The Challenges of Diagnosing Avian Influenza

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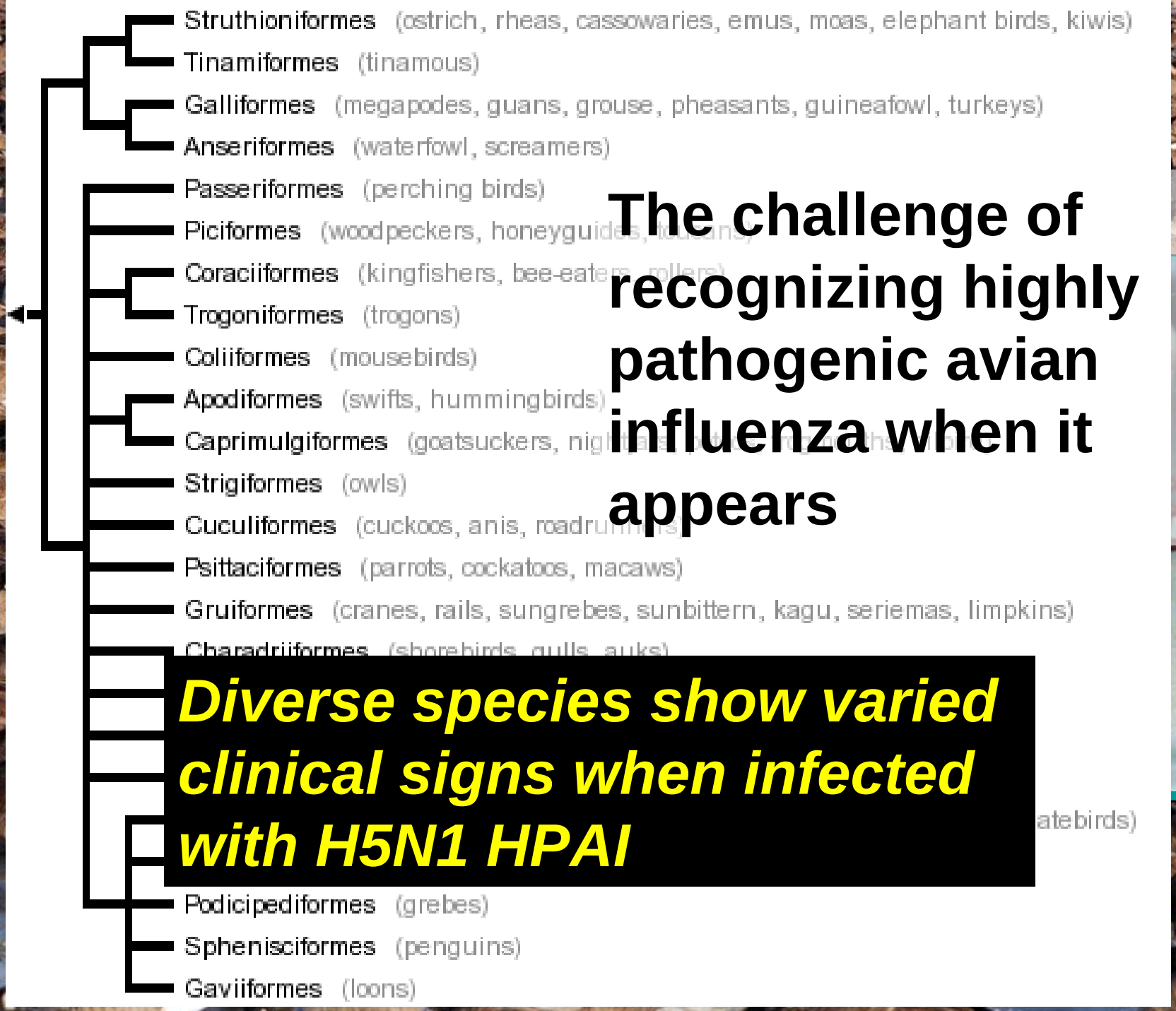

The challenge of recognizing highly pathogenic avian influenza when it appears

Diverse species show varied clinical signs when infected with H5N1 HPAI

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The challenges of testing

Varied diets can mean variable results.

