One Health in Serbia-Scope of my talk

- Well, I have been living in Serbia little bit shorter of 3 years after my absence of 26 years
- My prospective of OH in Serbia will be assessed by the comparison of OH in NA and some EU countries
- Would I be a good speaker for the chosen subject and meet your expectations?
- To gather literature, data etc. in Serbia regarding the OH was at least challanging
- Therefore, I decided to have general views on OH and focus more on : Animal health, Food Safety and Zoonoses

One Health Prospective

- One Heath Commission (OHC)
- " the collaborative effort of multiple disciplines to obtain optimal health for people, animals, and our environment"
- One Health Initiative Task Force (OHITF)
- "the promotion, improvement, and defense for the health and well being of all species by enhancing cooperation and collaboration between physicians, veterinarians, and others scientific health professionals and promoting strengths in leadership and management to achieve these goals"

One Health Prospective

- There are a numerous laws and legislations in Serbia that define and regulate *Public Health*
- The term *One Health* is used and understood by very limited group of people- predominantly scientists
- The term *One Health* is used in many different contexts ?! - Not only in Serbia!!!
- Is OH One medicine? One world-One Health-One Medicine? entirely synonymous*
- Well, One Health is getting its worldwide recognition rapidly

One Health Prospective

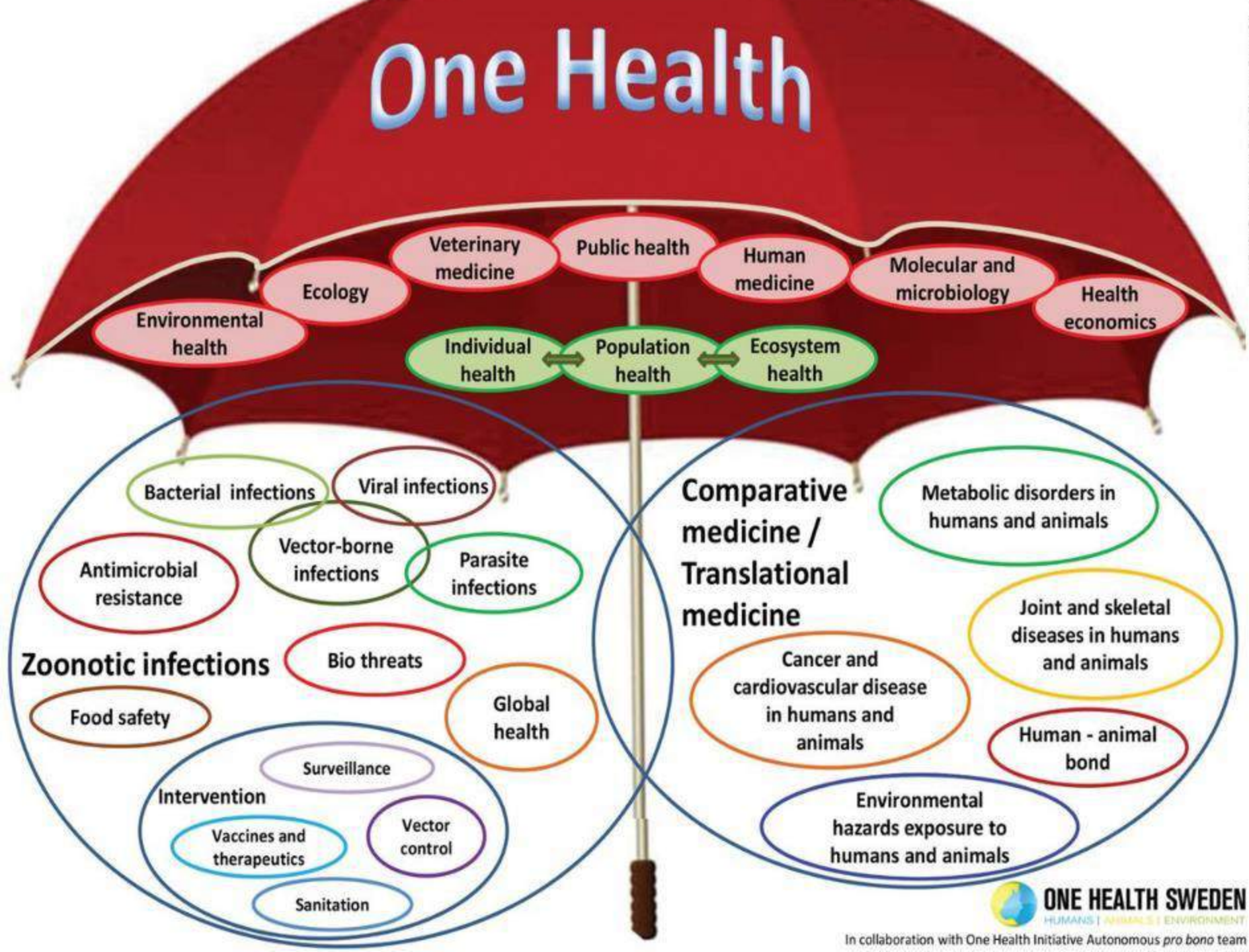
- What OH means to Farmers, Slaughter houses, Food processors, Food packers, Food sellers, Restaurant personals etc.?
- What OH means to general population of the country?
- What OH means even for scientists outside of the field of OH*?
- What OH means to Legislators of Food Safety, Public Health Officials or environmental experts!!!*
- It seems that all of us should do better job in order to educate general population of the country?*

