



# Anthrax

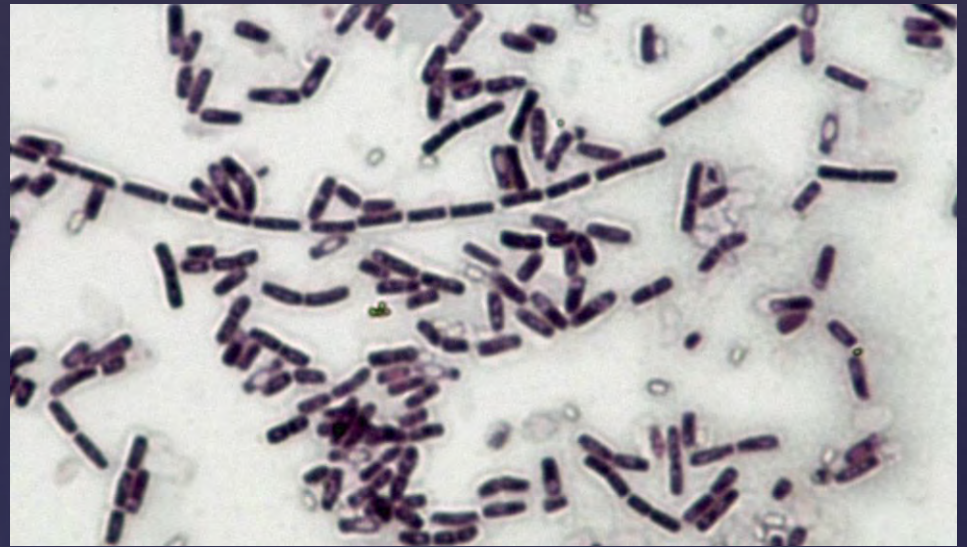


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# Anthrax

## Causative agent:

- a spore forming bacterium: *Bacillus anthracis*
- 2 stage lifecycle
  - Inactive highly resistant stage (spore) – forms when vegetative stage is exposed to air,
  - Spore form can remain viable in soil or carcasses for decades.
  - Growing (vegetative) stage requires anaerobic conditions and produces toxins.
  - Toxins cause damage to blood vessels resulting in lack of blood clotting, oedma, and toxic shock.



# Anthrax

## Status:

- Endemic disease in Australia – ‘Restricted Matter’ under Queensland Biosecurity Act 2014.
- Suspected or confirmed cases in animals are notifiable to Queensland DAF (CVO).
- Significant zoonotic disease – the disease in humans is notifiable under Queensland Health legislation.