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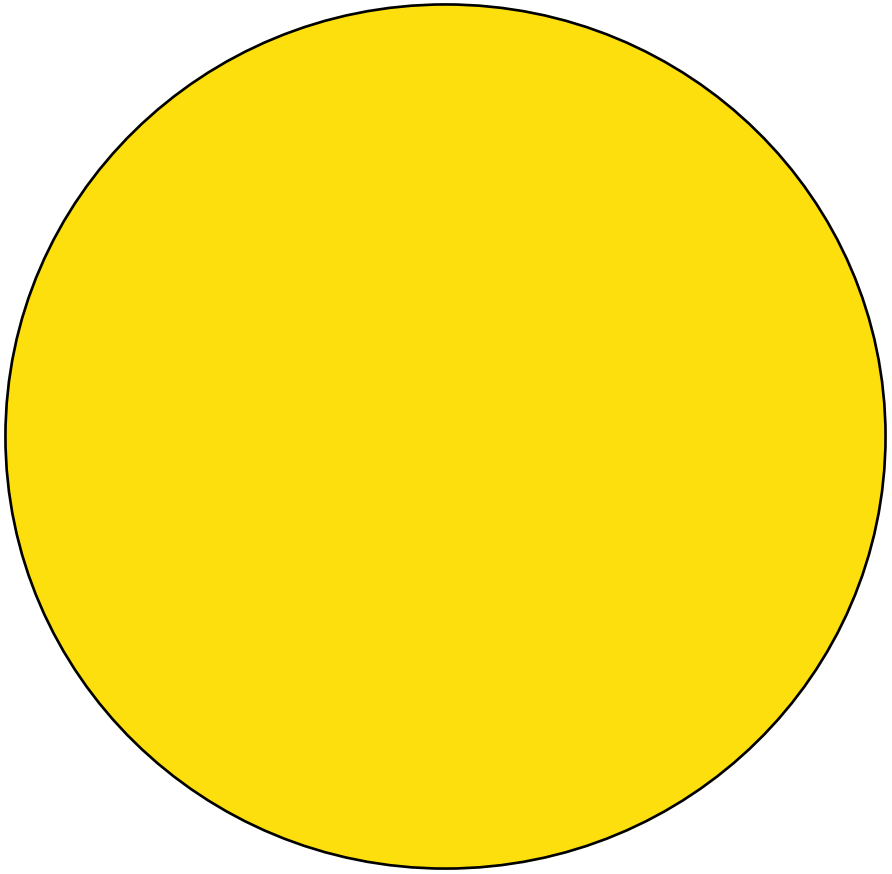
The challenges of testing

