

Climate change - increasing animal health risks in Australia

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Disease risks are increasing

Human population / wealth increases lead to

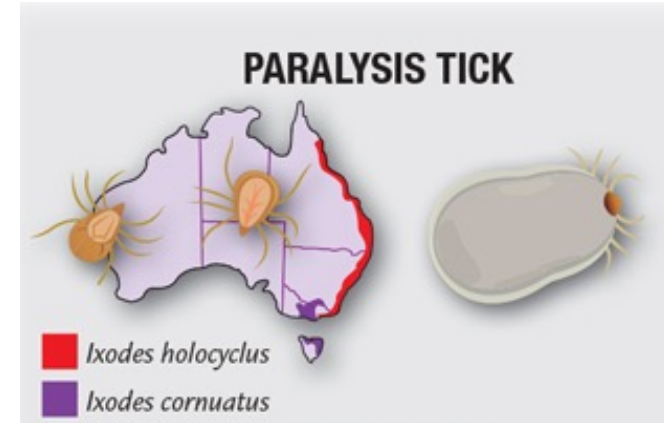
- **More trade & travel** complexity and volumes
- Intensification of **food production**
- Impingement on **wildlife ecosystems**
- **Climate change due to more emissions**

Concurrent emergencies

- e.g. **COVID-19 + weather emergencies**
+ old and new disease epidemics

Insects know the climate is changing

- **Many insects spread animal and human diseases – One Health**
 - mosquitoes, midges, biting flies and ticks
 - increasing their range in Australia (and elsewhere).
- **Warmer, wetter conditions favour**
 - spread to higher latitudes and altitudes
 - longer risk seasons
- **e.g. Paralysis ticks *Ixodes holocyclus***
 - can kill dogs, cats and small children
 - in the 1970's its southern range stopped at Sydney Harbour Bridge
 - now down to Gippsland in Victoria.
- **Many ticks and tick-borne diseases extending their range northwards in North America and Eurasia.**



Exotic animal diseases getting closer

- 2 devastating insect-borne exotic animal diseases, lumpy skin disease of cattle and African horse sickness, have spread to SE Asia.
- Both would have serious animal health and welfare impacts, as well as major trade implications, and require very expensive vaccination and movement control if they arrived here.
- Their insect vectors regularly blow into N Australia via monsoons.
- If they enter, climate change will make extensive southern spread more likely.

Lumpy skin disease – cattle and buffalo

Highly infectious, generalised skin poxvirus disease

- Spread mainly by biting flies, mosquitoes and ticks
- Effective live attenuated vaccines available

On the move!

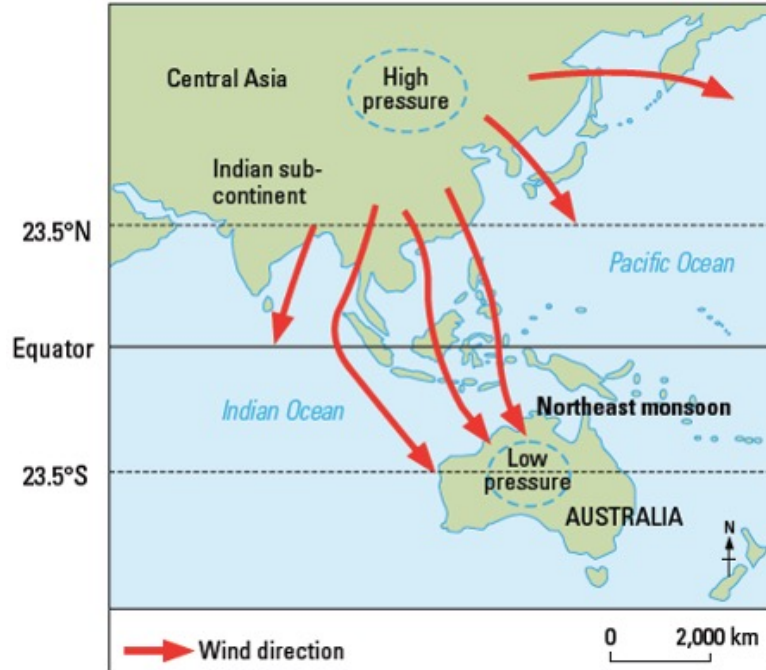
- Before 2012 - limited to Africa and Israel
- 2012-18 - Middle East, SE Europe, Russia and Kazakhstan
- 2019-21 - Bangladesh, China, India, Nepal, Taiwan, Bhutan, Vietnam, Myanmar, Sri Lanka, Thailand, Cambodia, Malaysia, Laos
- 2022 – Indonesia – Riau (Feb), Sumatra (March)