# Anthrax

## History and distribution:

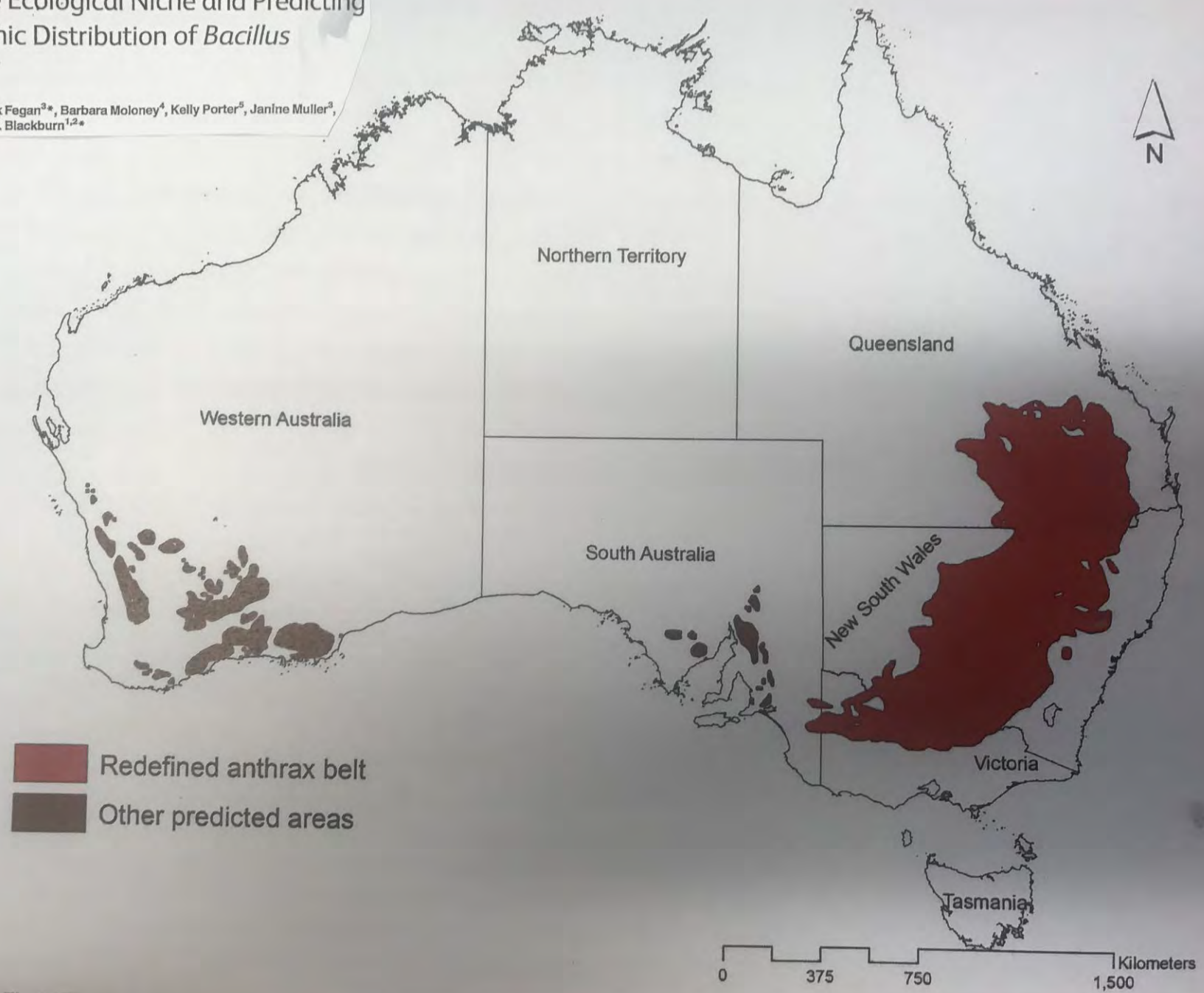
- First recognised in NSW in 1847 and has been responsible for serious stock losses in earlier years, but widespread use of vaccine has resulted in smaller sporadic outbreaks since then.
- Disease cases have occurred historically throughout a zone extending from the Victorian/ NSW border through central NSW to just above the Queensland / NSW border (the Anthrax Belt).
- Bacterium prefers neutral to slightly alkaline soils, rich in calcium and nitrogen, and which have periodic inundation, which favour its multiplication.
- More common in areas where the average rainfall is between 200-500mm of rainfall per year.
- Last case in Queensland occurred in 2002



**Figure 1: The Anthrax Belt – for the last 50 years almost all cases of anthrax in NSW have occurred within the highlighted region termed the ‘anthrax belt’.**

# Redefining the Australian Anthrax Belt: Modeling the Ecological Niche and Predicting the Geographic Distribution of *Bacillus anthracis*

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# Questions?



# Anthrax

## Susceptible species:

- Most susceptible hosts are herbivores, particularly cattle, sheep, goats and horses.
- Moderately resistant species are omnivores – pigs and humans.
- Most resistant species are carnivores – dogs and cats.



