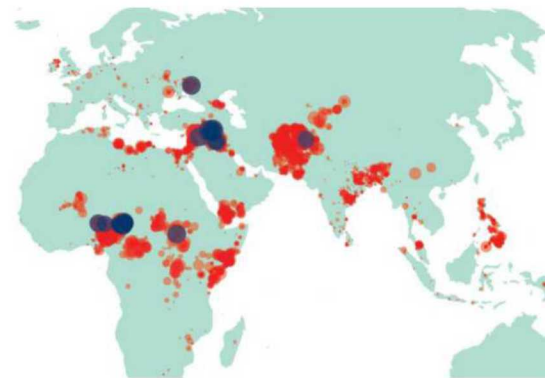
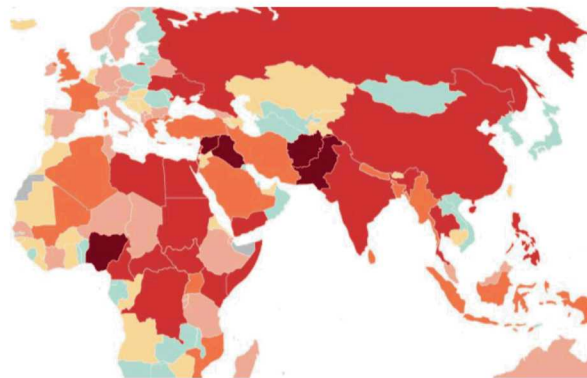
Global Animal Health systems

13. Trans-boundary animal disease
14. Organization of Veterinary Services
15. General certification procedures
16. Inspection and certification procedures
17. Veterinary legislation and ethics
18. International trade framework

More
public good
info
needed?

Terrorism

- Terrorist activity increased by 80 percent in 2014 to its highest recorded level
 - Deaths from terrorism rose from 18,000 in 2013 to nearly 33,000 in 2014
- Terrorist activity is most prevalent in five countries
 - 57 per cent of all attacks and 78 per cent of all deaths occurred in only five countries: Iraq, Nigeria, *Afghanistan*, *Pakistan* and Syria
 - *Afghanistan, Iraq and Pakistan have been ranked in the ten countries with the highest number of deaths from terrorism for every year for the last ten years*



Persuasive Recruitment

The Taliban

Used amnesty as a method to recruit government officials and law enforcement person

Coerce poor and under privileged children by offering food and shelter

Daesh

Mastered social media

- Reportedly post 90,000 social media messages per day
- By 2015, the organization drew in more than 20,000 foreign fighters to Iraq and Syria via the internet.

Specifically targets the young and vulnerable online, in schools, and in mosques

Hundreds of foreign fighters, many with scientific degrees, have been recruited

Fear

Those who refuse to adhere to ISIS policies are brutally murdered

Persuasive Recruitment

Daesh

Offers stability and extraordinary wealth

- Daesh is one of the best funded-terrorist organizations in history
- As of Oct 2014, ISIS possessed assets of more than US\$2 trillion with an annual income amounting to US\$2.9 billion.
- Earnings primarily derived from illicit oil sales; minority taxes and farmers; confiscation of property and livestock; looting of antiquities, and kidnapping of civilians for ransom

Tactics include promises of high salaries, luxurious living conditions, cars, and women

Promote organized social services, such as court systems, a police force, public works, and consumer agencies

Interest in Acquiring Biological Material For Nefarious Means

Historically...

Hittites (modern day Turkey)

Introduced people infected with tularemia into enemy territories

Mongol Empire

People infected with bubonic plague and infected fomites were used

Smallpox???

State sponsored programs

Germany, Japan, Great Britain, United States

Interest in Acquiring Biological Material For Nefarious Means

Recently...

Rajneeshees

Food poisoning of 751 individuals in Dalles, Oregon through the deliberate contamination of salad bars with salmonella (1984)

Aum Shinrikyo

Japanese cult who released sarin gas in the Tokyo subway system (1995)

Larry Wayne Harris and William Job Leavitt Jr.

- Neo Nazi sympathizers with microbiology backgrounds
- Arrested for trying to weaponized anthrax (1995)
- Acquired from the American Type Culture Collection

2001 US Anthrax Attacks

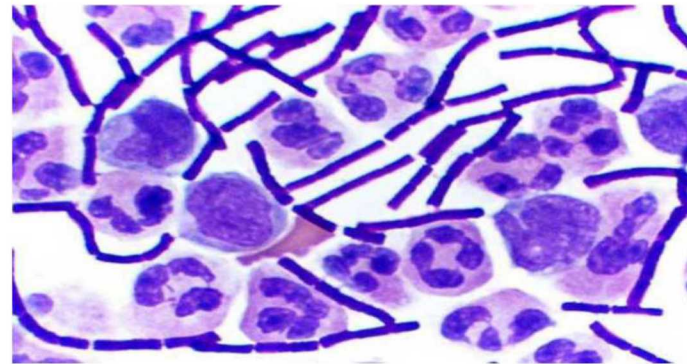
- Letters containing anthrax spores sent to various media outlets and congressional office buildings
- 22 infections, 11 acquired inhalation anthrax infections, 5 deaths
- Bruce Ivins, a government bioweapons research named as the perpetrator