One Health Prospective-Institutions In Serbia

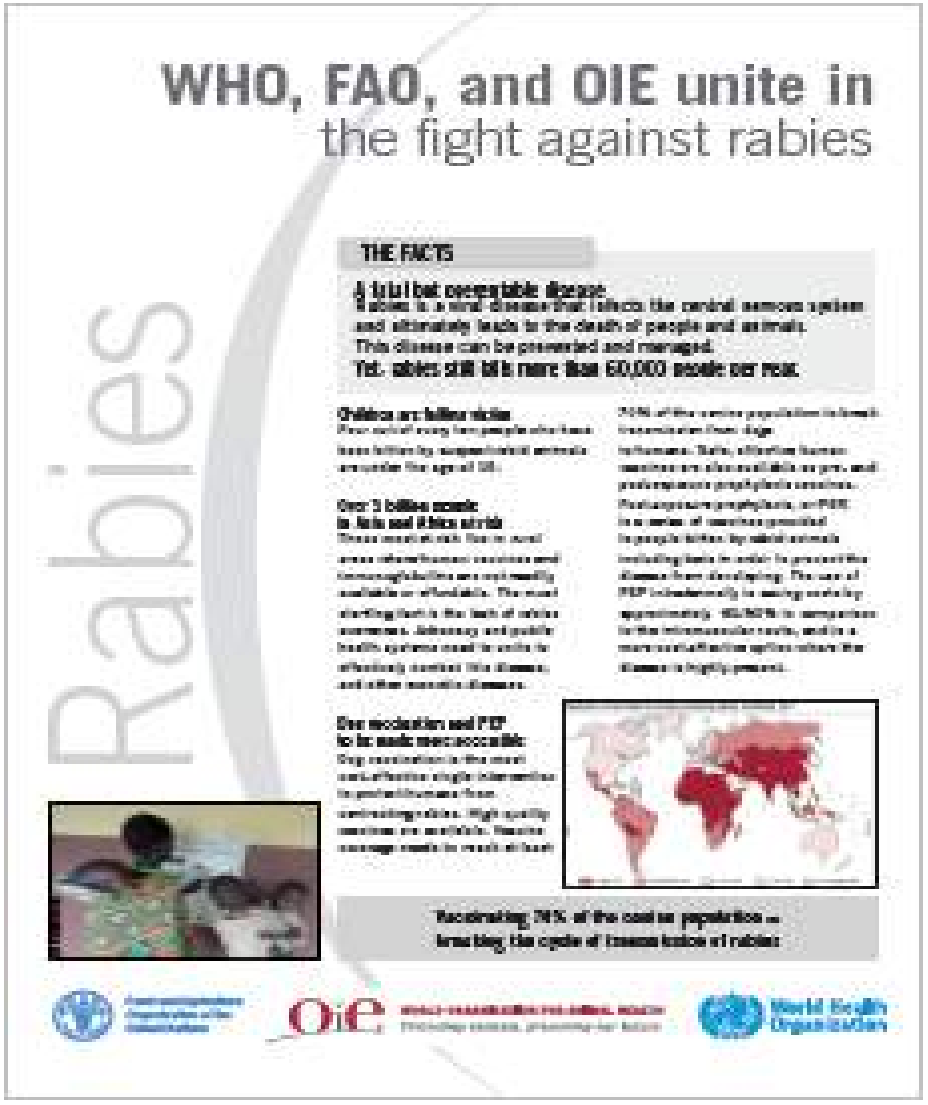
- Environmental institutions end legislations (approximately 10 Goverment Institutions)*
- Animal health Institutions including Directory of veterinary medicine under the Ministry of Agricultre (approximatelly 8-12 Institutions)*
- Public Helth - Human Medicine (numeros of Institutions, many of them with overlaping responsibilities)*

Public Health

- World Health Organization definition: Public health incorporates the interdisciplinary approuches of epidemiology,biostatitics and health services. Environmental health,comunity health,behavioral health, health economics, public policy, inssurence medicine, mental health and occupational safety and health are other important subfields.