# Anthrax

## Transmission:

- In herbivores the disease is contracted by ingestion of infectious spores while grazing contaminated pasture or contaminated hay.
- In pigs and carnivores (rarely) the disease is usually contracted by the consumption of contaminated herbivore carcasses.
- In humans (in Australia) the disease presentation is usually cutaneous, caused by direct contact of abraded skin with contaminated material (wool sorters disease), which causes a 'malignant carbuncle'. This occurrence is now rare in humans in Australia.
- In less developed overseas countries, human fatalities occur following ingestion of contaminated food or more rarely inhalation of contaminated dust.

# Anthrax

## Clinical disease:

- Incubation period: usually 4-7 days but may be longer (up to 10 days in uncommon cases).
- Most common presentation in herbivores (especially ruminants) is the peracute case – sudden death with no observed clinical signs.
- A few animals may be seen immediately prior to death and may show, fever (39-40 degrees C), dyspnoea, convulsions and muscle fasciculation.
- Pigs may develop dyspnoea, marked oedema of the head and throat and may subsequently die in 2-7 days, although many may recover.

# Anthrax

## Post Mortem signs:

- Usually sudden death with no evidence of struggling.
- May have no *rigor mortis*.
- Rapid bloating and decomposition of carcass.
- Lack of blood clotting results in dark, tarry, bloody discharges from all orifices.
- Urine may be blood stained.
- Internally, the carcass may show extensive haemorrhages and the spleen is usually enlarged (cattle) dark and black (blackberry jam consistency if cut open).
- **NOTE: DO NOT CONDUCT A POST MORTEM IF ANTHRAX IS SUSPECTED!!!!**

