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Poultry Producers' Association of Namibia
Windhoek

15 March 2018

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Avian Influenza

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AI

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Contents

- The Virus
- Human Health Implications
- Spread
- What happened in RSA
- Prevention

The Virus

- Virus
- Segmented, negative sense, single stranded RNA virus
- Genus *Influenza A*
- Family *Orthomyxoviridae*

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The Virus

- Type A Influenza virus
- 8 Different genes
  - PB2
  - PB1
  - PA
  - HA
  - NP
  - NA
  - M
  - NS
- Where does H and N come from

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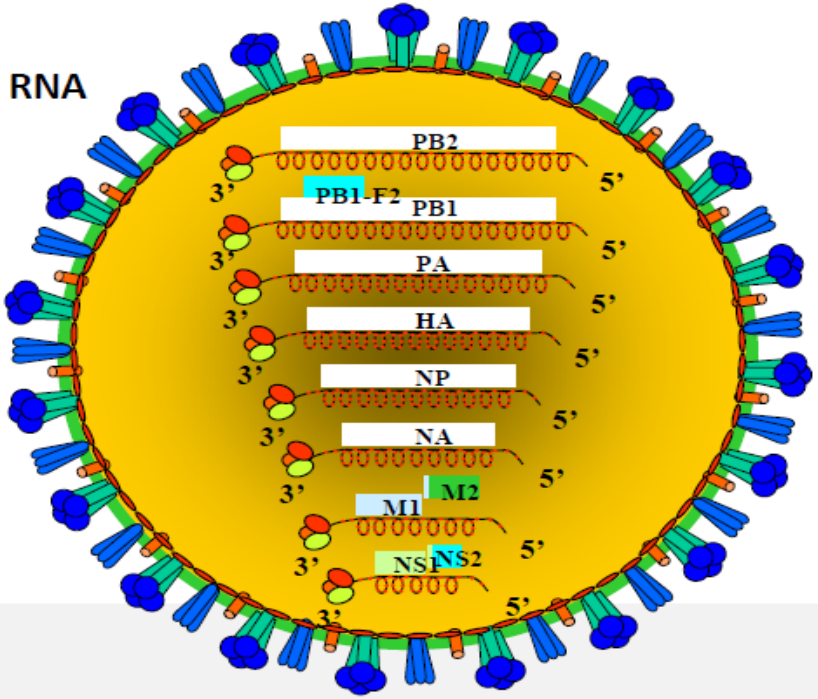
The Virus

- Type A Influenza virus
- 8 Different genes
  - PB2
  - PB1
  - PA
  - **HA**
  - NP
  - **NA**
  - M
  - NS

Influenza A virus

- Family: *Orthomyxoviridae*
  - Segmented, single-stranded, negative sense RNA
    - *Influenza A, B, C virus*
    - *Thogovirus, Itovirus*
- Eight segments encode for at least 13 proteins
  - Membrane proteins
    - HA, NA, M2
  - Internal proteins
    - PB2, PB1, PA, NP (vRNP)
    - NEP
    - M1
  - Non structural proteins
    - NS1
    - PB1-F2
    - PA-X



From:
Encyclopedia of Molecular Mechanisms of Disease:
Mundt, 2008

Courtesy of Dr. Egbert Mundt Boehringer Ingelheim Animal Health

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The Virus

- 15 Different HA
- 9 Different NA
- Any combination is possible and that is only 2/8

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The Virus

- Low Pathogenic Avian Influenza LPAI
- Highly Pathogenic Avian Influenza HPAI

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The Virus

- Low Pathogenic Avian Influenza LPAI
- Highly Pathogenic Avian Influenza HPAI

- ALL HAS TO DO WITH THE HA PROTEIN

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The Virus

- Haemagglutinin Protein

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The Virus

- Haemagglutinin Protein
- To enter chicken HA must be activated
- Use the chicken enzyme

The Virus

- Haemagglutinin Protein
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- LPAI
  - Only in the respiratory tract and intestine

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The Virus

- Haemagglutinin Protein
- To enter chicken HA must be activated
- Use the chicken enzyme