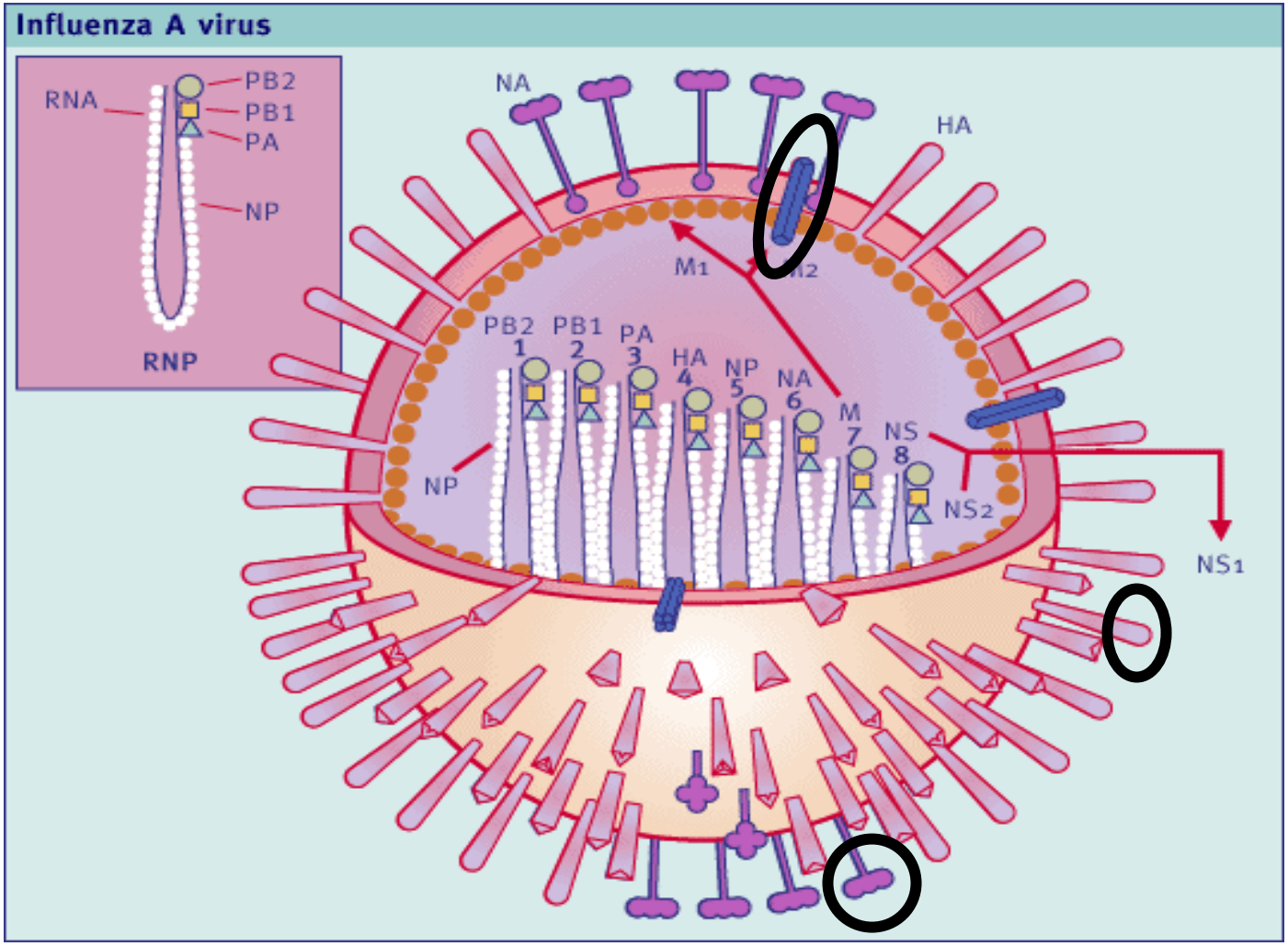
- **The application of diagnostic tests can be challenging in some environments**

The challenges of testing



…trying to hit a moving target.

The challenges of testing



Avian influenza

Conserved proteins:

M = Matrix

NP=Nucleoprotein

Virus subtype

Surface Proteins:

HA = Hemagglutinin

NA = Neuraminidase

H1-16; N1-9

…multiple tests are required.

