A global Prospective on Infectious Animal Disease Surveillance System

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Outline/disclaimer

- Challenging questions
- Responses which represent my opinion
- Focus on animal diseases – Surveillance concept
- Generate questions and sound discussion/ disagreement

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Surveillance and OVS

[Davies, G. Animal Disease Surveillance. Geering, W. A., Roe, R. T., and Chapman, L. A. Proceedings of the Second ISVEE. p3-10. 1980.]

"Our task is to guide the explosive interest in surveillance into practical channels that can be seen to be producing material that is indispensable to the agricultural industry."

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Surveillance and OVS

[Acha, P. N. A strategy for Veterinary Services to meet the requirements of a changing world. Rev Sci Tech Off Int Epiz. 1987; 6(4):925-945.]

"In recent years, delegates to the OIE have voiced concern about the situation of many Official Veterinary Services (OVS). There is broad agreement on the obsolescence of many OVS in regard to the demands of the animal industry."

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Why is surveillance getting global attention?

- Emerging animal and zoonotic diseases
- Increasing international trade
- Public interest in food quality
- September 11, 2001
- SPS Agreement
- Financial institutions' reactions

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Questions and Challenges

- What are the issues?
- How much do we know about surveillance approaches?
- Why do we care about these issues?

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What is the "official" public health definition of Surveillance?

"... the ongoing systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know..." Centers for Disease Control, 1986

Why do we not define surveillance as a function of data management and analysis?

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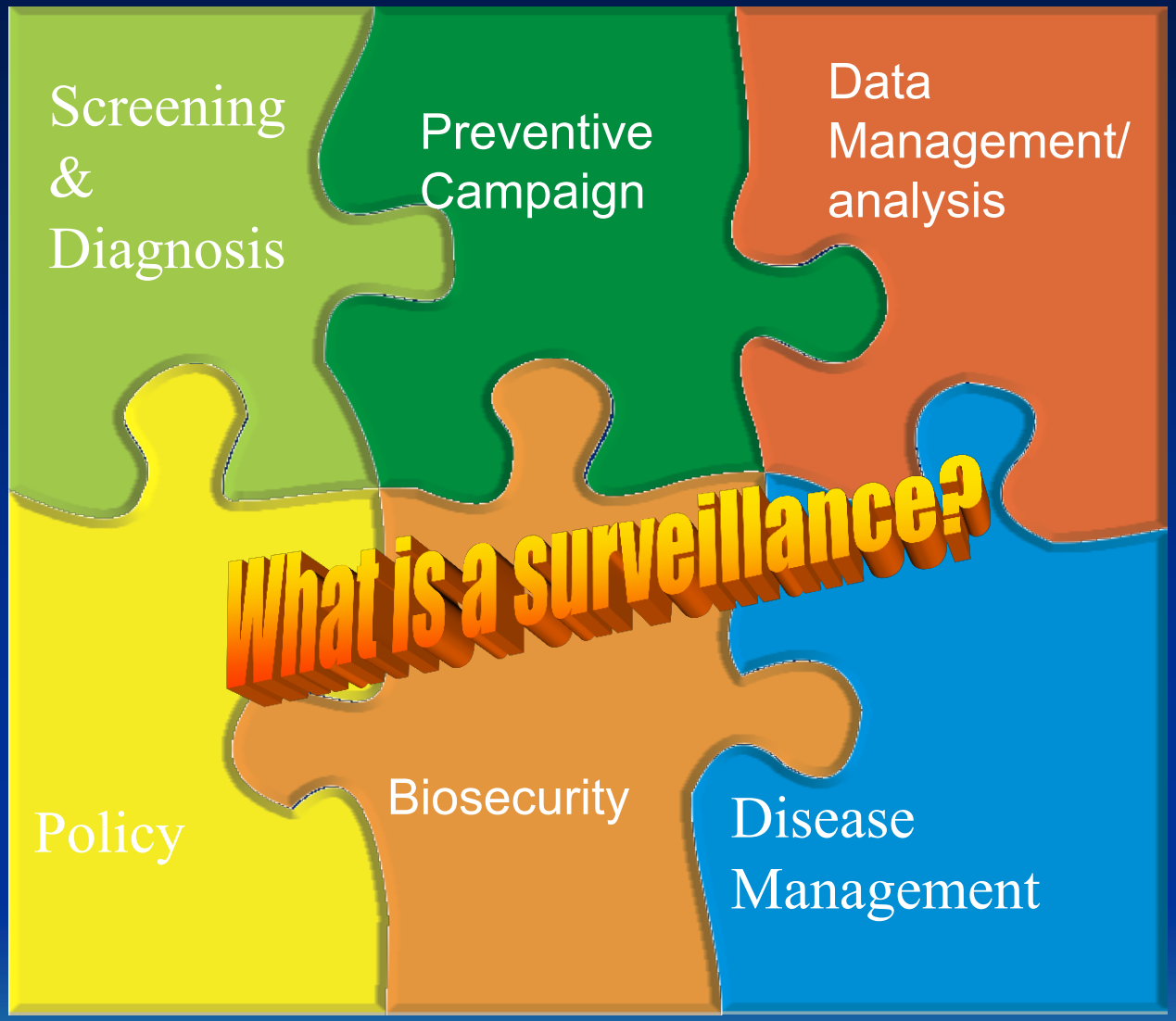