- LPAI
  - Only in the respiratory tract and intestine

- HPAI
  - All cells = whole body

The Virus

- HPAI
- Mortality patterns
  - Slow and then explodes

Courtesy Dr. Greg Cilliers

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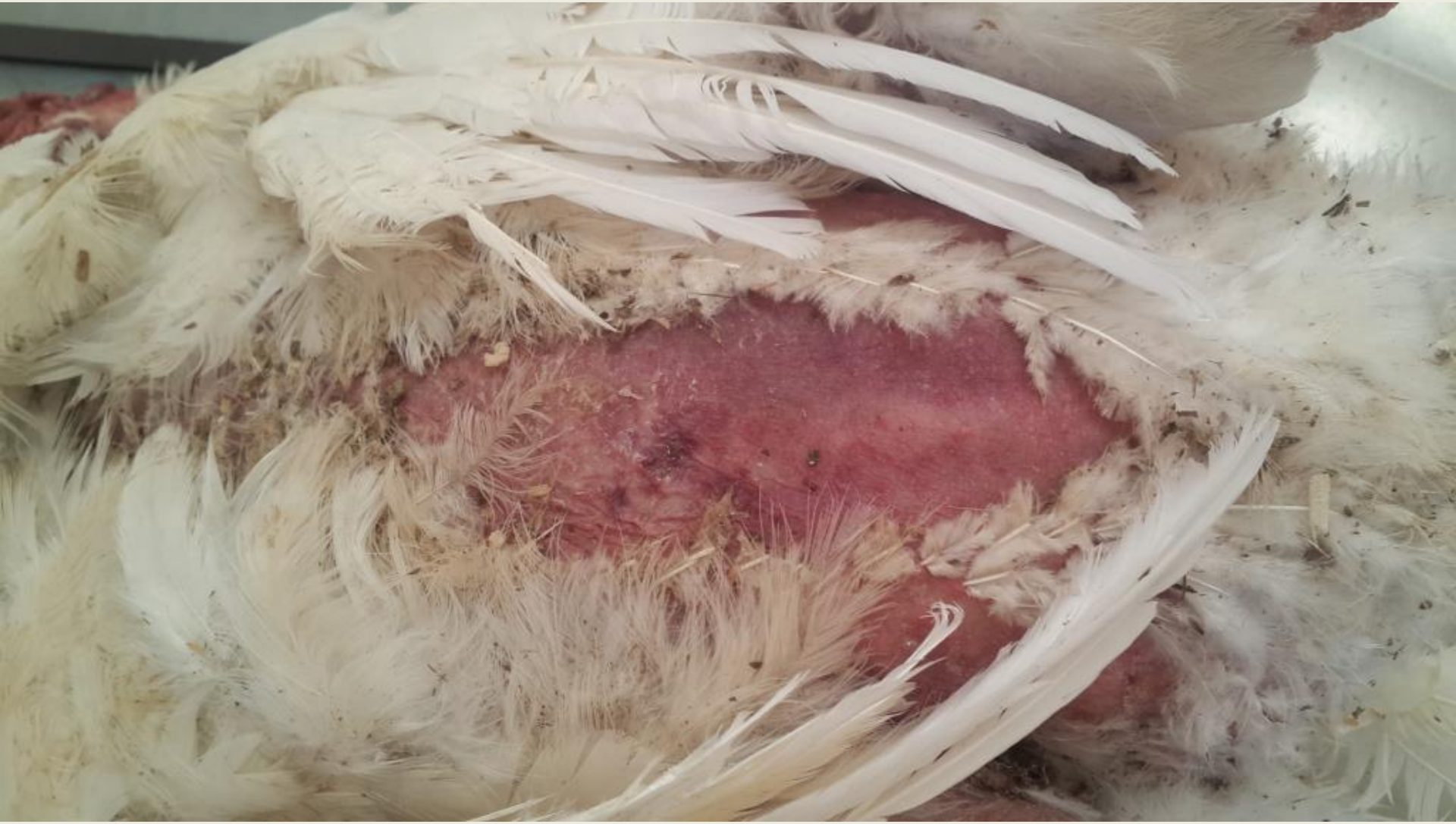

Courtesy Prof. Neil Duncan

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Human Health

- What makes this different from Human Flu?