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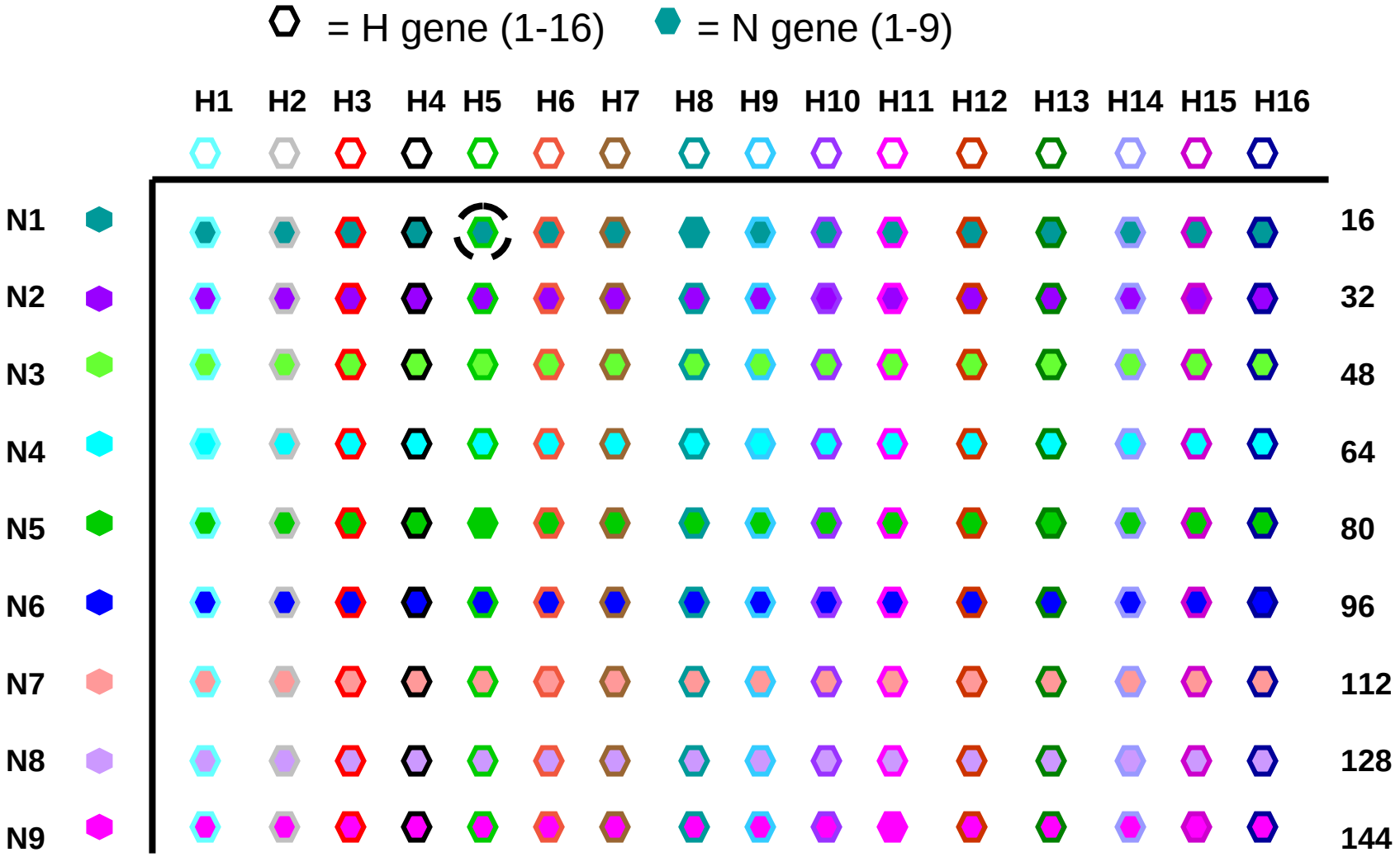
Avian Influenza Virus Subtypes



Numerous variations are possible.