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What are the components of a surveillance system?

- Detection and Response

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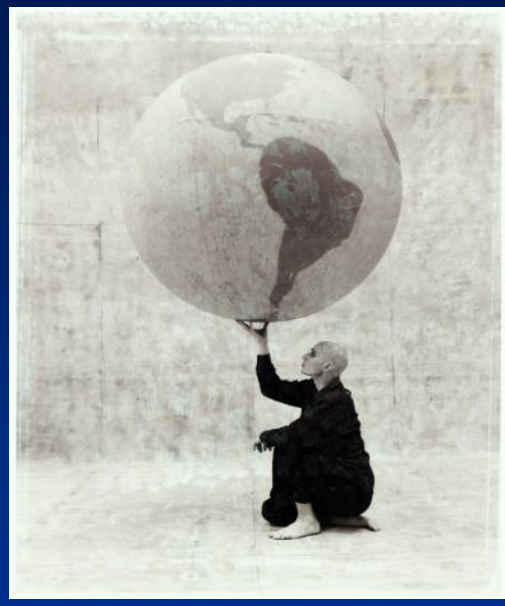
Detection

Testing & Diagnosis

Case Findings

Data Collection

Data analysis



Response

Preparedness

Mitigation

Data analysis

What are the components of a surveillance system?

- A comprehensive surveillance system includes the response to a specific trend with the appropriate plan of action.
- A successful plan includes the ability to communicate among the many organizations involved.

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What are the limitations of current attention to animal disease surveillance?

- Human and financial resources are becoming more and more limited in many countries.
- Issues that present higher risks merit higher priority. Other diseases are ignored.
- Limited technical knowledge in establishing and implementation of comprehensive surveillance.

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What is risk-based surveillance?

Stärk KD et al., 2006

- The aim is to set priorities, and to allocate resources effectively and efficiently.
- A certain sub-population of interest have a higher probability to be sampled for detection of diseases or hazards.
- An important goal is to achieve a higher benefit-cost ratio with existing or reduced resources.

What is risk-based surveillance?

Stärk KD et al., 2006

- It is implementation of risk assessment methods in the design of the surveillance.
- Public health, economic and trade consequences of diseases play an important role in selection of diseases or hazards.