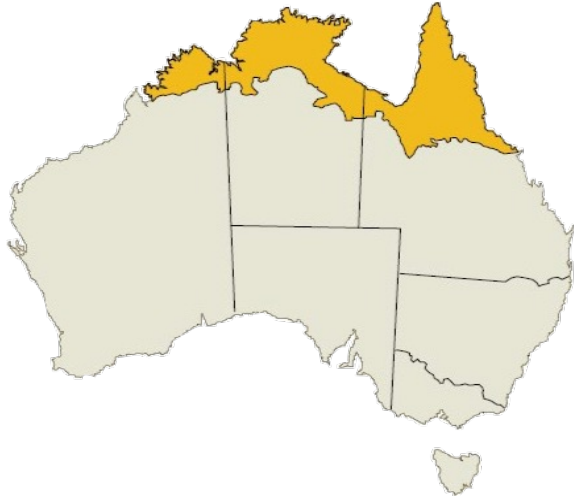
**Future?? – Rest of Indonesia, Timor-Leste, PNG,
Australia ??**

Northeast Monsoon – October to May each year

In 2022, could have blown LSD-infected insects across the Malacca Straits from southern Thailand and Malaysia to north and central Sumatra.



Feral water buffalo occur in suitable wetland habitats across tropical northern Australia (DEW 2004)



NT buffalo pop'n

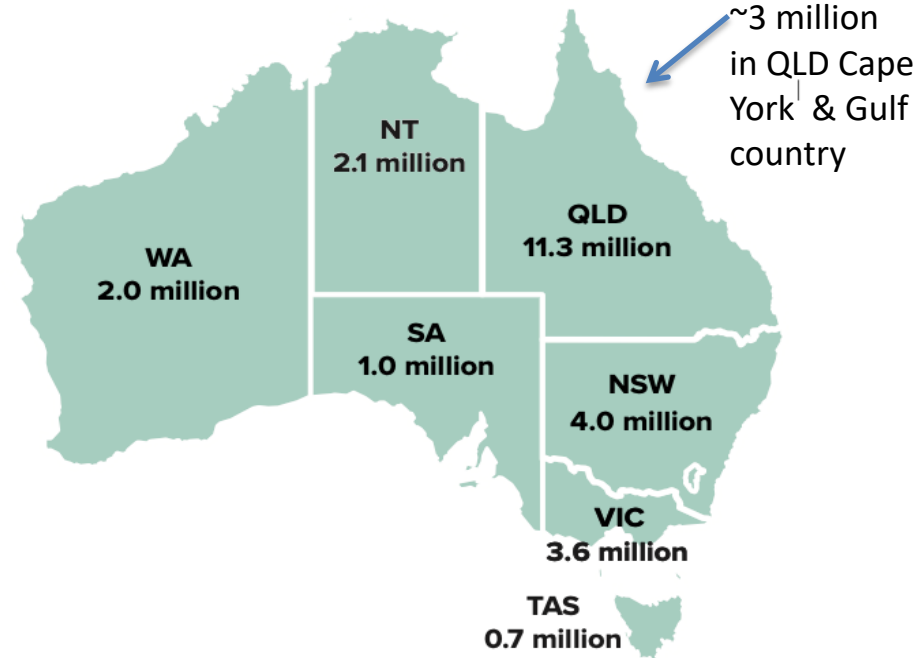
1980 - >300,000

1992 - ~ 30,000 (BTEC)

2008 - ~150,000

Cattle distribution in Australia 2019 (MLA)

**National cattle numbers:
25 million head**



African Horse Sickness

Causes mortality - in **horses 70-95%**, **mules ~ 50%**, **donkeys ~ 10%**

Only subclinical or mild infection in zebra and African donkey

Vaccines available from South Africa

- Live, attenuated, strain-specific or polyvalent
- May be teratogenic - not yet registered in Australia