## Anthrax in Queensland: 2002 – 2018.



11/23/2014 4:39 pm



49

Bollon

St George

Nindigully Pub

85

Dirranbandi

55

46

46

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Google earth

28°17'34.00" S 148°03'20.75" E elev 185 m eye alt 198.93 km







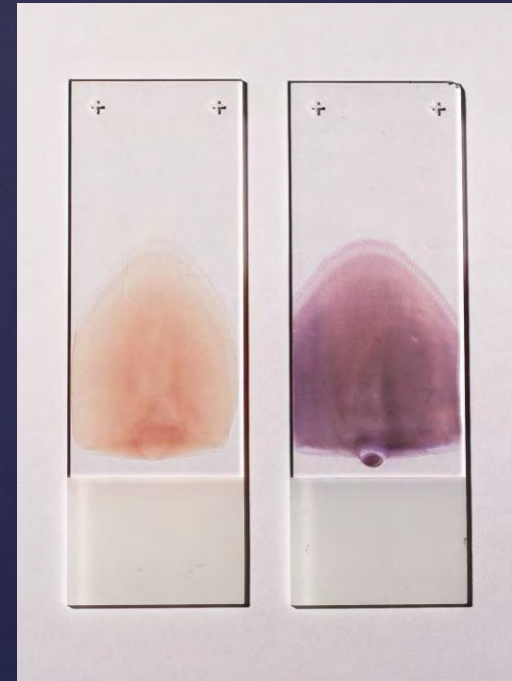


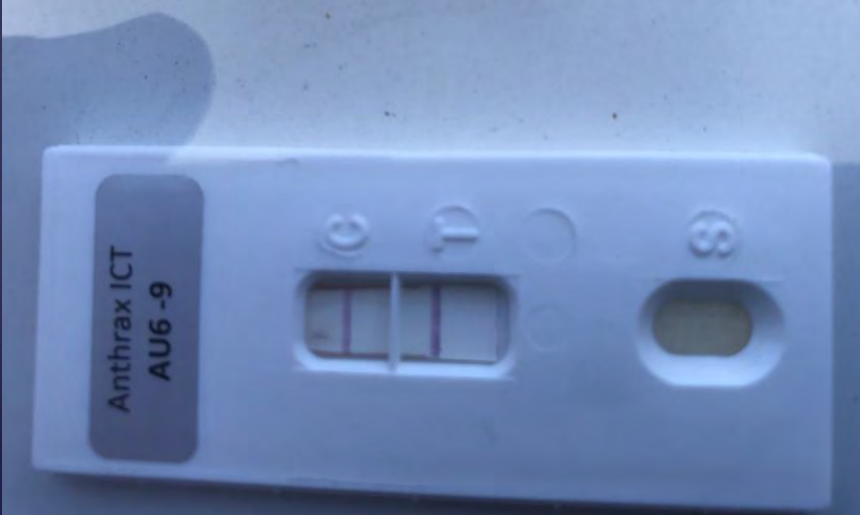


# Anthrax

## Diagnosis:

- Case history:
  - Sporadic incidents of sudden death in ruminants in historical anthrax zones, often ongoing deaths, which may be otherwise unexplained. Differentiate from other causes such as botulism, or toxic plants.
- Case presentation:
  - Bloated carcasses with rapid decomposition and bloody discharges from orifices.
- Laboratory testing:
  - Blood smears from peripheral vessels – stained for microscopy.
  - Bloody discharges – PCR and culture.
- Penside tests: lateral flow devices.



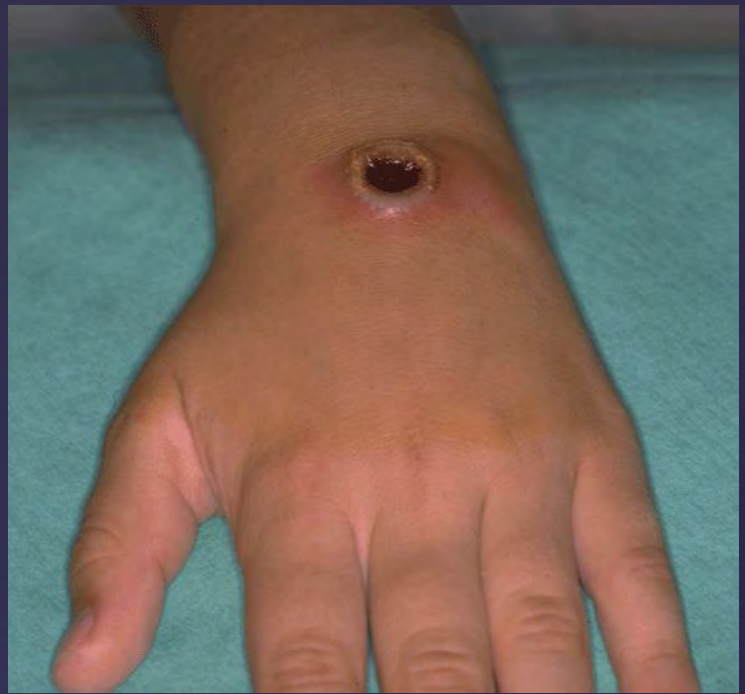


# Questions?

# Anthrax

## Cutaneous disease in humans:

- Due to contact of abraded skin or wounds with contaminated material .
- Development of a 'malignant carbuncle' –
  - Commences as a papule (pimple or small swelling) which develops into a blister.
  - After 2-6 days the blister becomes necrotic and forms a black hard raised scab (eschar),
  - This may be surrounded by a ring of small blisters, and significant swelling and inflammation,.
  - The lesion is usually painless due to the toxic effect on local nerves.
- Untreated cutaneous anthrax is progressive may cause systemic septisaemia and may be fatal.
- Prevention: PPE & hygiene.
- Treatment: antibiotics (penicillin and doxycycline) are very effective.





# Anthrax

## Prevention :

- Awareness of anthrax prevalence and distribution (anthrax belt).
- Hygiene and care in sourcing replacement stock and feed (hay).
- Vaccination of susceptible at risk animals using the Sterne 34F2 live vaccine.
  - CVO approval required to purchase
  - Dose rates are 1.0 ml s/c in cattle (approximately \$5.00 per dose) & 0.5 ml s/c in sheep (approximately \$2.50 per dose).
  - Withholding period for slaughter of vaccinated stock for human consumption = 42 days.