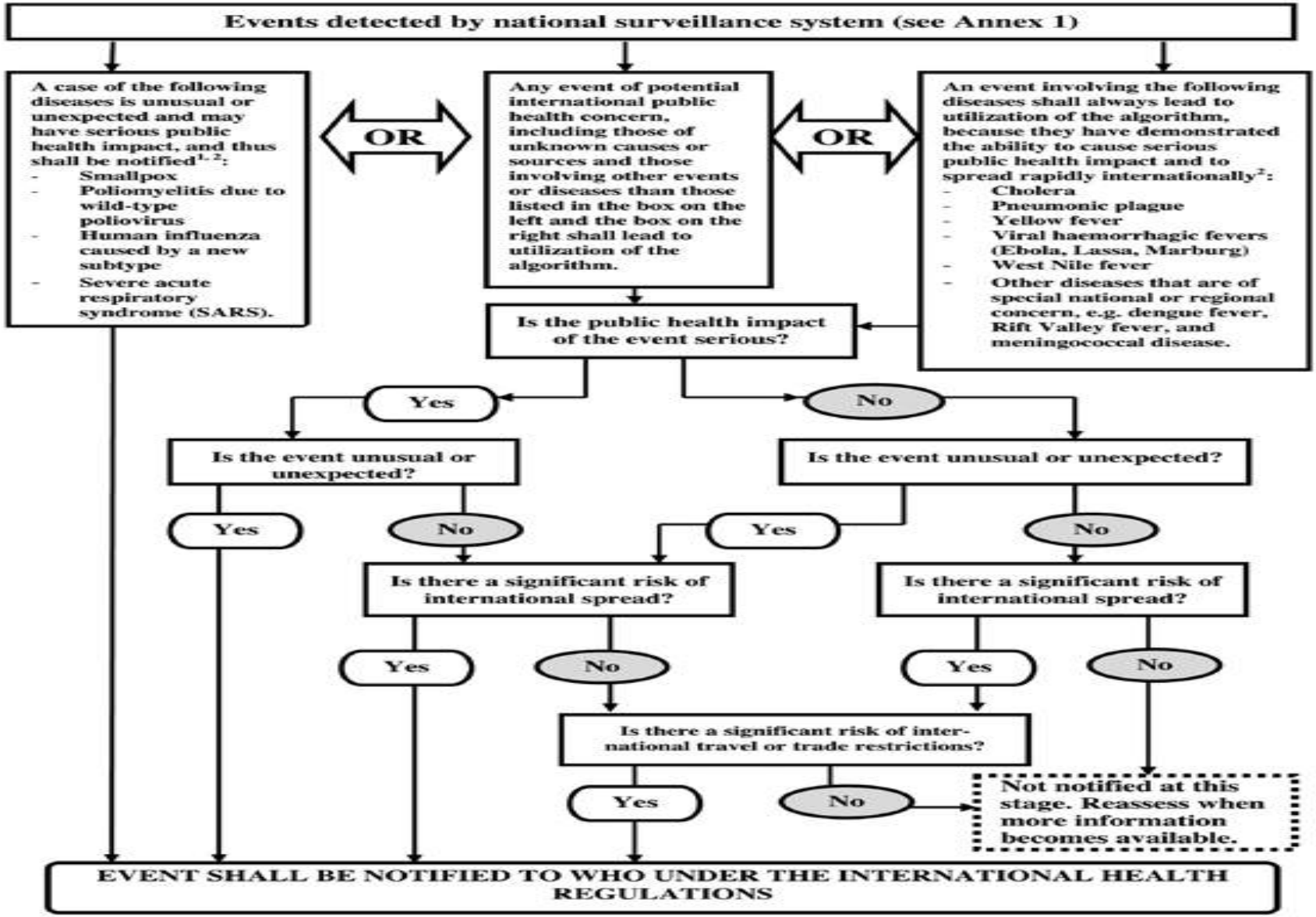


Food and Agriculture Organization (FAO),World organization for animal health (OIE), World Health Organization (WHO)