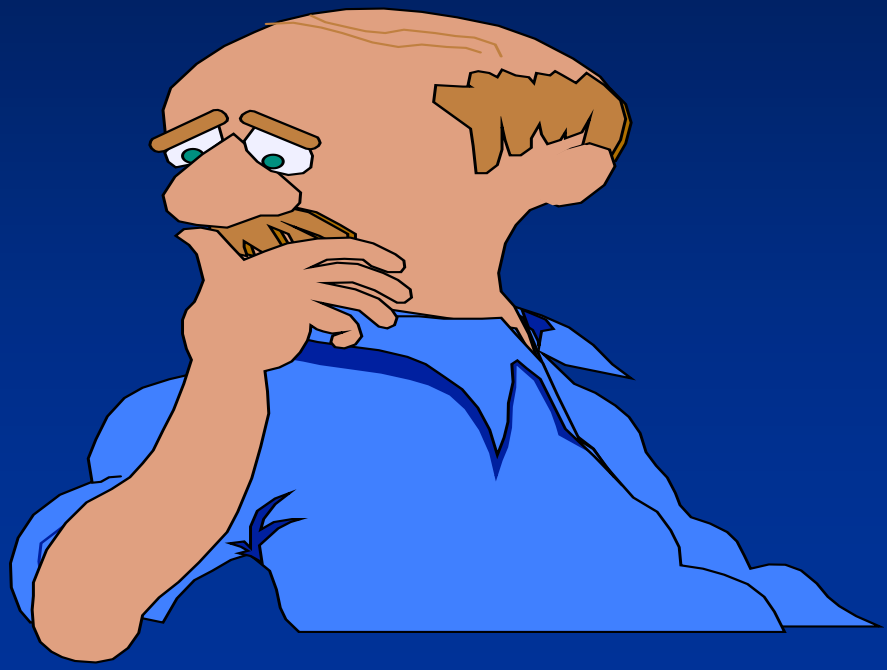
What is the link of surveillance to risk assessment?

- Risk assessment is a critical component of the entire risk analysis in epidemiology.
- Risk assessment is not qualified to be labeled as a discipline. It is an integration of several disciplines and approaches.
- Animal health risk analysis cannot be done without surveillance data and observations.
- Understanding the means of disease transmission require observations through the surveillance system.
- Effect of mitigation measures require knowledge about the effectiveness of these measures.

What is syndromic surveillance?

- Utilizing “syndrome” as a proxy for a disease or a group of diseases.

- An old concept for practicing good veterinary medicine.



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What is syndromic surveillance?

- A term “borrowed” recently by human health professions as a “new approach”.
- Most animal diseases require syndromic surveillance.
- Confirmation of the disease or group of diseases is still required.

What is the link of surveillance to database management?

- Data are essential components of reliable surveillance.
- Managing and analyzing the generated data by surveillance require a trustworthy database.

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What is the link of surveillance to database management?

- Reporting outcomes from a surveillance system is an essential step in maintaining the surveillance.
- Database management of surveillance data is NOT the entire surveillance system as it has been used in most developed countries.

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What is a warning system?

- Preparedness for “unexpected” event or circumstance
- Prior knowledge required about the expected (baseline) so that the unexpected can be recognized
- Surveillance essential component for a reliable warning system for diseases and health events

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How can warning systems be assessed?

- Warning systems should be assessed in the same manner as diagnostic systems.
- A threshold point is critical in this assessment.
- The use of Receiver Operator Curve (ROC) can play a major role in this assessment.
- Little has been done in this field.

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Validity of a warning system

Surveillance Outcome	Disease Present	Disease Absent	
Response			Yes
No response			No

Validity of a warning system

Surveillance Response Result	Disease	No- Disease
	Power	False Alarm
No response	Late action	**Confidence**