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Human Health

- What makes this different from Human Flu?
- Not much….

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Human Health

- What makes this different from Human Flu?
- Not much….
- Humans get Types **A**, B and C
- The species affected has to do with the receptor to which the virus initially binds

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Human Health

- AI binds to α2,3 linkage on the sialoligosaccharide receptor
    - Only birds
- Human Flu binds to α2,6 linkage on the sialoligosaccharide receptor
    - Not birds

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Human Health

- Can mutate to infect humans
- Humans will be naïve
- Huge death rate
- This is most likely what caused the Spanish Flu
- 50 million people

Niall P. A.S. Johnson and Jeurgen Mueller (2002) Updating the Accounts: Global mortality of the 1918-1920 “Spanish” Influenza. Bulletin of the History of Medicine 76 (1) 105 - 115

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Spread

- Very fast
- Wide variety of birds
- Different degrees of virulence
- 100% infection but +- 20% mortality
- Migration - Flyways

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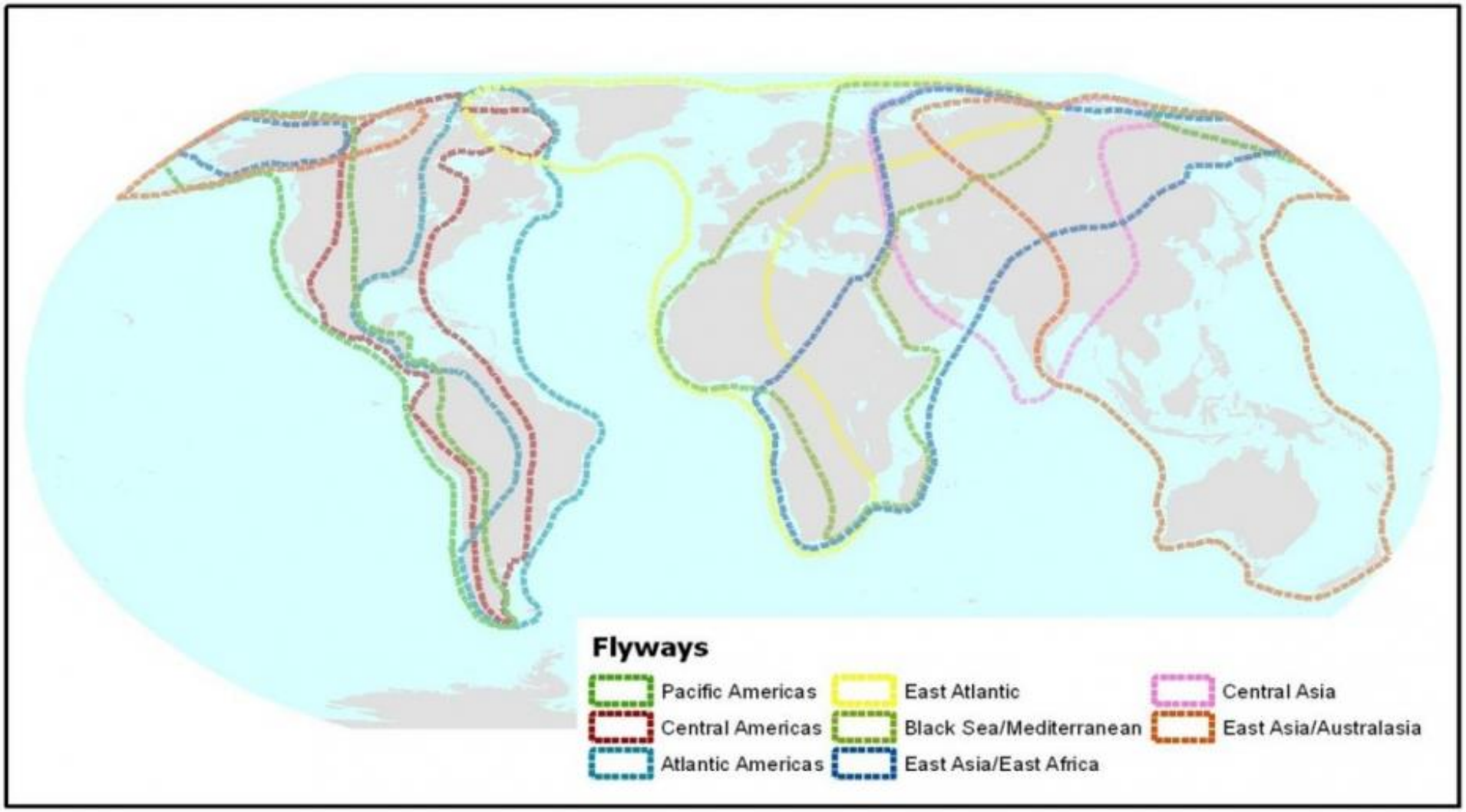
Spread