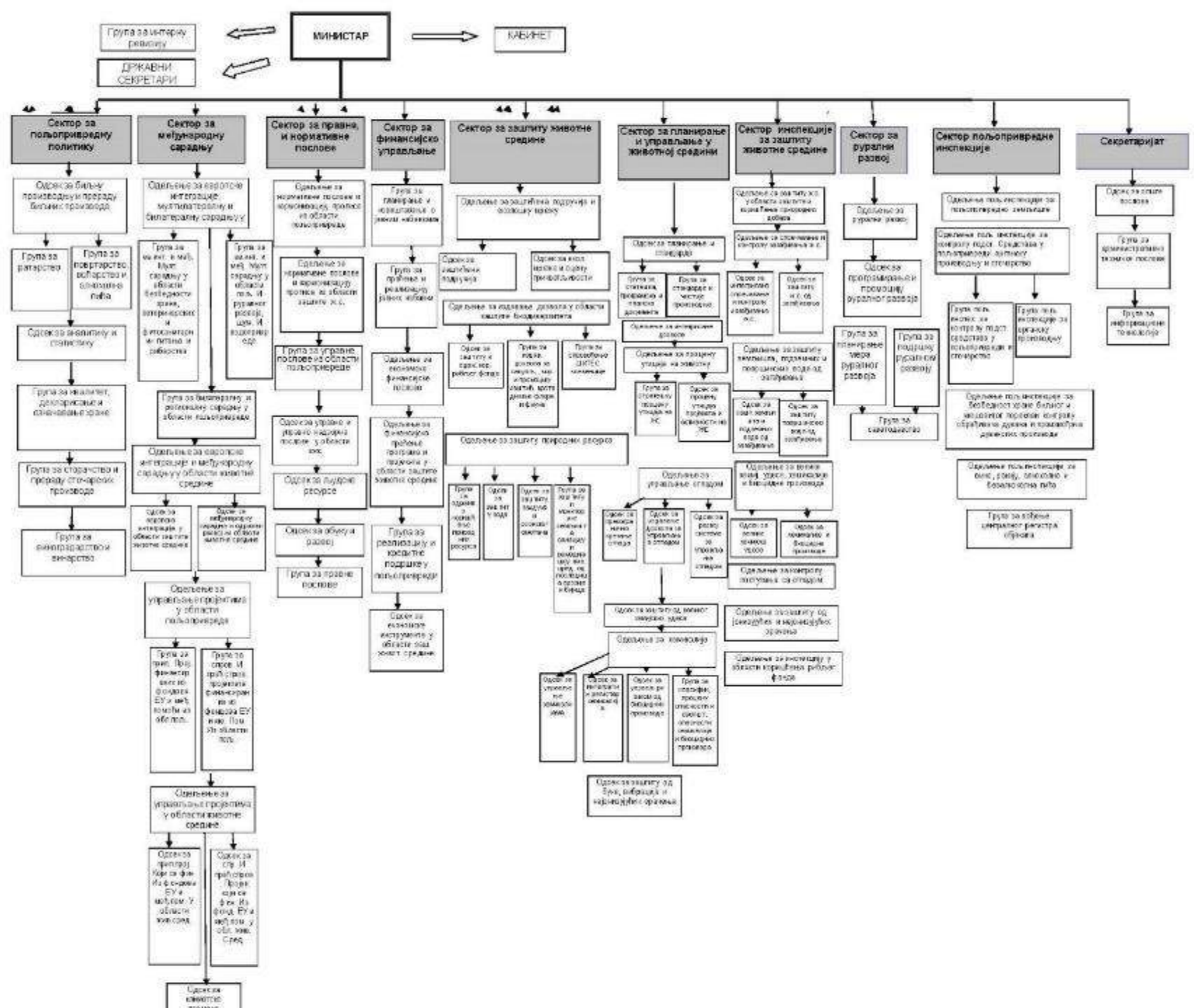
ANNEX 2

DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

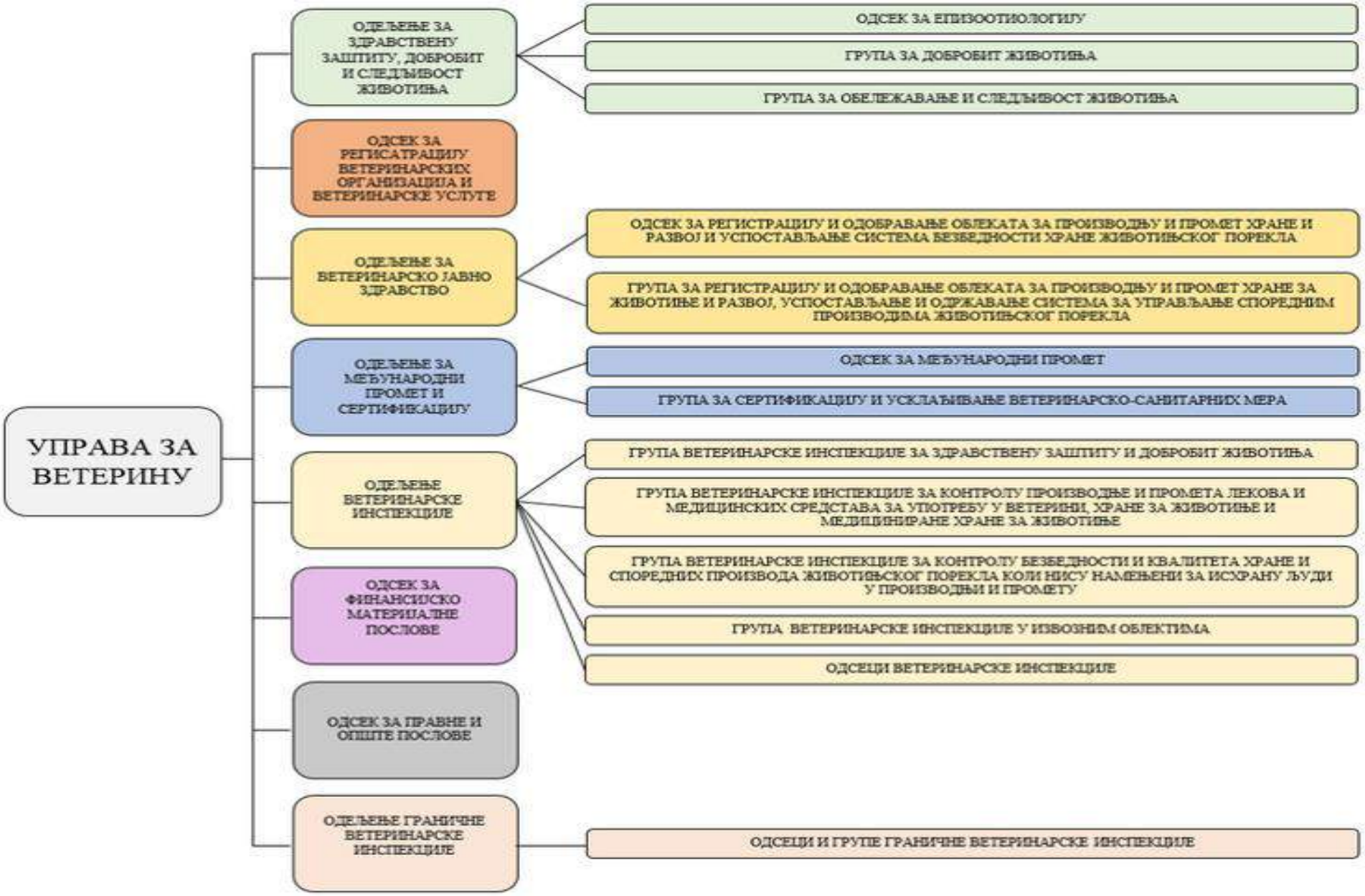