What we're doing at FAZD with avian influenza

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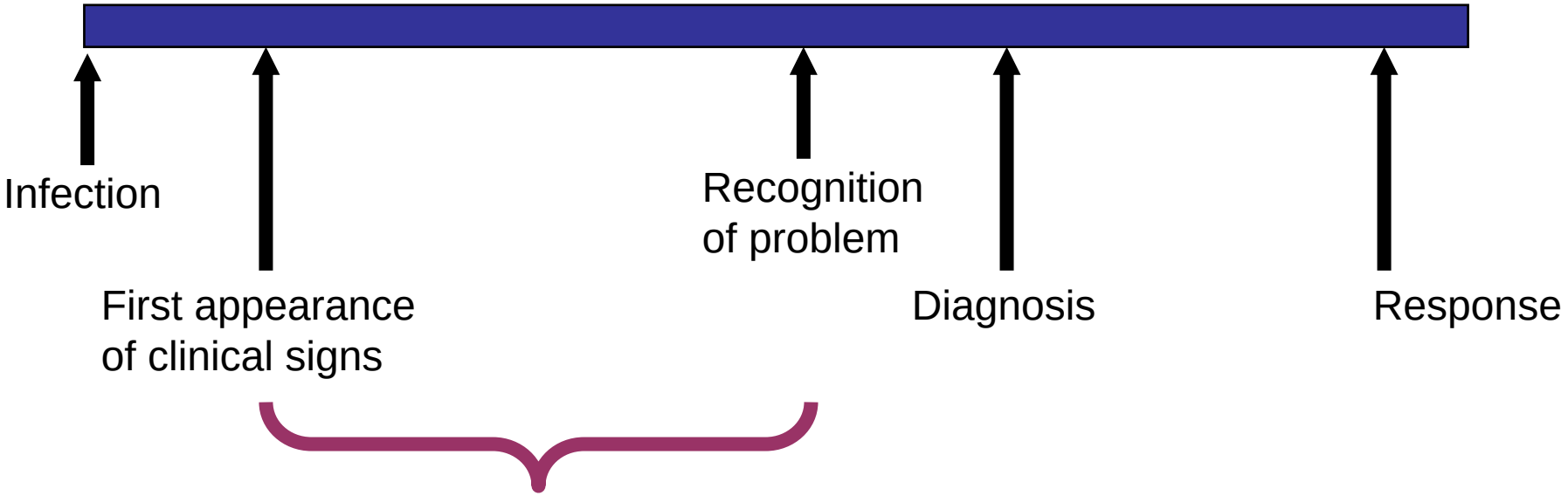
The need for a rapid diagnosis

- **Containment of an outbreak, requires a rapid response**



Avian Flu School

Rapid detection of morbidity and mortality events.

Getting information to the people working with poultry populations at risk.

http://www.vetmed.ucdavis.edu/whc/flu_school/index.html

Qué aspecto tienen las aves con gripe aviar mala?

La gripe aviar mala mata a muchas aves. Una bandada con gripe aviar mala tendrá muchas aves enfermas, moribundas y muertas.

Muchas aves muertas

Aves débiles y moribundas

Las aves con gripe aviar mala tienen a veces las cabezas hinchadas y la piel azul.