- http://www.birdlife.org/sites/default/files/worldsflyways.JPG - 8 March 2018

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Spread

- 19th Century
- 1959 – 1998
  - 23 million birds affected
- 2013 - 2017
  - 117 million birds affected[1]

[1]OIE Situation report for Avian Influenza 25 January 2018

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Spread

Region	Losses
Africa	8,272,838
Americas	28,219,734
Asia	67,120,439
Europe	13,686,568
Oceania	490,000
Total	117,789,579

[1]OIE Situation report for Avian Influenza 25 January 2018

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Spread

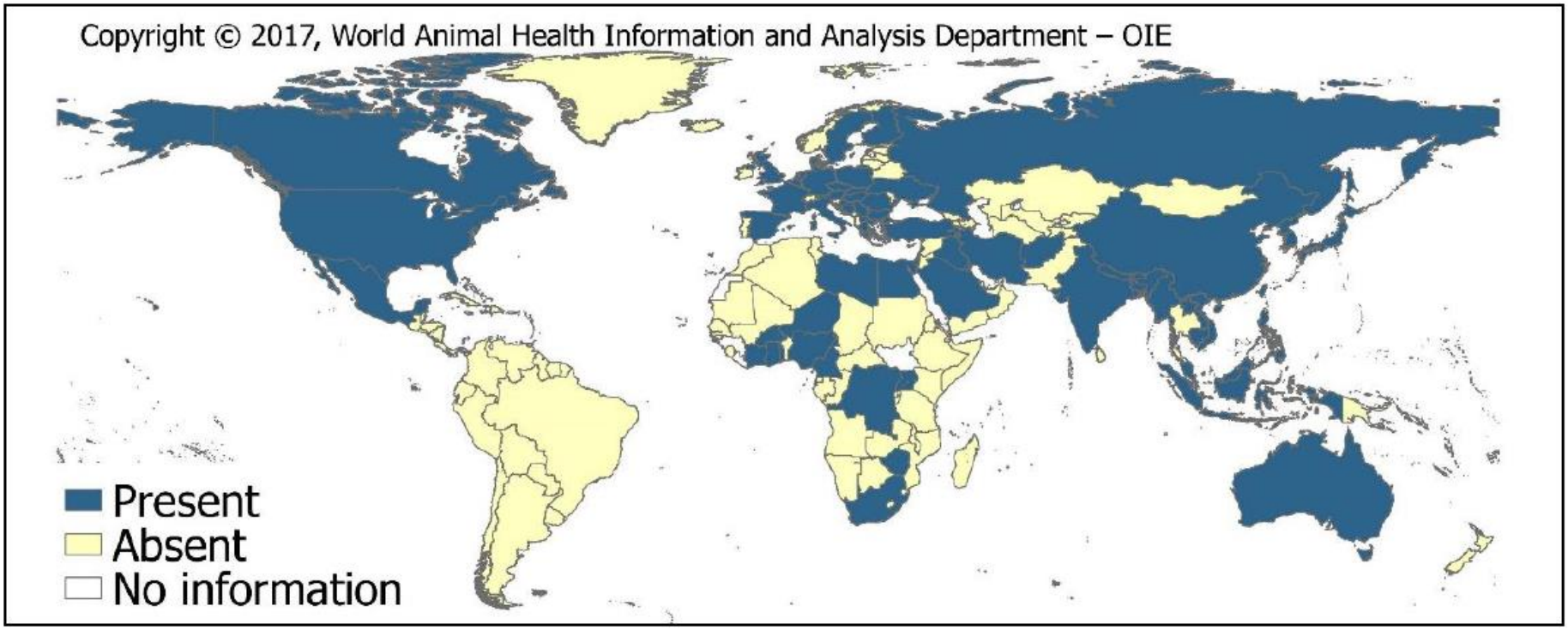

Figure 1. *Countries affected at least once by HPAI outbreaks in domestic birds, 2013-2017.*

[1]OIE Situation report for Avian Influenza 25 January 2018

South African Outbreak

- First case was on 19 June 2017
- Close to the Vaal River

South African Outbreak

- Why then?

- Winter in RSA
- Migratory birds are back in Europe

South African Outbreak

- My opinion

- September 2016 birds arrive from Europe
- Interact with native birds
- Waterfowl breeding grounds
- March 2017 migratory birds leave
- Winter – low rainfall ; less food

South African Outbreak

- My opinion

- September 2016 birds arrive from Europe
- Interact with native birds
- Waterfowl breeding grounds
- March 2017 migratory birds leave
- Winter – low rainfall ; less food

- Birds come closer to houses

South African Outbreak

- My opinion

- Virus in droppings
- Virus survives better in the cold
- UV light less intense
- Easier to get into the houses

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South African Outbreak

- Genetic analysis of the virus
- 5 different introductions of the virus
- 4 of these were localized.
- One of the strains was able to spread more from farm to farm – Western Cape