[1] As per WHO case definitions.

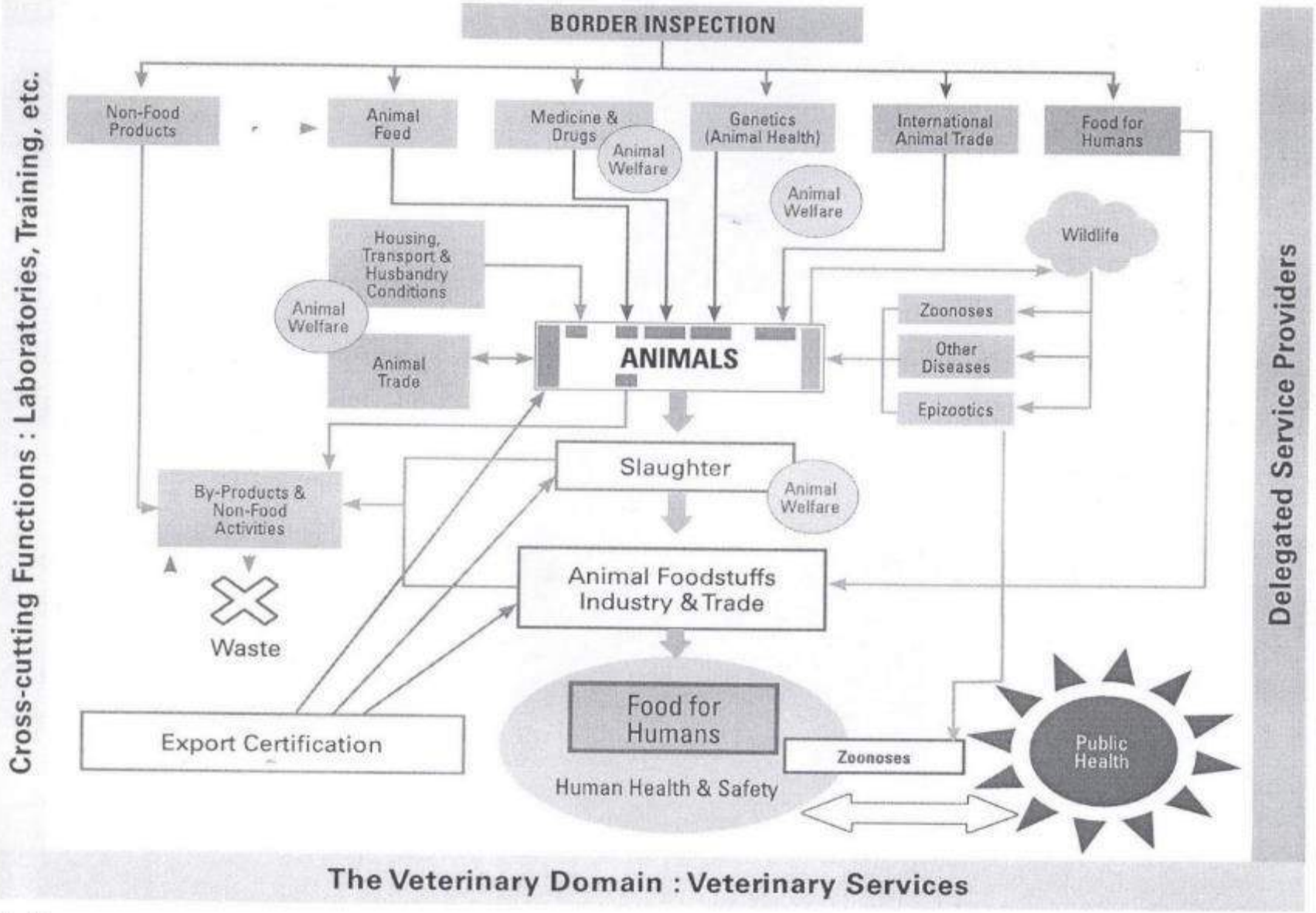
[2] The disease list shall be used only for the purposes of these Regulations.