Australia has

- **~ 5 million feral donkeys** in central Australia, Kimberleys & Top End
- **~ 400,000 feral horses**
 - the world's largest wild horse population expanding in Alps, parts of QLD, NT & WA
- **~ 1 million owned horses** with **~ 400,000 owners**
- **Horse & donkey culls highly sensitive.**

African Horse Sickness spread in SE Asia

Thailand

March 2020 1st ever AHS outbreak in Asia

– due to **import of zebras from South Africa**

April – July 2020 vaccinated horses within 50Km of outbreaks in 7 provinces

Aug – Sept 2020 – new cases in horses and zebras

Malaysia

September 2020 - 1st cases in horses in Terengganu
- horses destroyed, no further cases reported.



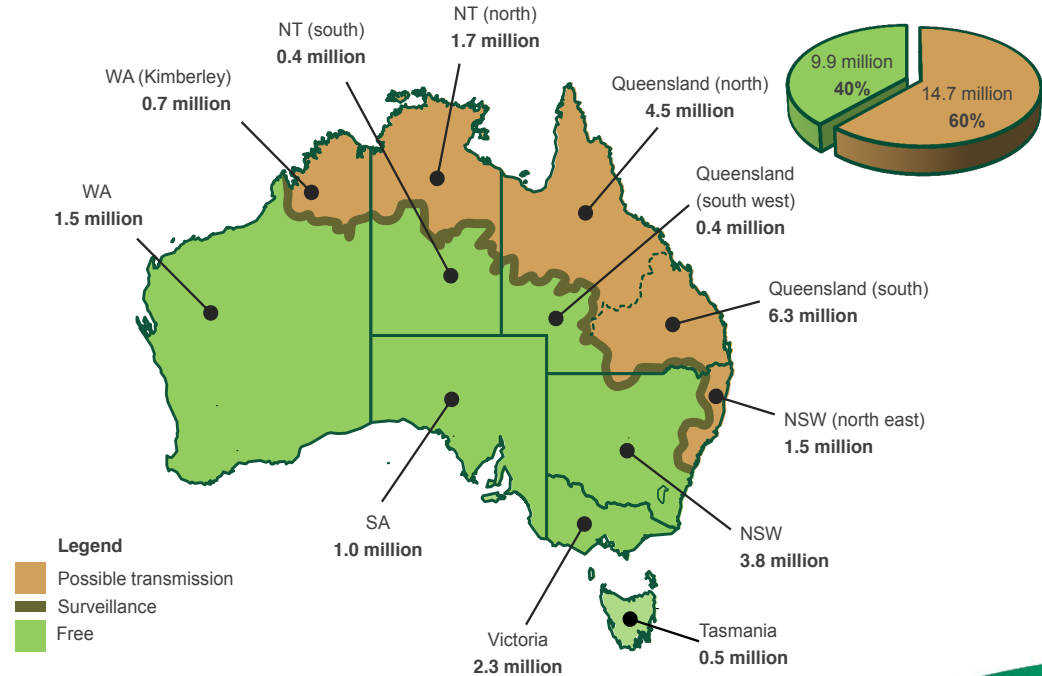
AHS & Bluetongue virus (BTV) both spread by windborne *Culicoides* midges feeding on hosts



National Arbovirus Monitoring Program (NAMP)