# Anthrax

## Control:

- Movement restrictions to prevent the movement of animals which may be incubating the disease and to prevent the movement of contaminated feed, equipment or vehicles.
- Vaccination of susceptible at risk stock.
  - Immunity is deemed to be effective (under legislation) 20 days post vaccination.
  - Immunity usually develops more rapidly than this with protection of at risk stock usually after 7-10 days (cessation of mortality).
- Destruction of carcasses to reduce contamination of the death site with spores.
  - Preferred method is to totally burn carcasses in situ and bury the ash.
  - Carcasses should not be disturbed or moved unless absolutely necessary.





# Questions?

## Passive General Surveillance Programs in Queensland:

- Biosecurity Queensland has a national obligation to conduct surveillance for national notifiable animal diseases and other diseases and pests of concern. As discussed, passive general surveillance is surveillance capable of detecting any disease, pathogen or pest.
- Passive General Surveillance for notifiable diseases and pests, relies on routine reporting, investigation of case information and testing of laboratory samples from cases which have been investigated or submitted for other reasons.
- Most commonly this occurs as a result of a disease investigation where a non-notifiable endemic disease is suspected. These investigations may be conducted by Private Veterinary Practitioners (PVPs), DAF Veterinary Officers (VOs) or appropriately trained Biosecurity Inspectors.
- Timely and thorough disease investigations are critical for the early detection of exotic and emergency diseases, such as Foot and Mouth disease (FMD), the spread of which could have a devastating impact on Australia's livestock industries and our way of life.
- Investigations need to be backed up with high quality laboratory submissions to allow definitive testing in order to rule out a notifiable disease or pest.
- Effective communication between the producers, PVP, VOs and the Laboratory is essential to ensure that everybody is informed of the outcomes of a disease investigation in a timely manner.



## Queensland's Veterinary Laboratory Submission Program:

- The Queensland Department of Agriculture and Fisheries (DAF) Biosecurity Sciences Laboratory (BSL) offers a **fully subsidised laboratory testing system for submissions** from cases where notifiable diseases or other diseases of concern are suspected to be involved.
- PVPs are welcome to submit case material for diagnosis, alongside of submissions from DAF Veterinary Officers, Biosecurity Inspectors and producers.
- DAF is prepared to provide this fully subsidised service, which has very generous interpretation of cases submitted to exclude notifiable diseases, because we recognise that PVPs and their clients are primarily dealing with non-notifiable endemic animal diseases and pests, and that a regular submission of these samples will allow increased likelihood of the detection of a novel or sporadic notifiable disease, pathogen or pest.
- This a **“Win /Win”** for the producer, the PVP and for Biosecurity Queensland.



# Questions?



REAL DOCTORS TREAT  
MORE THAN ONE SPECIES



## BQ Vet Contacts:

### CVO:

Allison Crook:

### Deputy CVOs:

- Mark Cozens PVO (Emergency Response):
- Nina Kung PVO (Epidemiology & Poultry):

### Field Operations:

- Jonathan Lee PVO Toowoomba:
- Greg Williamson SVO Townsville:
- Rachel Bowater SVO (Aquatics) Tvl:
- Barry Robinson SVO Mackay:
- Derek Lunau SVO Rockhampton:
- Binendra Pratap SVO (TSE) Brisbane:
- Louise Mullemeister SVO Roma:
- Sandy Adsett VO Toowoomba:
- Renee Thompson VO Nambour
- Guy Weerasinghe VO Nambour

### Policy:

- Lawrence Gavey PVO (BJD & Endemics):
- Janine Barrett PVO (Surveillance & TSE):

### Lab:

- Louise Jackson (Manager BSL):

### Tick Fever Centre, Wacol:

- Phillip Carter SVO:
- Peter Rolls SVO:

### Residues:

- David Pitt SVO Bundaburg:



## Passive General Surveillance Programs in Queensland:



**Good surveillance systems sometimes find the most unexpected things!**