Sensitivity of the system = power

Specificity of the system = confidence

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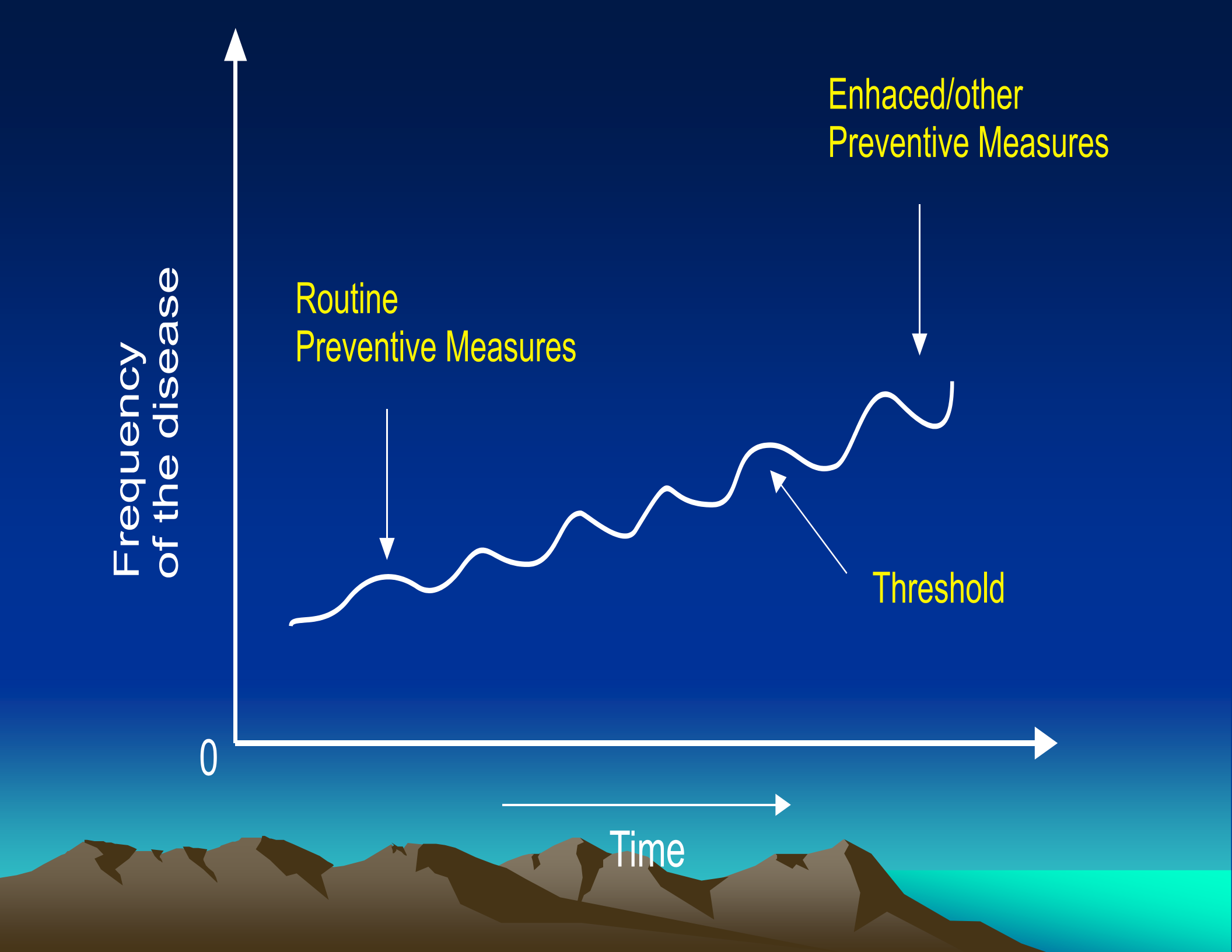
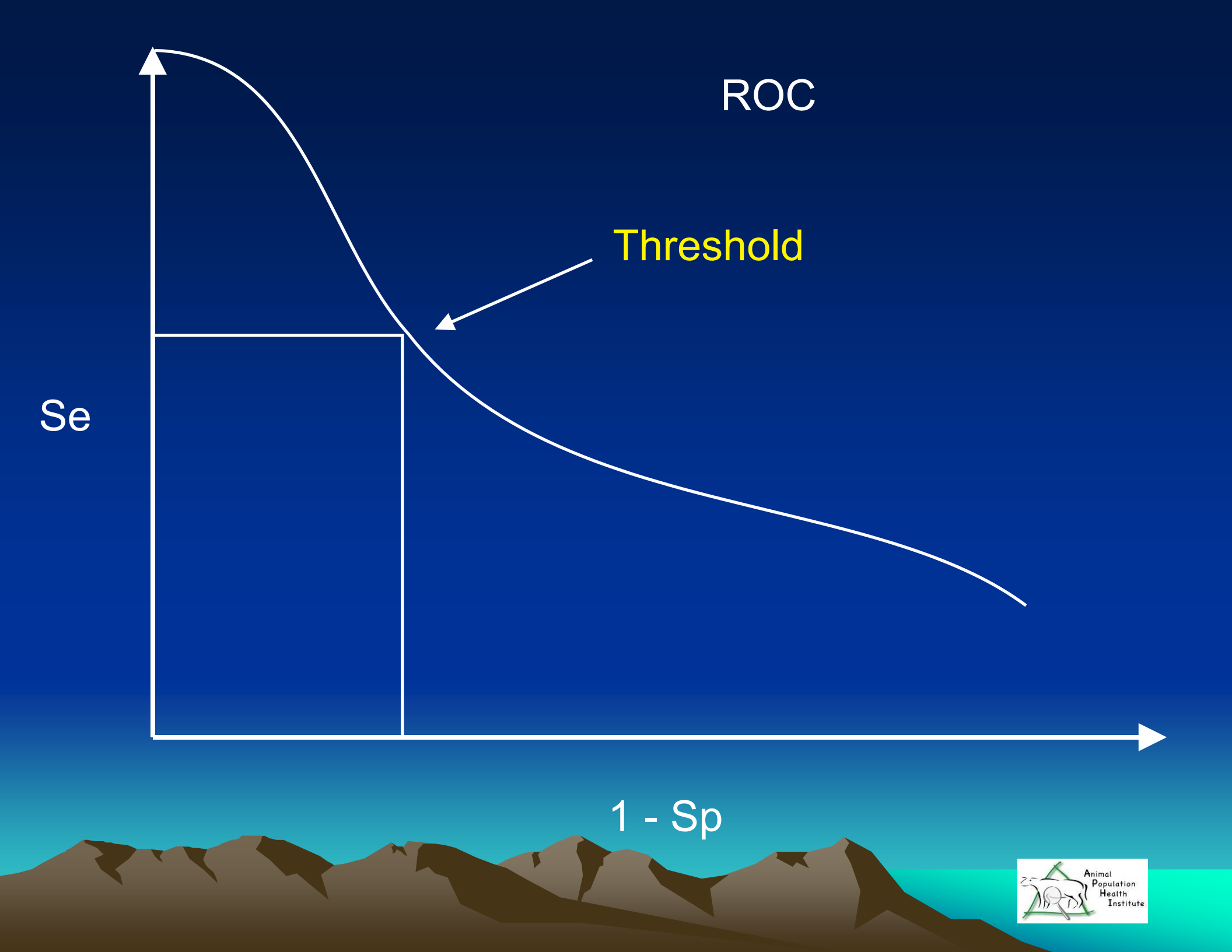