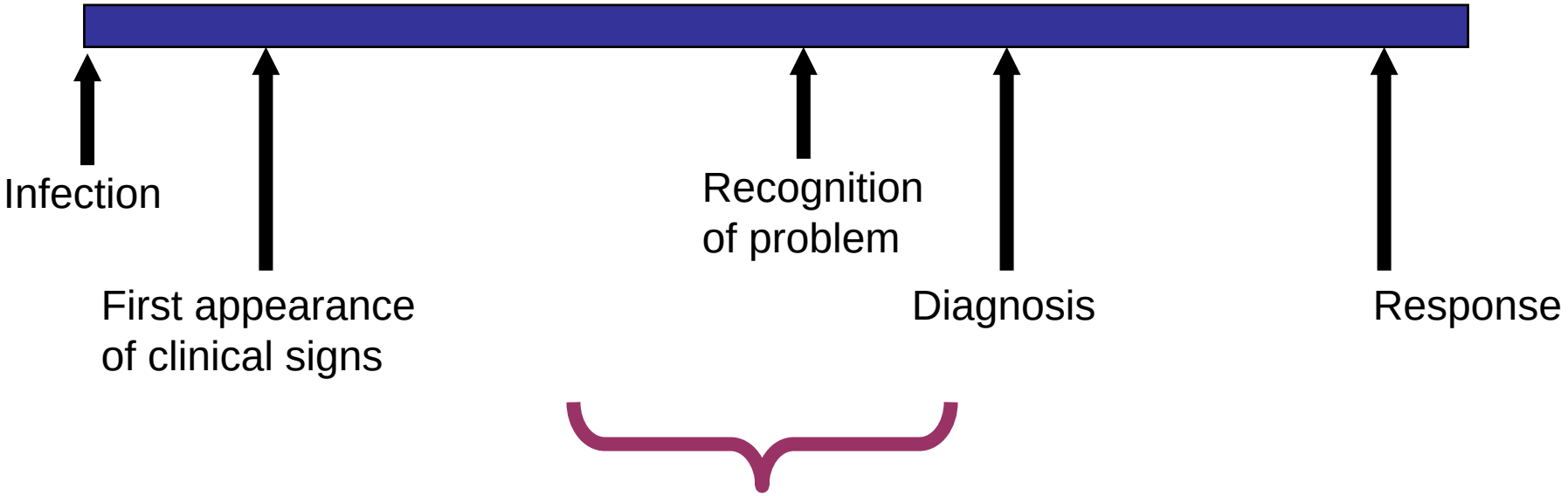
Cresta azul

Cabeza y cara hinchadas

Si ve cualquiera de estos síntomas, llame inmediatamente a:

The need for a rapid diagnosis

- **Containment of an outbreak, requires a rapid response**



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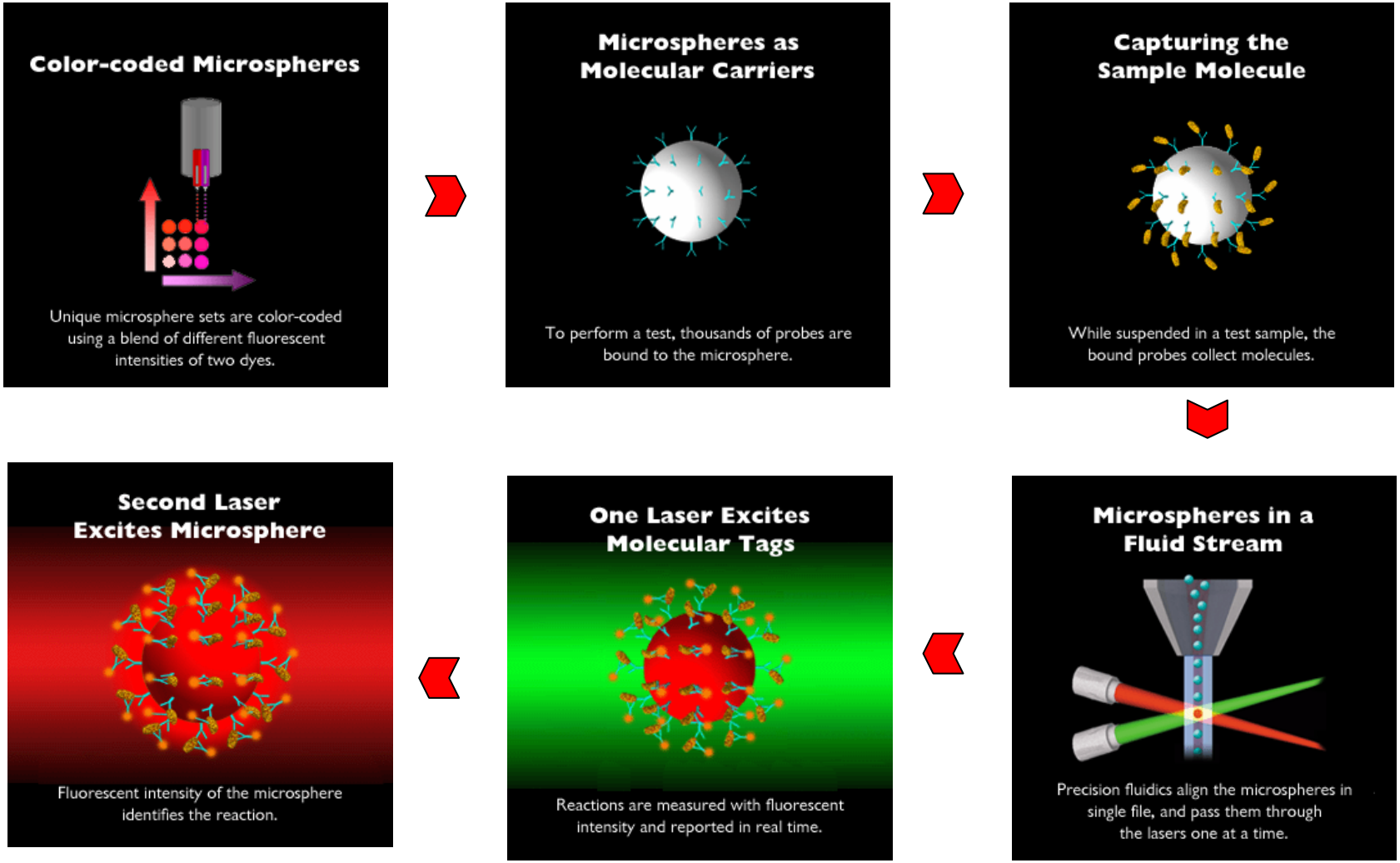
Luminex bead immunoassay