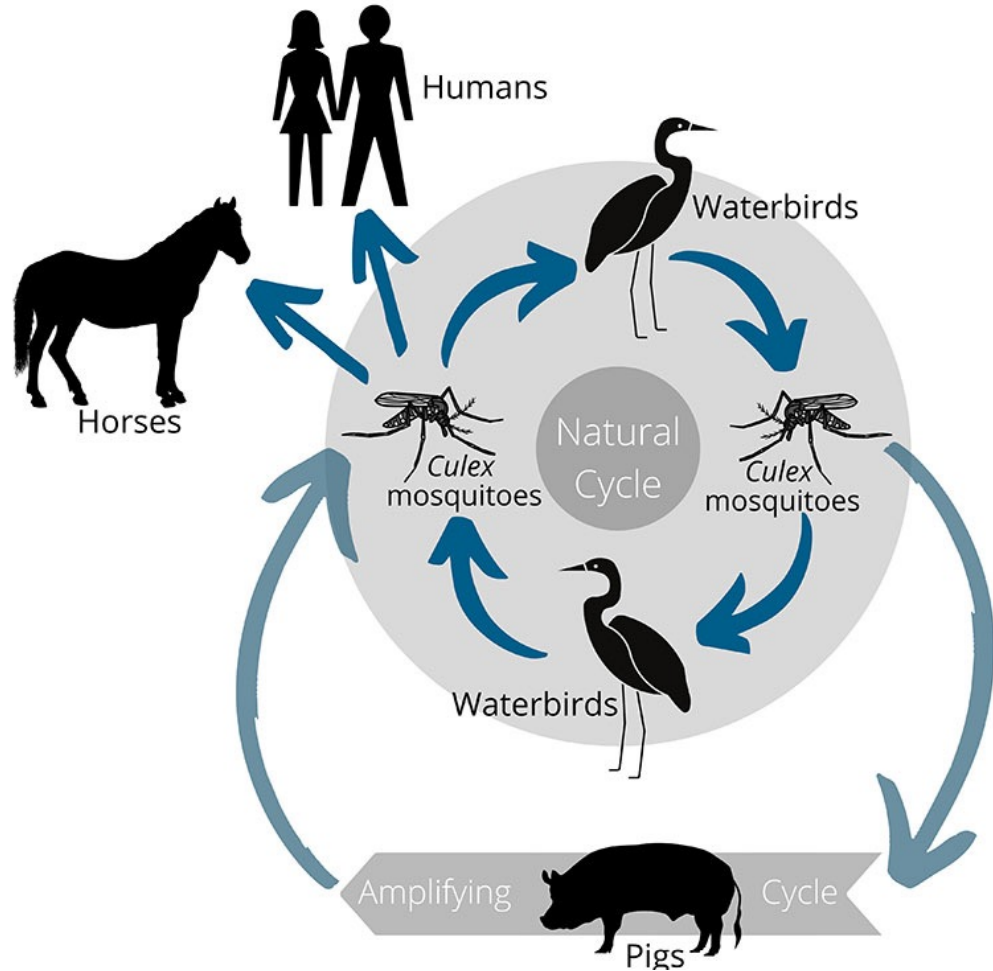
- supports live cattle exports by defining BTV-free areas
- finds BTV strains in midges and in sentinel cattle
- new strains blown from SE Asia in rainy season
- **southern limits extending**

Beef cattle herd*: Blue Tongue Virus Zone



* Herd based off June 2015 ABS estimate. Excludes dairy cattle.
Regional herd numbers are MLA estimates.

Japanese encephalitis disease spread pathway



Clinical signs of JE

- **Humans and horses** – from asymptomatic up to more severe encephalitis and death
- **Pigs** - ~20% piglets mummified, stillborn or weak
 - encephalitis in piglets up to 6m old
 - Some boars become infertile from testicular inflammation.

Japanese encephalitis in Australia

Previously tropical

- Annual health surveillance of N Australia found
 - 1995** - JEV in 3 people in the Torres Strait Islands
 - 1998** - 2 further human cases in Queensland, one person infected on Australian mainland

2022 – JE leapt far to the south down to Murray River corridor.

- JE cases found in QLD, NSW, VIC, SA, in
 - over 80 piggeries
 - 42 human cases - Qld 5, NSW 14, Vic 14, SA 9
 - 4 human deaths – 1 in each state

2023 – 3 more human cases so far – 1 in NT

- JE found in feral pigs in NT, northern WA and QLD, SA - **now endemic**

2022-23 was a third La Nina season!!

Risk mitigating factors

- **For LSD**
 - Virus is carried mechanically by vectors and does not replicate in them, greatly lowering the risk of long-distance transmission.
 - Cattle vaccine being used in Indonesia.
- **For AHS** – v. low horse and donkey populations in most parts of Indonesia – however, virus does replicate in *Culicoides spp.*
- **For JE** – Australian pig vaccine being developed.

Preparedness is essential

- **Risk assessments** regularly revisited
- **Vaccines** assessed, approved and available
- **Surveillance** for early warning & detection
- **Climate action** for long-term risk reduction

Thank you