Enhaced/other
Preventive Measures
Routine
Preventive Measures
Frequency
of the disease
Threshold
0
Time


ROC
Threshold
Se
1 - Sp
Animal
Population
Health
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The success of a warning system is influenced by specific factors:

- The surveillance system
- The dependency of the various components of the surveillance system e.g. early detection, “ routine” preventive measures, etc.
- The threshold point for activation of the warning response

What are the epidemiological tools to compare various surveillance systems?

	Country A	*Country B*	*Country C*
Passive surveillance (Se1)	0.6	0.7	0.6
Survey (Se2)	0.95	0.90	0.73
Slaughter surveillance (se3)	0.75	0.75	0.5
Overall system SE	0.995	0.992	0.947

1-((1-SE1)*(1-SE2)*(1-SE3))

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Prioritizing surveillance activities

A suggested approach

Prioritization working group

- Representative of different interest groups
  - Government, both Local and Central
  - Other authorities responsible for surveillance
  - Different animal industries
    - Producers
    - Food processors

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Identification of evaluation criteria

- Several criteria exist.
- In general, choose those with the greatest impact on producers and on public health.

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Prioritization matrix

		Public health	Production impact	Feasibility of control	Cost	Impact on trade products	Impact on trade animals
	Weight factor	**2**	**1**	**1**	**1**	**0.5**	**0.25**
High	**3**		CSF	CSF		CSF	CSF
Medium	**2**		BT		CSF BT		BT
Low	**1**			BT			
None	**0**	CSF BT				BT	

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How can a surveillance system support disease freedom status?

Critical components for a successful "classification" of disease freedom is a comprehensive surveillance system.

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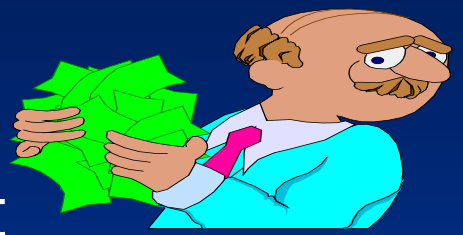
Bottom Line

- The SPS equals to “open” trade
- Health issue can be considered a hurdle!!
- OIE recommendations may play a role but the main issue is that the two trade partners accept the status.
- Requires scientific evidence.
- Risk-based approaches have been used to demonstrate such evidence.