Dual-Use

Dangerous pathogens that are used for research and diagnostic purposes are dual-use

- Dual-use: Having applications that are necessary to advance public and animal health and applications for nefarious purposes

Must ensure that dual-use pathogens, research, technology, and methods are not used for nefarious purposes



Sources of Biological Materials

Vaccine production and testing facilities

Outbreaks

Environment

LABORATORIES!!!

Animal and public health

Research

University

Clinical/diagnostic

Culture collections and repositories



Need For Biorisk Management

Biological agents and toxins in a laboratory setting pose inherent risks to the health and safety of all personnel

All laboratories are responsible for biosafety and biosecurity that protects their workers, animal populations, and the environment from exposure or spread of pathogens.

- Public health concerns
- Biological threat reduction/terrorism

The guidance and information presented is in accordance with the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2015 edition

- Chapter 1.1.3. Biosafety and Biosecurity: Standard for Managing Biological Risk in the Veterinary Diagnostic Laboratory and Animal Facilities
 - *Adopted during the May 2015 General Session*

Biorisk Management

What are biorisks?

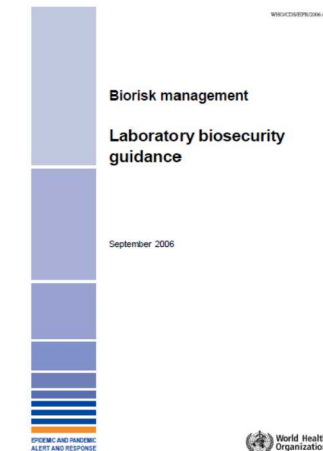
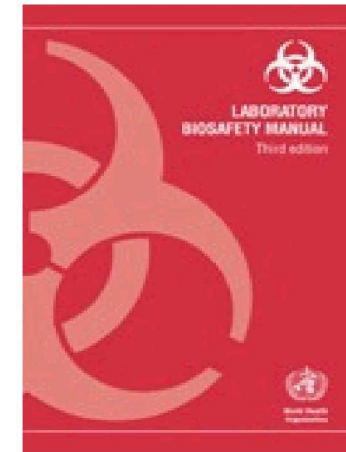
- What/Who are we protecting?
- Protecting from what?

Biosafety-containment principles, technologies, and practices implemented to prevent unintentional exposure to pathogens and toxins, or their unintentional release₁

Biosecurity-protection, control, and accountability for valuable biological materials within laboratories in order to prevent their unauthorized access, loss, theft, misuse, diversion or intentional release₂

1. Laboratory Biosafety Manual, Third Edition (World Health Organization, 2004)

2. Biorisk Management-Laboratory Biosecurity Guidance (World Health Organization, 2006)



Biorisk Management

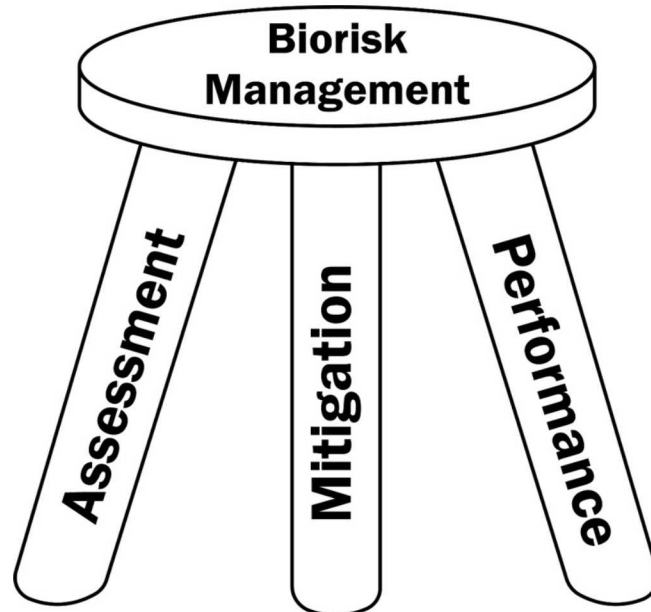
What is biorisk management?