Група за интерну ревизију
ДРЖАВНИ СЕКРЕТАРИ
МИНИСТАР
КАБИНЕТ
Сектор за пољопривредну политику
Сектор за међународну сарадњу
Сектор за правне, и нормативне послове
Сектор за финансијско управљање
Сектор за заштиту животне средине
Сектор за планирање и управљање у животној средини
Сектор инспекције за заштиту животне средине
Сектор за рурални развој
Сектор пољопривредне инспекције
Секретаријат

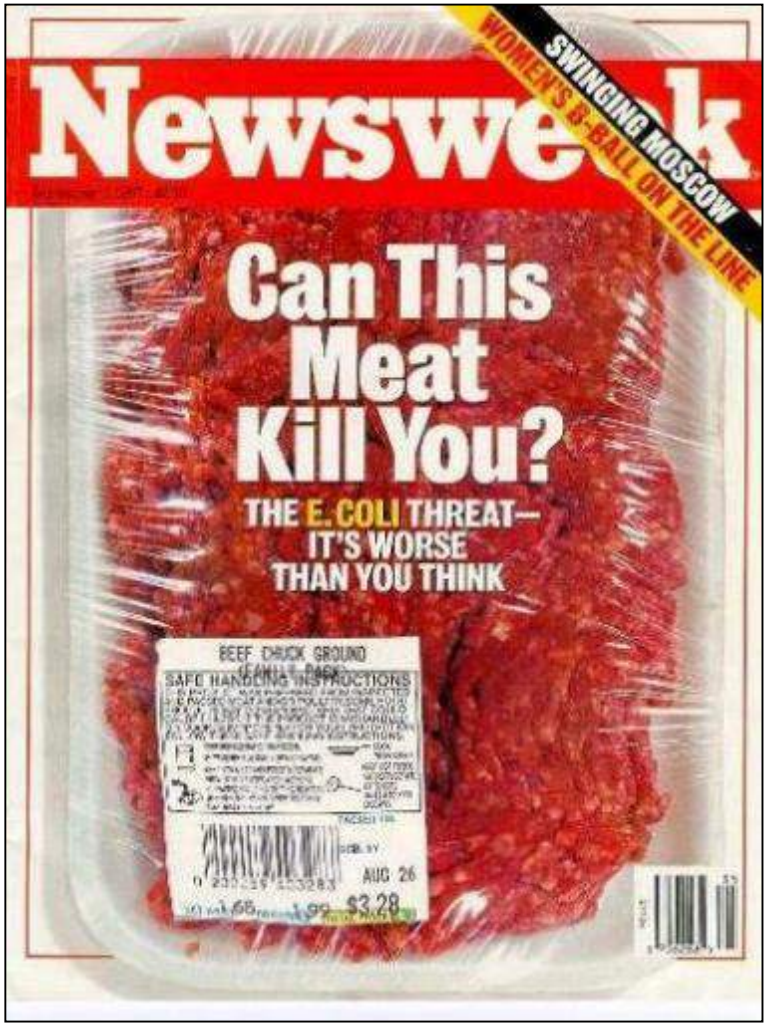
- Organization chart of Veterinary Directory in Serbia



Border Inspection



Enterohemorrhagic *E. coli* (EHEC)



September 1, 1997

August 3, 1998

One Health Prospective

- ZOONOSES

- Embracing the concept of OH particularly in developed countries in last 10 years *give tremendous results*
- However, *in developing countries* where concept of OH *is not embraced entirely blocking barrier of transmission of infective agents between animals and humans did not have greatest impact*