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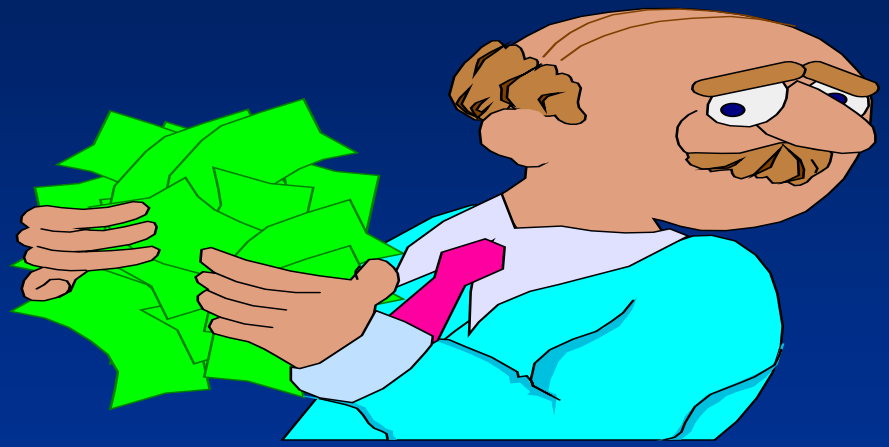
How a researcher can help in disease freedom status?

- Develop and implement scientifically-based survey and surveillance systems.
- A comprehensive approach to assess the certainty degree of findings from survey systems in declaring a country/region free of a disease.



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How can a researcher assesses the quality of a surveillance system?

- Sensitivity
- Specificity
- Representativeness
- Timeliness
- Simplicity
- Flexibility
- Acceptability

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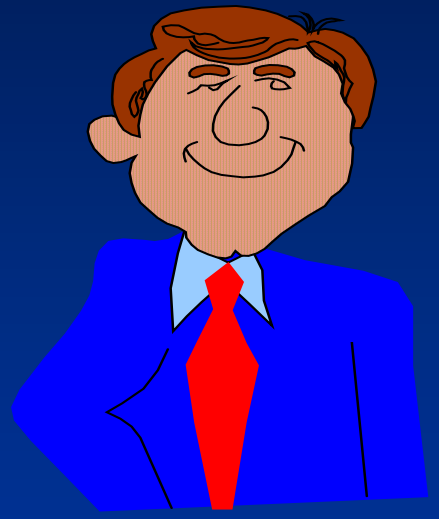
How is surveillance recognized by the decision makers?



- No surprise with limited embarrassment
- Involvement and awareness of the various stages of the system
- Regular reporting of the outcome and early warning system
- Options with their sequences instead of a single action plan

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The Challenge

- Surveillance is under the spotlight
- Increasing demands on implementation of surveillance in the animal health arena
- Demonstration of animal health status

However...

- Reduction of public spending
- Veterinary services often not top priority
- Decreasing budgets for veterinary services
- Weak infrastructures
- Difficulty to obtain funding for surveillance

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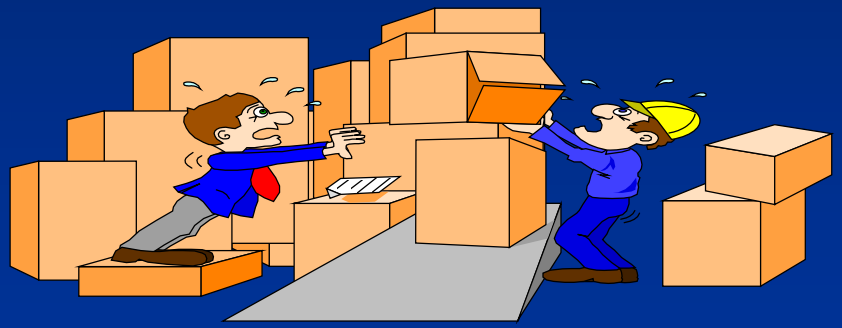
Conclusion