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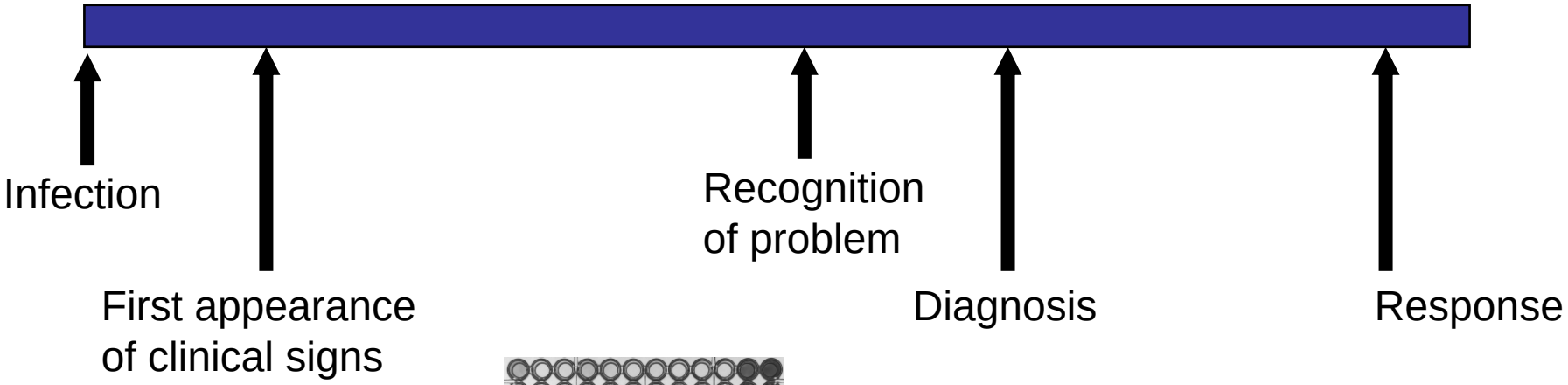
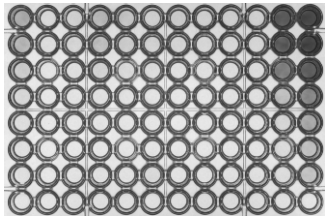
Why a multiplex bead assay?

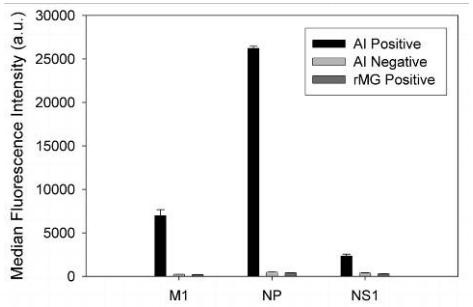
- Detect antibodies to all relevant AI proteins in a single sample
  - NP, NS1, M1, HA (16), NA (9)
  - Assess efficacy of vaccination
  - Distinguish vaccinated from infected birds (DIVA)
  - Profile exposure to all avian influenza subtypes (HA, NA)
- Additional advantages
  - Use minimal sample (< 1 μl serum)
  - Improve sensitivity and specificity
  - Reduce assay time (solution-phase kinetics)
  - High-throughput 96 well plate format