One Health Prospective

- Zoonoses
- *Approximately 75% of new emerging human infectious diseases are defined as zoonotic, meaning that they may be naturally transmitted from vertebrate animals to humans*
- *Reemerging zoonosis in last three decades are consequence of the increasing interdependence of humans on animals and their products and our close contact with companion animals*
- *Climate change, environmental changes, etc. also played significant role*

One Health Prospective

- Zoonoses
  - There is approximately 1,461 infectious diseases recognized to occur in humans
  - Approximately 60% are caused by *multihost pathogens*
  - Humans serve only 3% of known zoonotic pathogens

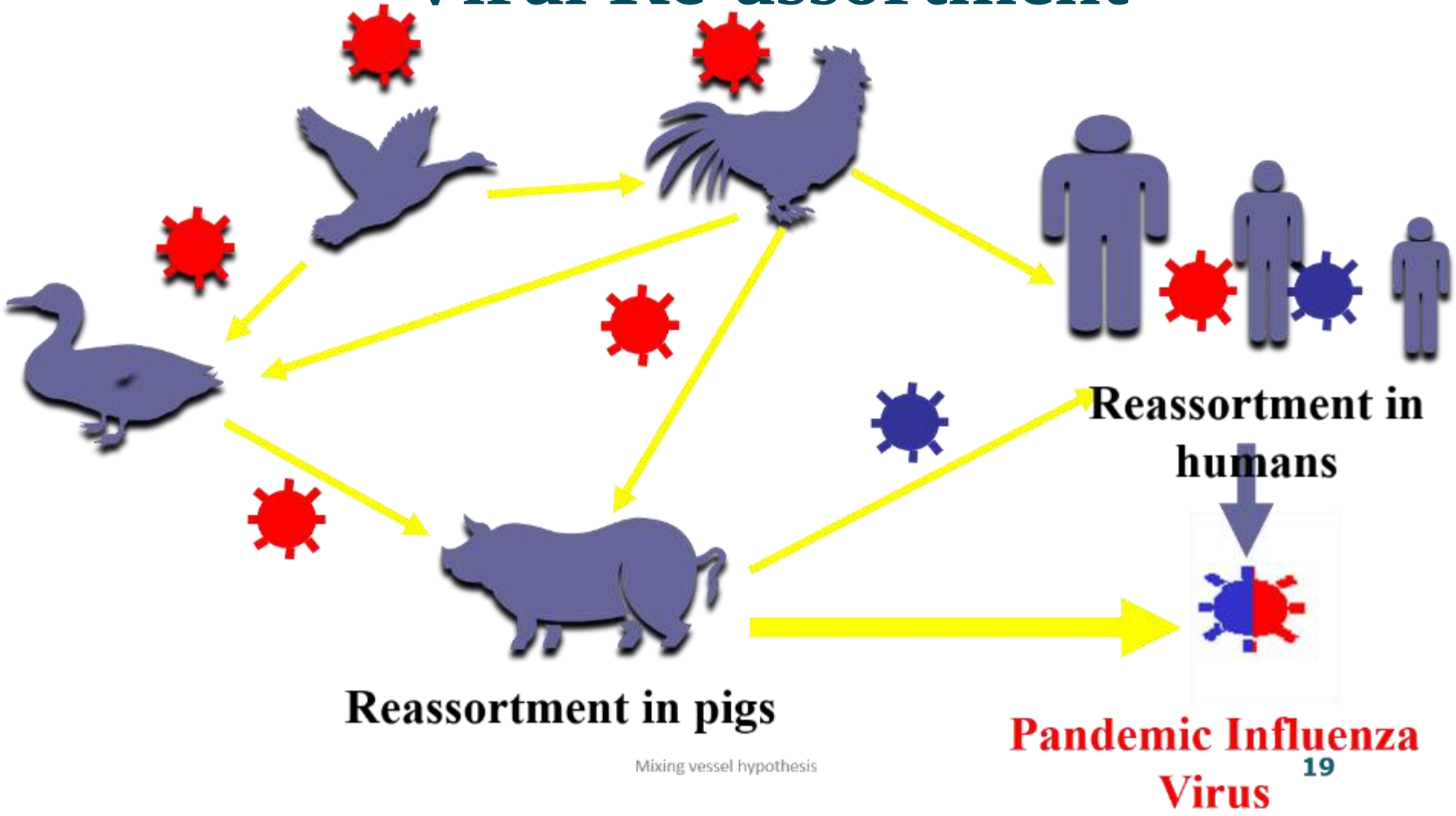
One Health Prospective

- Zoonoses
- West Nile virus
- Hendra virus
- Nipah virus
- Influenza virus A which bind to sialic acid/galactose disaccharides on the cell surface
  - ✓ Sialic acid could be linked to the position 3 or 6 to the backbone of *galactose*
  - ✓ In humans α-2,6 linkage predominate
  - ✓ In avian α-2,3 linkage is most common
  - ✓ Pigs express both linkage - “mixing vessel” hypothesis