South African Outbreak

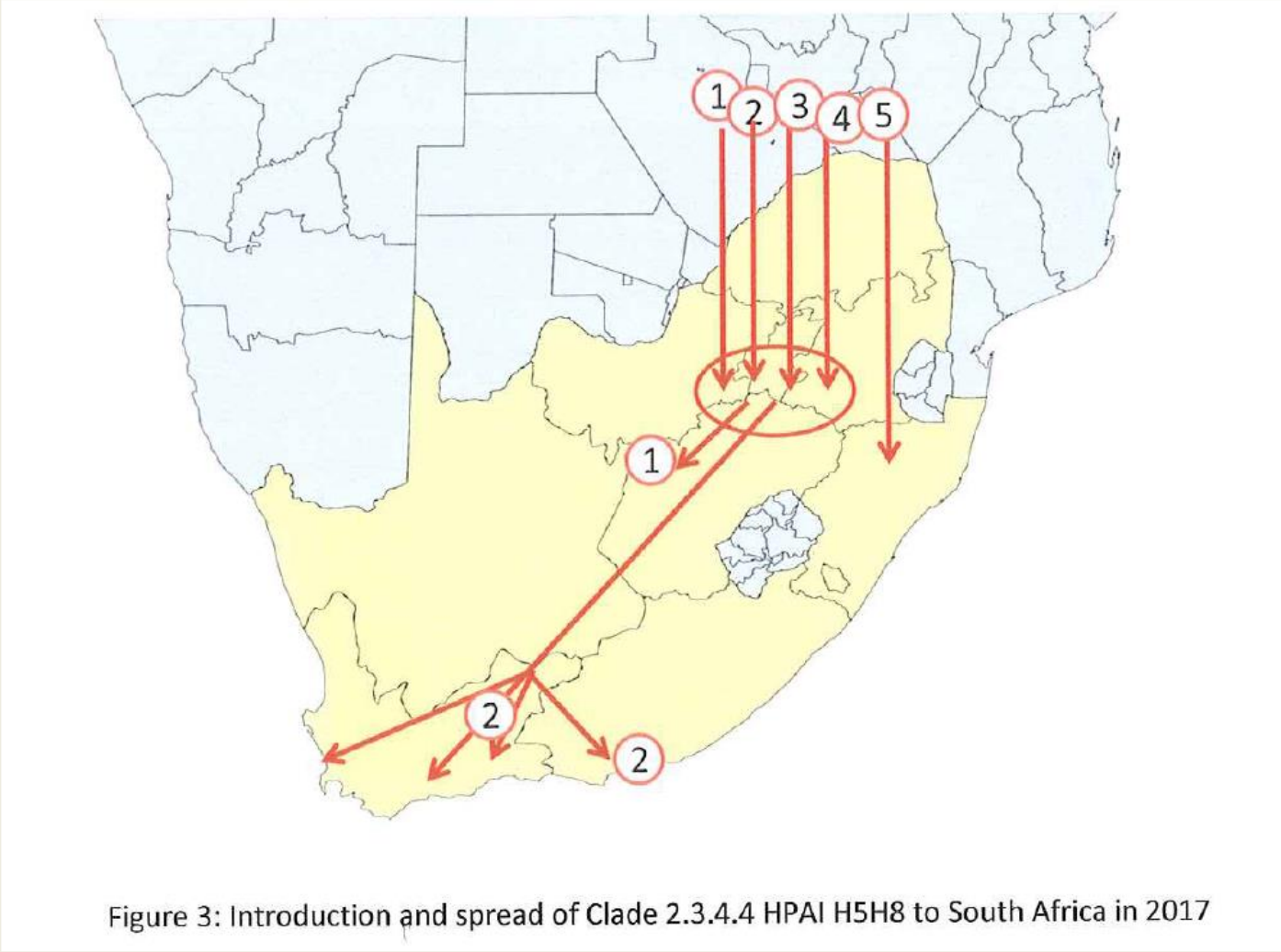

Figure 3: Introduction and spread of Clade 2.3.4.4 HPAI H5H8 to South Africa in 2017

Courtesy of Prof. Celia Abolnik, University of Pretoria

South African Outbreak

- 155 different locations tested positive – 119 Western Cape
  - 30 Commercial
  - 43 Ostrich
  - 10 Backyard
  - 19 Zoo/Hobby
  - 53 Wild Birds

- Avian Influenza: HPAI H5N8 outbreak and surveillance update report 1 March 2018; compiled by DAFF Directorate: Animal Health

South African Outbreak

4,5 million commercial birds

R 954 million

Control

- Direct contact between birds
- Faeces

- Fomites

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Control

- Direct contact between birds
- Faeces

- Fomites
  - Fancy word for things the virus can be on

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Control

- Birds
- Water
- People
- Clothing
- Equipment
- Vehicles
- Eggs
- Boxes

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Control

- Can survive for at least 35 days at 4°C
- For at least 7 days at 20°C in manure and can be isolated from dam water where waterfowl are present.
- The virus can survive for up to 23 days if refrigerated and for several days in carcasses at ambient temperature.