The need for a rapid diagnosis

- **Containment of an outbreak, requires a rapid response**







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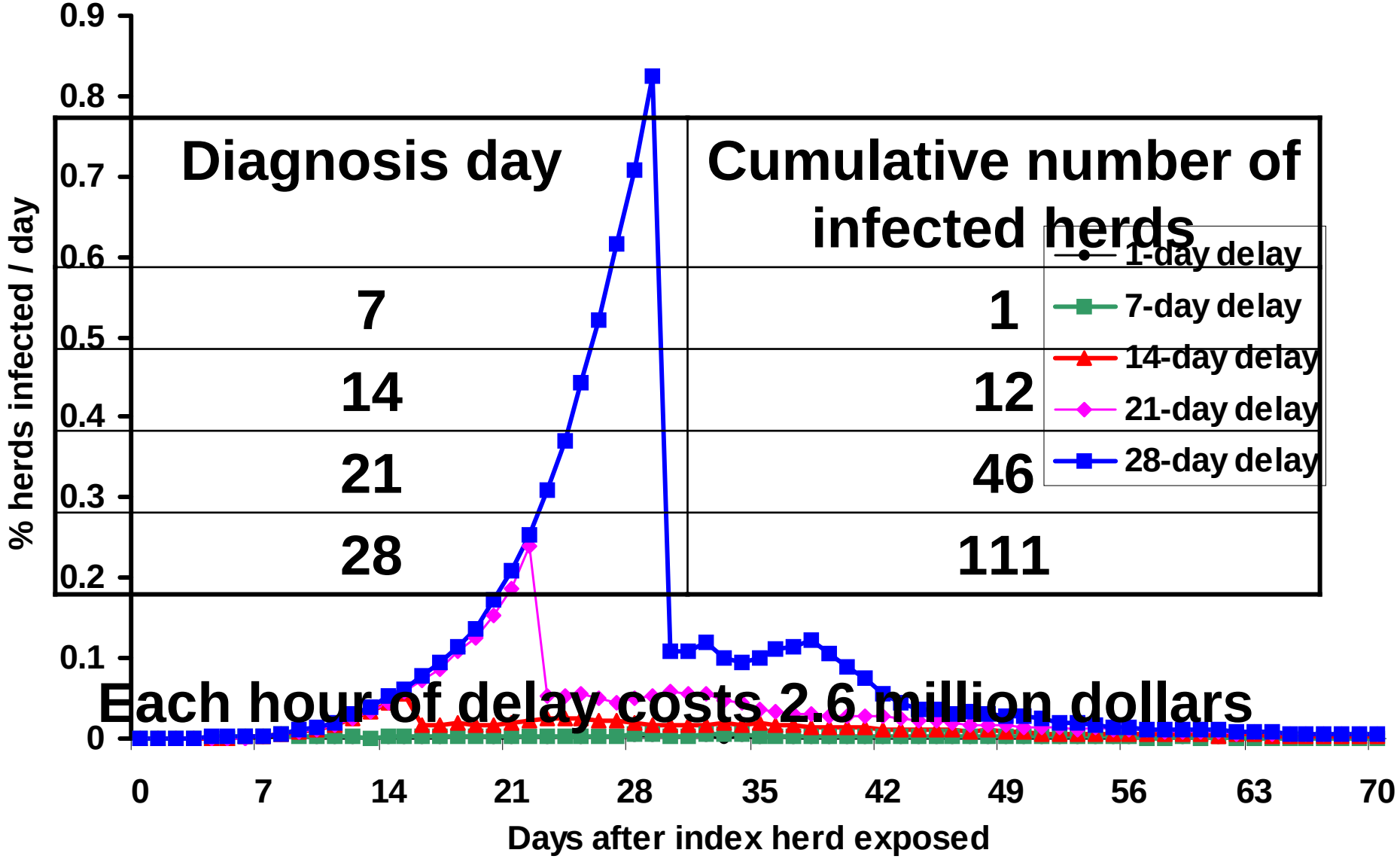
Delay increases prevalence and detection cost



Diagnosis day	Cumulative number of infected herds
7	1
14	12
21	46
28	111

Each hour of delay costs 2.6 million dollars