- System or process to control safety and security risk associated with the handling or storage and disposal of biological agents and toxins in laboratories and facilities

Risk Characterization, Risk Management, Risk Communication

The AMP Model

- Assessment
- Mitigation
- Performance



A Risk Analysis Approach- Biological Risk Assessment

An analytical procedure designed to identify and characterize biological risks in a facility, laboratory or a unit within it, or other type of operation dealing with pathogens or toxins

- Both biosafety AND biosecurity risks
- Should always be thorough and robust
- Allows a facility, laboratory, or other operation to determine the relative risk of its different activities pose, and helps guide risk mitigation decisions

Biological Risk Assessment



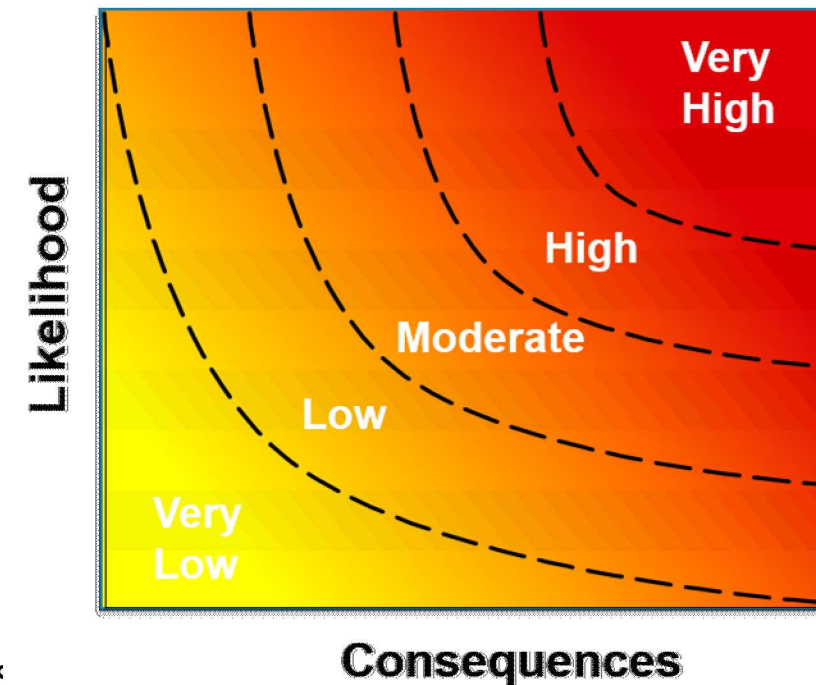
Risk is defined as a combination of the likelihood (probability) of the occurrence and the severity of harm (o

- Risk vs. threat
- Likelihood and consequences

Important factors to consider

- Characteristics of the agent
 - *Route of transmission*
 - *Pathogenicity*
 - *Clinical signs/pathology*
 - *Available prophylactics/ treatment*
 - *Zoonotic potential*
- Laboratory Infrastructure
- Human Factors
- Operational Factors
- Environmental and Community Factors

RISK



Biological Risk Assessment

The biological risk assessment allows a facility to determine if the work proposed poses an unacceptable risk to biosafety and biosecurity.

Once the biorisks have been identified and fully characterized, the facility can decide if the risk is acceptable and if the risk can be managed and mitigated appropriately to reduce the likelihood and consequences of injury, illness, or theft

- Diagnostic and research laboratories have to accept some risks due to their purpose and function within the public health sector

THERE IS NO WAY TO PERFORM WORK WITH BIOLOGICAL MATERIALS ABSENT OF RISK

Biorisks unique to veterinary/animal facilities

- Live animals on premises
- Animal bites/attacks/injuries to humans
- Necropsy/carcass disposal



Mitigation Control Measures

Elimination or Substitution

- Decline to do the work or work with a similar pathogen with lower consequences
 - Sterne strain of *Bacillus anthracis*

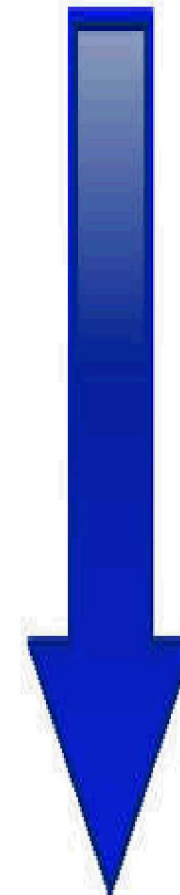
Engineering Controls

Administrative Controls

Practices and Procedures

Personal Protective Equipment

Generally, the control methods at the top of the list are more effective and protective than those at the bottom



Biorisk Management- Performance

The implementation of the entire biorisk management system, including evaluating and ensuring that the system is working as designed

- An ongoing process
- Regular monitoring and evaluation
 - *Drills, audits, documentation of incidents, equipment validation*
- When warranted, mitigation controls measures are added, adjusted, or removed to ensure their proper function and role in reducing biorisks



Public Health

- Tons of opportunities
 - Local, national, international
 - Volunteer or part time
- Masters of Public Health degree
 - Necessary for subject matter expertise
 - Limited coverage in veterinary school curriculum
 - Dual DVM/MPH programs
- Far reaching impact



Questions???