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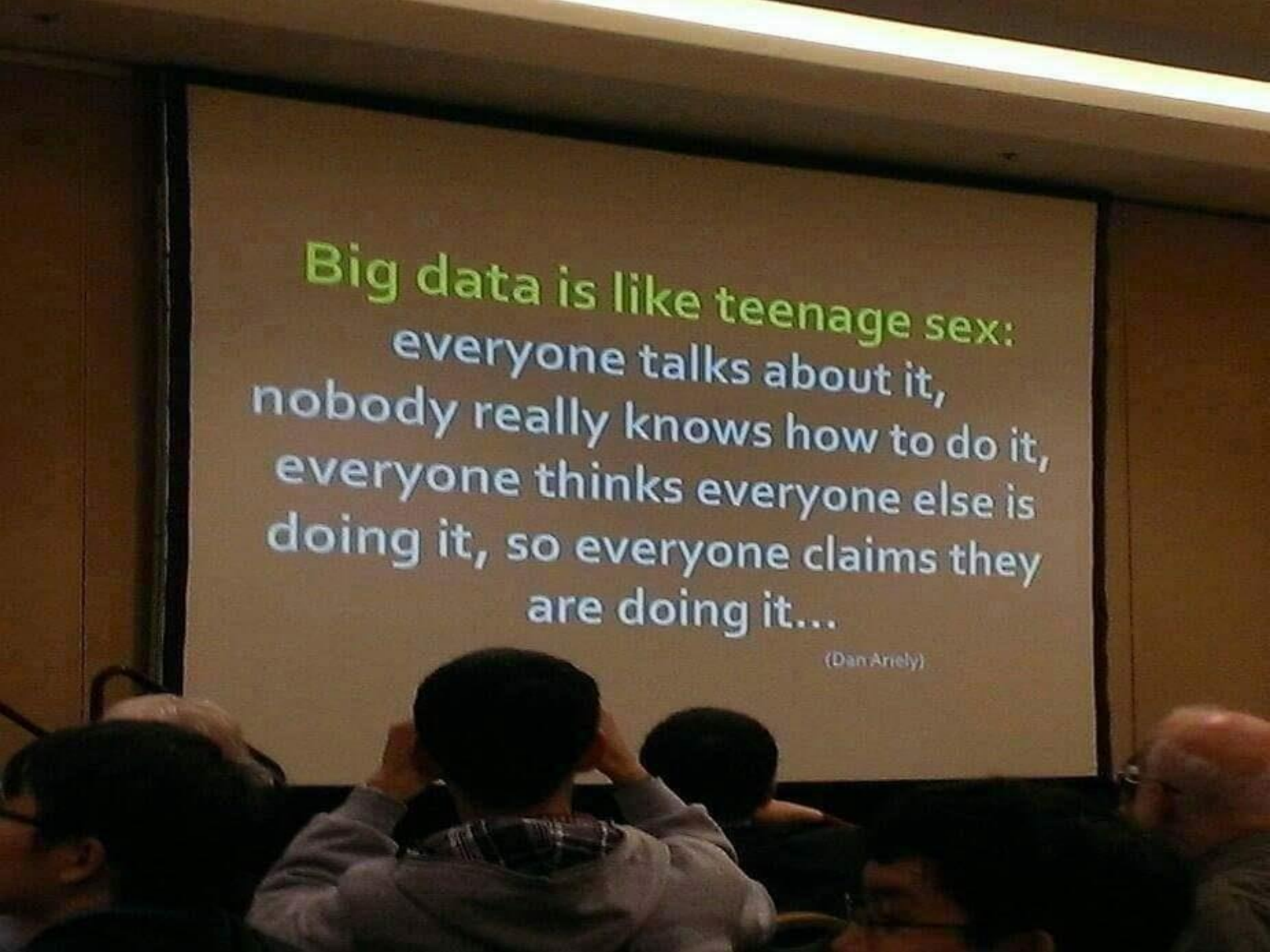
Control

BIOSECURITY


Big data is like teenage sex:
everyone talks about it,
nobody really knows how to do it,
everyone thinks everyone else is
doing it, so everyone claims they
are doing it...
(Dan Ariely)

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Control

- Essential components for Biosecurity

- Bird proofing
- Limit access
- Pest control
- Water source
- Staff buy in

- No exceptions

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Control

- Each farm is different
- Need to observe your operation
- Control for everything

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Control

- Vaccination
- Eradication vs Control

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Control

- Vaccination
- Vaccination does not eradicate the disease

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Control

- Vaccination
- Con's
  - Invisible disease - uncontrolled spread
  - Risk to human health
  - International trade barriers

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Control

- Vaccination
- Pro's
  - Prevent catastrophic financial losses.