One Health- Zoonoses

- HPAI H5N1 endemic in Hong Kong
- Forced the global community to recognize that animal health and human health are linked (1997)
- 18 people affected
- 8 people died
- 1.5 milllion birds was killed
- There are severall examples accross the world in regards to HPAIH5N1*
- 2009 pandemic with H1N1 swine flu/triple reassortment (bird,swine and human virus re-assorted with Eurasian pig flu virus) with enormous consequences worldwide
-

Viral Re-assortment



One Health Prospective

- Environment
- Urbanization
- Globalization
- Climate shift
- Use of chemicals in Agriculture
- Pollution and contamination of Land and water sources have created a new threats to the health of both animals and humans

One Health Prospective-Example

- Walkertown, Ontario, Canada
- Clean water agency May 2000
- Ground water become contaminated with E.coli O157:H7
- Contamination was due to runoff into water well
- 5000 people had bloody diarrhea
- 5 people died
- 2500 become ill
- 19 children with HUS
- Improper operating practice cost Goverment of Canada over CAD $100 000 000
- Goverment of Canada made 93 recomendations

One Health Prospective

- 2001 in Province of Saskatchewan, Canada
- 5800 people become infected by the protozoa *Cryptosporidium*
- Despite Government recommendations for clean water supply disaster happened
- Premier of Saskatchewan comments were rather ironic !!!

One Health Prospective/Preharvest interventions

❖Pre-Harvest Control of *E.coli* O157:H7 and non O157:H7 *in general food borne pathogens*

1. Management practice and transport of animals
2. Cattle water and feed management
3. Live animal treatments prior to the pre harvest

❑ Above mentioned strategies do not eliminate need for good sanitation procedures in the processing plant or during the food preparation !!!

One Health Prospective

- Pre-Harvest Control

- Live animal interventions to reduce pathogens must be installed in a multiple-hurdle approach that complements in plants interventions , so reduction in pathogen entry to the food supply can be maximized

One Health Prospective

- Management practices and transportation
  - Good management of the cattle at the farms is extremely important
  - Transportation of cattle plays significant role

Pre-Harvest Control

- Cattle water and feed management
- Reduce horizontal transmission
- Water troughs treatments
- Feed types over 20 different approaches has been examined with different success rate in order to minimize load of infection agents that animals bring to the slaughter house
- Live animal treatments
  Bacteriophages
- Vaccination

Enterohemorrhagic *E. coli* (EHEC)

- O157 serotype most prevalent in North America, may represent newly emerged pathogen
- Very low infectious dose
- In 2002 = 26 outbreaks,
  496 cases, 2 deaths
- Centers for Disease Control and Prevention (CDC) estimates 2000 Americans are hospitalized and 60 die each year as a direct result of *E. coli* infections and its complications

E. coli O157:H7

- *E. coli* O157:H7 have a novel mechanism of adherence to attach to microvilli in the host intestine, forming attaching and effacing (AE) lesions on the epithelial cells

- Bacteria manufacture and inject their own receptor into the host cell to which then can subsequently bind

- Binding of *E. coli* O157:H7 to the host cell is mediated by the following factors which are produced and secreted from the cell via a type III secretion system (TTSS) (encoded on a chromosomal pathogenicity island called the locus of enterocyte effacement (LEE)):

    - Intimin adhesin, Tir, EspA, EspB, EspD and EspF

E. coli O157:H7

- These proteins are injected directly into the mucosal cell causing a modification to the cell structure and the insertion of an intimin receptor (translocated intimin receptor, Tir) into the cell membrane allowing functional adherence and colonization of the mucosal surface

- EspA probably acts as a channel connecting bacteria with epithelial cells

- EspA is not translocated into epithelial cells

- Tir, EspB and EspD are translocated into host epithelial cells

- EspB and EspD are located in the epithelial cell membrane, it is believed that they make pores in the epithelial cell membrane and through the pore the effectors proteins of *E.coli* are introduced into the host cell

E. coli O157:H7 Genome

- Most of the genes involved in the formation of the AE lesions are located on a chromosomal pathogenicity island called the locus of enterocyte effacement (LEE)

- LEE contains five major operons
  - LEE1 (Ler)
  - LEE2
  - LEE3
  - LEE4
  - LEE5 (Tir)

- LEE encodes
  - type III secretion system (LEE1 – LEE3)
  - the intimin adhesin
  - translocated intimin receptor (Tir)
  - other effectors proteins
  - LEE1 encodes the Ler regulator, which activates all the other genes within the LEE