- **Surveillance is an essential component of a successful animal health program.**
- **Surveillance requires a well thought out process before the system is implemented.**
- **A surveillance system should include the response plans.**
- **Field operation is an important ingredient for an effective surveillance system.**



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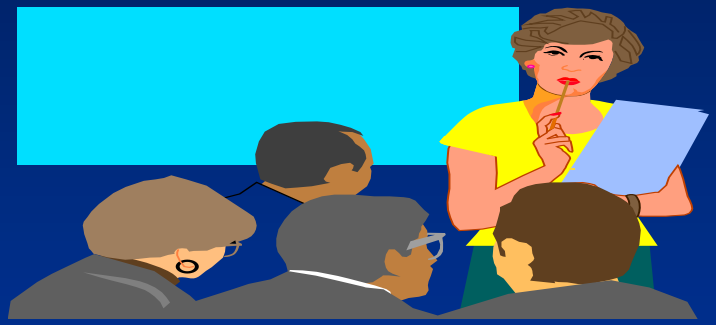
Conclusion

- **Effective systems are founded on comprehensive approaches that have been designed to meet pre-defined aims.**



- **These aims channel results of disease-monitoring into actions or products that are needed by the public.**

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Conclusion

- **The surveillance system should include an early warning system for unexpected events.**
- **Prioritizing of inclusion of diseases in a surveillance system should be assessed with prior established criteria agreed upon by all involved parties.**

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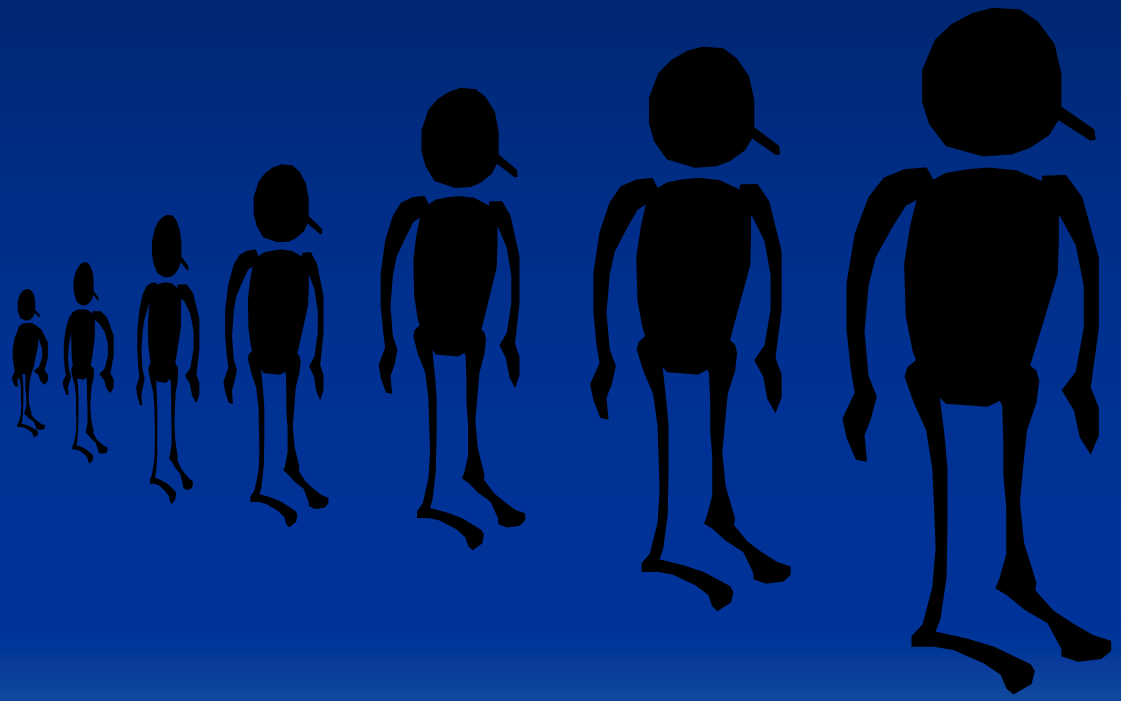
Contributions

- Ian Gardner
- Cristobal Zepeda
- Brian McCluskey



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Any questions?