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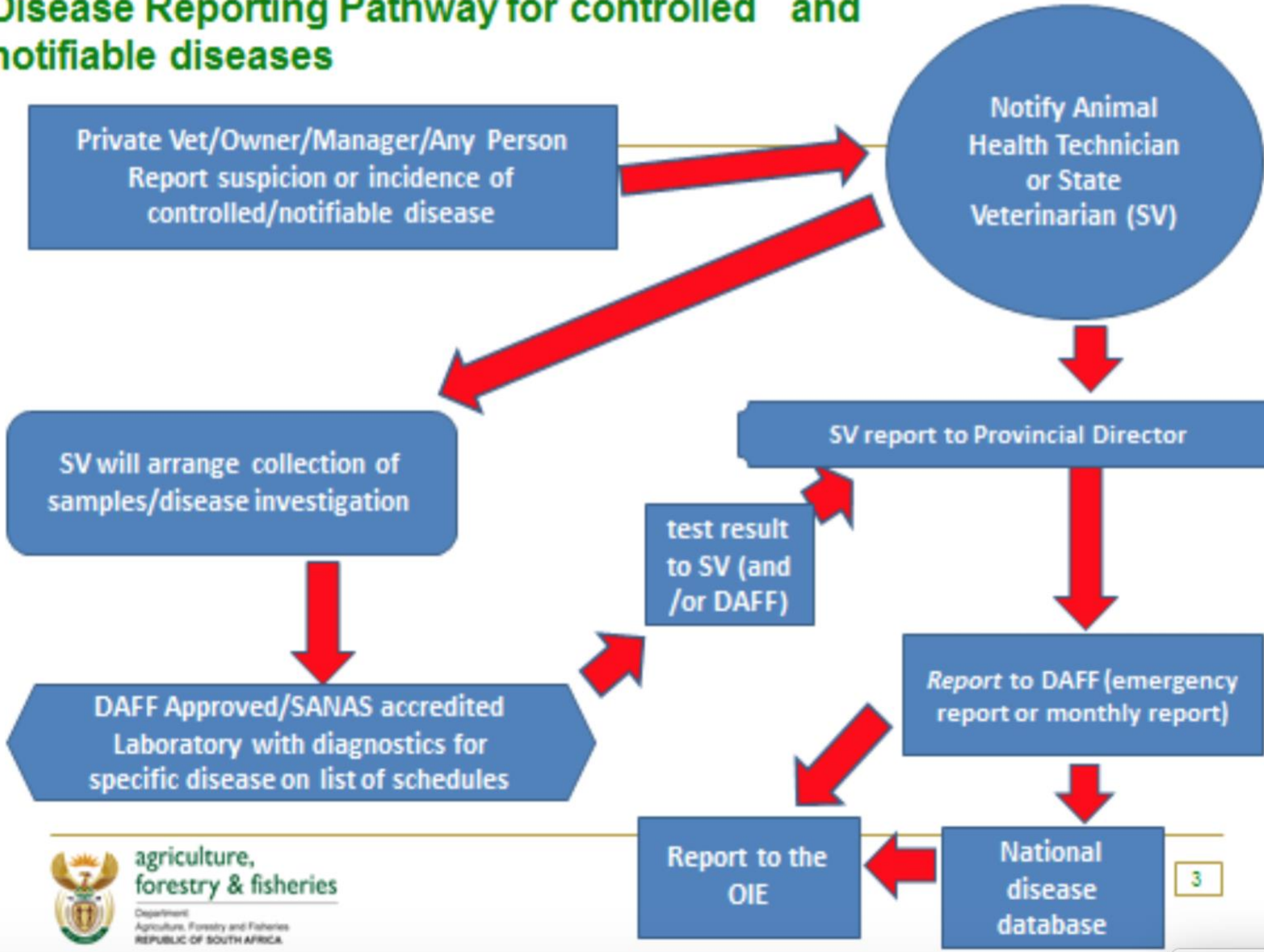
Problem Areas

- Not knowing where all of the farms are
- How to kill the birds
- Where to dispose of them
- Relationship with government
- A co-operative industry

Disease Reporting Pathway for controlled and notifiable diseases



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Conclusion

- Extremely complex and dangerous virus
- Global disease that spreads faster than any other
- Capable of causing human deaths
- Current aim is eradication
- Biosecurity
- Need good relationships and plans